FPUD JOB NO. 3095 – SMRCUP Construction

ADDENDUM D

June 26, 2019

Attention All Bidders:

This Addendum "D" includes clarifications and/or changes to the Contract Documents for the Fallbrook Public Utilities District, **Santa Margarita River Conjunctive Use Project Construction**

Clarifications and / or changes:

1. Per Addendum C, the District will receive sealed bids no later than July 10, 2019 at 3:30 pm.
2. In Notice Inviting Bids, change length of time bids are valid as follows, “Bids shall be valid for 60 calendar days after the bid opening date.”
3. All questions received are listed on the attached RFI Response Table. Those yet to be answered have been left blank. Those responses are under development and will be issued by June 28, 2019.
4. Note that responses to RFI’s #36, #56, and #114 have been revised since issued in Addendum B.
5. Revised drawings and specifications referenced in the RFI Response Table are provided as attachments to this addendum and include:

Drawing No.	Sheet No.	Drawing No.	Sheet No.	Drawing No.	Sheet No.	Drawing No.	Sheet No.
C-3	18	CD-1	60	P-31	115	700M-1	194
C-4	19	CD-2	61	200M-1	120	700M-2	195
C-6	21	CD-4	63	200M-2	121	700M-4	197
C-11	26	P-12	96	200M-4	123	GM-6	212
C-16	31	P-13	97	300M-1	126	GM-8	214
C-17	32	P-15	99	300M-2	127	PL-01	229
C-24	40	P-17	101	300M-3	128	400S-1	251
C-31	47	P-19	103	500M-1	180	400S-7	257
C-32	48	P-22	106	600M-5	188	700S-3	283
C-33	49	P-28	112	600M-7	190	700S-4	284
GFC-6	58	P-30	114	600M-9	192	GFS-8	292

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Electrical Drawings

Drawing No.	Sheet No.	Drawing No.	Sheet No.	Drawing No.	Sheet No.	Drawing No.	Sheet No.
GE-1	295	GE-25	319	600E-4	342	400I-3	366
GE-2	296	GE-26	320	600E-5	343	400I-4	367
GE-3	297	GE-27	321	700E-1	344	400I-5	368
GE-4	298	GE-27A	321A	GFE-1	345	400I-6	369
GE-5	299	GE-28	322	GFE-2	346	400I-7	370
GE-6	300	GE-29	323	GFE-3	347	400I-8	371
GE-7	301	GE-30	324	GFE-4	348	500I-1	372
GE-8	302	GE-31	325	N-1	349	500I-2	373
GE-9	303	GE-32	326	N-2	350	600I-1	374
GE-10	304	GE-33	327	N-3	351	600I-2	375
GE-11	305	100E-1	328	N-4	352	600I-3	376
GE-12	306	200E-1	329	N-5	353	600I-4	377
GE-13	307	200E-2	330	N-6	354	600I-5	378
GE-14	308	200E-3	331	N-7	355	600I-6	379
GE-15	309	300E-1	332	GI-1	356	600I-7	380
GE-16	310	400E-1	333	100I-1	357	600I-8	381
GE-17	311	400E-2	334	200I-1	358	600I-9	382
GE-18	312	400E-3	335	200I-2	359	600I-10	383
GE-19	313	400E-4	336	200I-3	360	600I-11	384
GE-20	314	500E-1	337	200I-4	361	600I-12	385
GE-21	315	500E-2	338	300I-1	362	700I-1	386
GE-22	316	600E-1	339	300I-2	363	GFI-1	387
GE-23	317	600E-2	340	400I-1	364		
GE-24	318	600E-3	341	400I-2	365		

Specification No	Title
02200	Earthwork
05311	Steel Metal Deck
06615	FRP Grating
09831	Acoustical Panels
11162	RO Equipment (Revisions Only)
11306	Horizontal End Suction Centrifugal Pumps
15100	Valves (General)
16280	Low Voltage Conditioning System

RFI #	RFI Question	RFI Answer
1	Will the services for testing and inspection of soil & material be separate from the proposal?	See response to Item 38.
2	Last day to submit questions	June 5, 2019
3	Please confirm a mutual waiver of consequential damages, as listed, will be inserted into the final contract documents: "In no event shall any Indemnified Party or the Contractor be liable to the other for any indirect, special or consequential damages (including, but not limited to, loss of profits, interest, earnings or loss of use) whether arising in contract, tort or otherwise."	No, requested change will not be made to the contract documents.
4	Please provide a reasonable cap for liquidated damages and confirm that they are the "sole and exclusive" remedy for delay.	No, requested change will not be made to the contract documents.
5	Please confirm that the District is the generator of all pre-existing hazardous material and will sign transportation manifests as such in the event that abatement is necessary.	Hazardous waste, if encountered, will be handled per Article 19 of the General Conditions.
6	Please confirm that the District will indemnify the Contractor for any loss, cost, expense, or fine related to any pre-existing hazardous material.	No, requested change will not be made to the contract documents.
7	Please reference the Guidelines for Meeting the California State Revolving Fund (CASRF) Programs (Clean Water and Drinking Water SRF) Disadvantaged Business Enterprise Requirements – Six Good Faith Efforts (GFE), Item No. 2. Please confirm that the solicitations for bids or proposals does not need to post for 30 calendar days in a row, but does need to be posted a minimum of 30 calendar days prior to the bid opening date.	Solicitations for bids or proposals needs only to be posted once, but a minimum of 30 calendar days prior to the bid opening date.
8	This email is sent to bring to your attention a DEFECTIVE SPECIFICATION for the SHEET METAL ROOFING on the project. Section 07610 Sheet Metal Roofing defines product that either does not exist or does not meet the performance requirements defined in its own specification.	**Make the following modifications to the Contract Documents** SPECIFICATION SECTION 07610 – SHEET METAL ROOFING 1. DELETE Section 2.1.B Entirely, REPLACE with B.Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M. 1.Zinc-Coated (Galvanized) Steel Sheet: Aluminum-zinc alloy-coated steel sheet, ASTM A 792, Class AZ50 coating designation, structural quality, Grade 50, 0.0236-inch minimum thickness. 2.Fire Resistance Rating: Comply with UL 263 and UL 790 Class A Fire Resistance Rating. 3.Wind Uplift Resistance: Tested according to ASTM E 1592 and in compliance with UL 580, Class 90 Wind Uplift, Construction #240. 4.Surface: Smooth, flat. 5.Width: 24" standing seam panels 6.Finish: PVDF Kynar 500 or Hylar 5000 7.Color: To be selected from full range of color available. 2. REVISE Paragraphs 2.5A.1 and 2.5A.2 to read: 1.Standing-Seam Roofing: Form standing-seam panels with finished seam height of 3 inch. Manufacturers: Metal Sales or Equal 3.DELETE Paragraph 2.5B entirely
9	Environmental and CEQA compliance component of this project. Will FPUD provide the archaeologists or will the contractor be responsible?	FPUD
10	Specification section 01150-1.3.A-6, describes a Bid Alternate to provide a Field Office as required in specification section 01590. It mentions the locations are shown on C-2 & C-27. Currently there is no bid alternate in the bid form for this, section 01590 only describes a printer/copier that the contractor is to provide, C-2 shows only the location and C-27 is a pipe profile that does not have any information on the field office. Please provide more information and provide direction so we can accurately account for the costs in our bid.	**Make the following modifications to the Contract Documents:** **I**n Specification Section 01150-1.3.A-6 DELETE all references to a bid alternative for a field office for the owner. On Drawing C-2 DELETE the callout for field office as (Alternative 4), and the corresponding leader line and foot print of the field office.
11	Is the PVC piping inside of the chemical trench classified as exposed? Does it require coating per specification section 09900?	**Make the following modifications to the Contract Documents** SPECIFICATION SECTION 09900 REVISE 2.4A. to read: System No. 41 - Exposed, Exterior (except PVC piping in trench):
12	Section 00490 - Bidder's List. From our previous experience, this bidders list page is something that is usually compiled and submitted 2-3 days after bid by the low 2-3 general contractors. It will be very difficult to assemble these documents for all bids received and get them submitted with the bid on bid day. Please confirm these can be submitted after the bid date. Also, the requirement to submit this form for all DBE and non-DBE subcontractors is unusual, this form is normally needed for DBE subs only. Please confirm this only needs to be submitted for DBE subcontractors.	District will not allow additional time to submit Bidder's List form. **Make the following modifications to the Contract Documents:** In Specification Section 00490 - BIDDER'S LIST, DELETE "or were contacted by Bidder/Contractor" from first sentence.
13	Please provide a specification for Metal Decking.	Specification Section 05311 - Steel Metal Deck is provided by addendum.
14	On drawing sheet C-16, note 2 on detail 1 states "Eliminate sleeve in core drilled walls. Epoxy coat entire core drilled opening". Please specify which epoxy system shall be used.	**Make the following modifications to the Contract Documents:** REMOVE NOTES 1 through 3 and REMOVE Note "Pipe through wall or floor, or ceiling, See Drawings" on Detail 1, Sheet C-16.

RFI #	RFI Question	RFI Answer
15	Does the truck loadout area require coating?	**Make the following modifications to the Contract Documents:** SPECIFICATION SECTION 09930 ADD after Paragraphs 1.1B.2.a.1) 2)Truck Loadout Area.
16	Specification sections 09651 - Resilient Floor Tile and 09653 - Resilient Wall Base and Accessories is included in the bid documents, but the finish schedules on drawings 400A-8, 500CWA-4 and GFA-4 do not show any tile flooring in any of the rooms listed. Please confirm resilient floor tile is not required in any location.	Confirmed. No resilient floor tile is required. Delete specification 09651-Resilient Floor Tile entirely. Resilient wall base is required for RB noted in the finish schedule on drawing 400A-8
17	Note 2 on C-3 states install 33'' Trenwa Chemical Trench, see DWG C-16. C-16 shows sections of the chemical trench, but no dimensions. Is the 33'' the depth or width? To inside or outside of trench? Also, on drawings C-6 & C-7 it appears portions of the trench are different widths. Please clarify the depth & width of all of the concrete chemical trench sections.	**Make the following modifications to the Contract Documents:** Drawing C-3, Construction Notes REVISE Note 2 to read: Install 33” Trenwa Chemical Trench. See C-16 and Specification 13340 PRECAST CONCRETE CHEMICAL TRENCHES. Drawing C-16, NOTES ADD Note 2 to read: See Specification Section 13340 PRECAST CONCRETE CHEMICAL TRENCHES. SPECIFICATION SECTION 13340 REVISE 1.8A to read: Acceptable manufacturers include Trenwa, Inc., Model BHC3024-120 STD, (1419 Alexandria Pike; Fort Thomas, KY 41075), or approved equal. ADD Paragraph 2.5A. after 2.4 to read: 2.5 LIDS A. Lids shall be concrete, AASHTO H20 Design
18	On page 3 of the contract documents, section 00100 - Notice Inviting bids, it states "Award of Contract: District shall award the Contract for the Project to the lowest responsible bidder as determined from the base bid plus alternates". On page 5 of the contract documents, section 00200-6 - Instructions to bidders it states " If alternate bid items are called for in the Contract Documents, the lowest bid will be determined on the basis of the base bid only, unless otherwise specified in the Notice Inviting Bids. However, District may choose to award the contract on the basis of the base bid alone or the base bid and any alternate or combination of the alternates". Please clarify what will be the basis of award.	**Make the following modifications to the Contract Documents:** SPECIFICATION SECTION 00200 REVISE Instructions to Bidders, Item 6 - ALTERNATE BIDS, to read: "...the lowest bid will be determined on the basis of the base bid plus all alternates. However..."
19	The Geotechnical report includes 1ea boring (B-14) at the Gheen Site which appears to be taken in a location where there is little earthwork to be done. The boring was done in an area that appears to have an existing surface elevation of EL 998.33. The work in this area requires earthwork that will remove roughly 6,000 Cy of dirt from that site, this work is done be cutting the existing grades down to EL 998. There is no subsurface information provided in the areas of work. Please provide additional geotechnical information in the cut areas of the Gheen Facility.	No additional geotechnical information is available.
20	We would like to request an additional site visit for Wednesday 5/8/2019 at 9:00am. Please confirm this date and time works to visit the plant site.	Per Addendum A, Optional site visit was scheduled for May 16, 2019 at 10:00 AM.
21	Has the district already notified the residents that live along the three pipeline alignments outside of the plant site?	Public information meetings were held during design, but specific construction notification has not occurred.
22	What is the last day to ask pre-bid questions?	See RFI#2
23	Please confirm when the section 00485 - DBE Good Faith Efforts Verification is due. From previous experience this is typically due 2- 3 days after the bid date, to give the contractor time to compile all of the information.	Due with bid, see RFI #12.
24	After reviewing the site it appears that is a good amount of piping, hoses, asphalt piles and miscellaneous debris that is currently onsite and not shown on the Demo drawings. Will all of this material be removed from the site before the contractor starts work?	Miscellaneous stockpiled materials not shown on the demo plans will be removed by the District.
25	Drawing GFD-1, note 8 states "Demo existing 1MG Martin Reservoir and attached structure". Please provide as-built drawings for reservoir and structure. If as-builts cannot be provided please provide a basis for contractors to assume in our bids.	Martin Reservoir record drawings provided as attachment to Addendum B.
26	Do the interior of the manholes for the Blow-Offs and Air-Valve assemblies require coatings?	Enclosures for air valve assemblies shall be polyethylene per the Approved Materials List. **Make the following modifications to the Contract Documents.** Section 09900 - Painting and Coating: ADD the following sentence to paragraph 3.11,E: Non-exposed surfaces of metal castings for valve well frames or blow off meter boxes shall be shop painted, black color.
27	Please confirm there is to be no standing seam metal roofing on the 2ea canopies at the Iron and Manganese Area and the Canopy at the Chemical Facility, only metal decking.	See response to Item 8.

RFI #	RFI Question	RFI Answer
28	Appendix B provided an Asbestos and Lead Paint evaluation for existing facilities that are to be demolished. Please confirm an Asbestos and Lead Paint evaluation was completed at the Gheen Facility for the existing Martin Reservoir.	No evaluation for the Martin Reservoir has been completed.
29	Drawing 700M-4 shows 4ea new Sluice gates and provides a detail. We have not been able to locate a specification section for these gates. Please provide a specification section, or at least a material type.	Gates are called out on revised Area 700M sheets.
30	1. When is the last day to submit questions?	See RFI #2.
31	2. Reference drawing GFC-1 Coordination Table Point 54 call out a catch basin location. Reference drawing GFC-2 note 5, shows no storm drain or drain lines come to or leaving this location. Please confirm Point No 54 on GFC-1 is to be a Catch Basin.	Confirmed, Point No 54 on GFC-1 is a Catch Basin with no inlet pipe (it captures surface runoff). Construct outlet pipe per elevation on GFC-1, Note 5 and extend to new catch basin at GFC-2 Point 32.
32	3. Reference Section 03200-2.1.A.4, "tie wire shall be Annealed Steel, 14 gauge minimum". The gauge specified doesn't work for the installation requirements of this project, we would request this to be revised to industry standards so and allow 16.5, 16 and/or 15 gauge wire where appropriate.	**Make the following modifications to the Contract Documents.** Specification section 03200-2.1 A.4 to read: tie write shall be Annealed Steel, 16 gauge or heavier.
33	4. Is there a requirement for wet or dry fire protection sprinkler systems in the RO Building, 500CW Pump Station and the Gheen Facility Pump Station?	Fire Sprinklers are not required for the buildings.
34	5. Specification Section 07810 - Unit Skylights, Manufacturers: Major Industries or equal, Basis-of-Design Product: Guardian 275® TransCURVE™ Curved Translucent Skylight System. a. The Specification requires to furnish Ice Blue sheet (colored) and qualifying a 70 ft-lbs requirement, which is not a problem. A windborne debris system, if it must meet large missile, will require a high impact exterior sheet, which meets 230+ ft-lbs and is only available in crystal or white. Please advise.	REVISED Specification Section 07810 - Unit Skylights par 2.2.A.5.b.4 to read Color: White
35	6. Reference Drawing G-6 FPUD Water Note 31, please identify which roads are "County-Maintained Roads".	Pipeline installation occurs in the following County Maintained Roads: Alturas Rd, Merida Dr, S Hill Ave, Almond St, S Mission Rd, Old Stage Rd, Palomino Rd between Old Stage to point where road width is reduced approximately 200 ft east of Emerald Ridge Rd, Palomino Rd between Morro Rd and McDonald Rd, McDonald Rd, Gum Tree Ln, E Mission Rd.
36	7. Along the Pipeline alignment, please identify which portions of pipe go through private roads and requirements within those areas.	Approximately Sta 69+25.00 to 86+00.00, Sta 200+30.00 to Sta 207+00.00 and Sta 303+00.00 to Sta 318+18.00. Pavement requirements per Spec Sections 02130 and listed related sections.
37	8. Reference Drawing D-1 Note 5, has the District started to coordination and application effort with SDGE to have the overhead service removed? If so, please provide a point of contact.	No
38	9. Reference Specification Section 00700 Article 16 and Article 26, notes District will pay for all inspections. Section 01400 states Contractor is to pay for inspections. Please confirm the District will pay for all inspection costs related to the project.	Specification Section 00700 Articles 16 and 26 are correct. Change Specification Section 01400 Paragraph 1.7.A.1 and 1.7.2 from "CONTRACTOR" TO "DISTRICT".
39	10. The pipeline alignment, both base bid and bid alternates, run through private roads. Some of the roads are in really good condition some in very poor condition. For the bases of bid, is the contractor to restore according to the District's standard details?	See RFI #36 & #95.
40	11. Please provide as-built drawings for the wet well and vault to be demolished on sheet D-2.	None Available
41	12. The side of the plant site looks to be leased to a farmer on the west side, what access are we required to provide them during construction? Will they be aware of the site safety (PPE) and SWPPP requirements for the project site?	Access to the nursery south of the site must be maintained throughout the project with coordination per the specifications. The nursery land is outside the limits of the work area and will not be effected by the project PPE requirements or SWPPP.
42	13. Drawing D-1 shows the demolition of the existing concrete storage bins. While at the site visit it is clear that these storage bins are full of various debris and aggregates. Will the district remove the contents prior to mobilization?	Yes
43	14. Drawing D-1 and D-2 do not show large quantity of pipe currently stored near the existing wet-well (also to be demolished), will the district remove the pipe and various mechanical items prior to mobilization?	Yes
44	15. Please define the parameters of what is considered "Rock Excavation".	"Rock Excavation" is defined in Section 02200, 3.10.
45	16. Sheet C-2 calls out a Bid Alternate 4, the current bid form only has 3 alternates. Please clarify what is required for Bid Alternate 4.	**Make the following modifications to the Contract Documents:** Drawings C-2: DELETE the call-out of the "Temporary Field Office for the District (Bid Alternate 4)" along with its leader line and footprint of the field office shown.
46	17. Which plant gate will be the construction entrance?	See dwg C-2
47	18. Will another site visit be allowed, who do we coordinate with?	See RFI #20
48	500S-6. 500M-1 to 500M-4 Drawing 500S-6 Detail 1 States the elevation at the bottom of the pump can is "per mech dwgs". But Mechanical Drawings 500M-1 to 500M-4 do not provide elevations for either the bottom of the pump can or the center line of any encased pipe. Please provide elevation information for the encase pipe at the pump station.	**Make the following modifications to the Contract Documents:** Drawing 500M-2, ADD 1. at the beginning of the note listed under NOTE: and ADD Note 2. that reads: Contractor shall coordinate depth of 24" PW and 12" PW PUMP SUCTION LINE with pump manufacturer of P-511 through P-514. See Specification 11110 VERTICAL TURBINE PUMPS.

RFI #	RFI Question	RFI Answer
49	400I-2 through 400I-7 Drawing 400I-2 indicates that drawings 400I-3 through 400I-7 should be used for RO trains 1, 2, and 3. Drawing 400I-3 shows instruments/valves with a pair of parenthesis next to the device indicating tags for the 2nd and 3rd trains. These parenthesis are missing for drawings 400I-4 through 400I-7. Should these drawings also be used for trains 2 & 3 and have these parenthesis indicating train 2 and 3 tags?	Tag ranges for all trains are shown on Drawing 400I-2. Numbers in parentheses on subsequent sheets are intended to help illustrate the ranges. The contractor should use those examples along with the ranges indicated on 400I-2 to determine tag numbers for Trains 2 and 3.
50	600I-1 through 600I- 11 Pumps P-601, P-603, P-605, P-611, P-621, P-631, P-641, P-651, P-661, P-671, and P-681 are shown on drawings 600I-1 through 600I-11. Each of these pumps have integral VFDs. There are also pumps P-602, P-604, P-606, P-612, P-622, P-632, P-642, P-652, P-662, P-672, and P-682 on these same drawings which do not show integral VFDs. Do these pumps require the VFDs?	Yes, controls for odd-numbered pumps as shown are "Typical" meaning the even-numbered pumps have the same controls. Controls for even-numbered pumps not shown for clarity.
51	700I-1 and GFI-1 Pumps P-700 and P-811 are shown on drawings 700I-1 and GFI-1 Both of these pumps have VFDs. There are also pumps P-701 and P-812) on these same drawings which do not show VFDs. Do these pumps require VFDs?	See response to Item 50.
52	GE-7, GE-21, GE-31 & GE-33 Luminaire Mounting Detail #17 (Drawing GE-31) shows both a light switch and GFCI receptacle. Circuiting as shown on Plant Sight Lighting (Drawing GE-7), A1 Panel Schedule (Drawing E-21) and Lighting Control Diagram #24 (drawing GE-33) does not account for this light switch or receptacle. Is this light switch to work in series with the controller module? Is this receptacle to be switched ? If receptacle is to be unswitched will additional circuits be required?	The switch is for energizing the receptacle when temporary source of 120VAC is needed.
53	GE-8 3/4" conduit quantity & size, on Conduit Schedule Line Item #132 is likely incorrect?	Change conduit size to 4 inches.
54	01150-1.3.A.6 Section 01150-1.3.A.6 includes a description for a Bid Alternative to provide for a Field Officer per Section 01590. This Alternative is not on the Bid Form. Please clarify	See Response to Item 10 in Addendum B.
55	01170, 01400, 01410 Section 01400-1.7.A AND 01410-1.1.a notes that the Contractor is responsible for all inspection, testing and testing laboratory services. Section 01170-1.3.B notes that the District shall furnish all materials testing and special inspections called for in the Contract Documents with exception of compaction testing for all bedding, backfill and soil compaction testing. Please clarify	See response to Item 38.
56	01600-1.37 Section 01600-1.37 notes the District, Engineer, etc. may attend factory witnessed testing at their option. Please confirm that all costs to attend the testing will be borne by the District with exception of retests clarified under 01600-1.37.H	Confirmed.
57	09900 Section 0990-1.7.B notes the District may reschedule the warranty inspection on Paint and Coatings to another day within the 2-year correction period. Per Section 00700, Art 53, the correction period on the project is 12-months. Please clarify	Specification Section 09900 1.7.B governs over Section 00700, Article 53. Two year correction period is required.
58	00700 Section 00700, Art 43 notes the Contractor is to provide a detailed estimate giving a complete breakdown of the Contract price within 10-days of award. Please confirm that the District is requesting a Schedule of Values and not a copy of the Contractor's estimate.	Confirmed, Schedule of Values per specifications
59	01115 Section 01115-1.4 provides interim milestone dates for all portions of the conveyance pipeline noting that each segment is to be completed within a 180-day duration within the first 360- days of the Contract. Please confirm that all portions do not need to be completed within the same 180-day period.	Confirmed
60	GE-8 & GFE-3 On drawing GFE-3, there are 3 Manual Motor Starters shown for a FCU, SF, and EF. These starters are on circuit 117. After referring back to GE-8 (cable schedule), it is determined these starters need to be NEMA Size 3. Is this correct?	The SF-1, EF-1 and FCU each has its own power circuit in LP. SF-1 and EF-1 are 1 HP and require starters. FCU has internal starter so just needs CB to provide power. FCU requires 240VAC instead of the 120VAC shown coming from Lighting Panel.
61	GE-8 & GFE-3 On drawing GFE-3, there are 2 Manual Motor Starters shown for MV-811 and MV-812. These starters are on circuits 107 and 108. After referring back to GE-8 (cable schedule), it is determined these starters need to be NEMA Size 5. Is this correct?	Conduits for MV-811 and MV-812 are shown on GFE-4.
62	Please consider extending the bid date by 3-4 weeks to allow enough time for additional examination of the existing facilities.	Per Addendum C, bids will be received until July 10, 2019 at 3:30 pm.
63	The technical specifications refer to “Substantial Completion” in various sections, however there is no mention of “Substantial Completion” in the General Conditions. Please provide a definition for “Substantial Completion” and describe how it is related to warranty start dates.	

RFI #	RFI Question	RFI Answer
64	Can FPUD please clarify the apparent discrepancy between the Specification and the General Conditions concerning material testing and special inspection services? In the Specifications SECTION 01400 1.7.A.1-2, 7 and SECTION 01410 1.1.A reads that “The CONTRACTOR shall provide all inspecting, testing, and testing laboratory services…” and “The CONTRACTOR shall be responsible for payment of all costs for inspection, testing, gathering samples and testing laboratory services…” But in the General Conditions under Article 26 the document reads “Costs for District testing and District inspection shall be paid by District. Costs of tests for Work found not to be in compliance shall be paid by the Contractor.”	See response to Item 38.
65	Concerning the General Conditions Article 25 (Excessive Noise), will the Contractor be required to set up noise and vibration monitoring? If so, will the cost for monitoring be born by the District or the Contractor and will such monitoring be required during the whole duration of the project?	No
66	In specification section 01039-1.6-2 - State and Federal Permits, there are three RWQCB permits listed that are the responsibility of the Contractor to obtain and pay for, the RWQCB permit for groundwater discharge, RWQCB General Permit No. CAS000002, and the RWQCB permit to discharge hydrostatic test water. These permits are required to be obtained by the land owner. Please clarify whether the contractor is required to obtain these permits, and if so, we suggest including an allowance to cover these costs.	See Article 22 of General Conditions
67	In specification section 01039-1.9-D. San Diego Gas & Electric - states "Contractor shall contact SDG&E to coordinate SDG&E review and acceptance of proposed pipeline design documents and construction schedule, prior to commencement of construction activities". Public utilities generally only deal with the property owners and designers and will not interact with Contractors. This doesn't seem like it should be the responsibility of the contractor, as they are not responsible for the design. Please confirm this will be done by FPUD or the design engineer.	**Make the following modifications to the Contract Documents:** SPECIFICATION SECTION 01039: REVISE paragraph 1.9.D.1 to read: "CONTRACTOR shall contact SDG&E to schedule their attendance at the pre-construction meeting and for all required inspections by SDG&E personnel, and to coordinate the installation, relocation, or protection of SDG&E utilities in accordance with work orders, standards or special requirements deemed necessary by SDG&E.
68	Note 5 on GFD-1, states "Contractor to Coordinate Relocation of Existing Telemetry Equipment", please clarify what is meant by "coordinate". Please confirm who is responsible to relocate the Cell Tower, additional infrastructure inside of the gated area, removing the gated area and concrete pad, and removing any underground utilities.	District has initiated coordination with cell site manager. Relocation work to be completed by cell company's Contractor. Schedule and access coordination between District's Contractor and cell company's contractor will be required.
69	Note 5 on GFD-1 states "Notify cell site manager at least 6 months prior to anticipated relocation". This will need to be removed at the start of the Gheen Site work. Specification section 01115 requires the Gheen site work including the 4MG reservoir to be completed in 360 days. There is not enough time to wait six months to remove the cell site and still complete the Gheen Site work. It is unclear if the intent is to keep the cell site functional during the work, please advise.	See RFI #68 & RFI #304.
70	Specification section 01150-1.5-B, states "all costs of inspection and testing performed during overtime work by the contractor which are allowed solely for the convenience of the contractor shall be borne by the contractor. The district shall have the authority to deduct the cost of all such inspection and testing". Please provide the hourly cost for inspection and testing during overtime work.	The hourly rate for District inspection is $150/hour.
71	Please confirm the flowing tanks indicated on Drawing 600M-1and in Chemical Storage Tanks Schedule on 600M-9 are to be fabricated per specification section 11179: Sodium Hypochlorite T-600 and T-601, Sodium Hydroxide T-630, Sodium Bisulfate T-610, Ferric Chloride T-650, Phosphoric Acid T-640 and Hydrofloursilisic Acid T-680.	The tanks shown on 600M-1 and on the Chemical Storage Tank Schedule on 600M-9 shall be manufactured per specification 11179, namely: T-600,T-601,T-610, T-630,T-640,T-650 and T-670. Additional tanks, not shown on 600M-1, are listed in specification 11179. See Specification 11179 for additional FRP tanks required.
72	Please specify type and size of grating for 2'-0" SQ sump shown on GFS-2	See FRP Specification 06615 issued by addendum.
73	Drawing 400M-3 indicates Sump Pumps P-490A and P-490B with LSHH-490, LSH-490, LSL-490, LSLL-490 and CP-490. Neither Drawing 400M-1 or 400S-1 indicate a sump in the pipe trench nor are they listed in Specification Section 11307. Please confirm that there is a sump in pipe trench in Area 400 located per 400E-3 and provide details for construction.	There are no sump pumps in the RO process building trenches. The trenches drain by gravity.
74	Drawing 400M-10 indicates a 36" tank manway on T-450 RO CIP tank whereas specification section 11379-2.1.B.2.f.6 lists a 24-inch flanged manway. Please confirm the tank manway for T-450 RO CIP tank is 24-inches.	**Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 11179 REVISE Paragraph 11179.2.1.B.f.6) to read: One 36-inch flanged manway.
75	Per 11179-3.2.B and .C, FRP tanks are to be installed on grout layer across the entire surface of the concrete base. Elevation 2 on 600M-9 indicates "4 to 5 layers of 30# felt paper beneath the tank" with 1/2" thick grout only at the tie down lug locations per Fiberglass Tank Tie Down Lug and Clip Detail 4/600M-9. Please confirm that all the tanks listed in the Chemical Storage Tank Schedule on 600M-9 and T-400 RO CIP Tank are to be installed per details on 600M-9.	Confirmed.
76	3.8 F. defines successful completion of the 14-day test as a requisite for substantial completion. Is there a specific number of calendar days from notice to proceed associated with substantial completion similar to the 720 days for Final Completion?	

RFI #	RFI Question	RFI Answer
77	Please provide a specification for FRP grating and supports.	See RFI #72.
78	Note 5 provides info regarding relocation of cell site and states to provide 6 months notice. This is likely a schedule issue and its highly recommended that FPUD proceed with this notification.	See RFI #68 & #304
79	Appendix A has provided a hazardous analysis of the shed to be demolished on site. Has there been an analysis done of the existing reservoir we are do demolish at the Gheen Site? If so please provide.	See RFI #28
80	Please reference specification section 09930. Part 1.1-B.1 of specification 09930 lists the Sodium Hypochlorite and Feed Areas as requiring an epoxy coating and floor topping. Per Part 2.1-A.1-f of the same spec section lists Sodium Hypochlorite under the section requiring a vinyl ester coating. Please clarify the type of coating that is required for the Sodium Hypochlorite and Feed Areas.	**Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 09930 **DELETE** Item 09930 2.1.A.1.f.1) · Sodium Hypochlorite (12.5%) ADD Sodium Hypochlorite (12.5%) 2.1.B.1.f.1)
81	Drawing C-6 thru C-13 all reference FPUD Std Dwg W-7A for 6" Blow-off Assemblies, however I cannot find a Detail W-7A in the details and W-7A is also not shown in the listing of details. The 4" Blow-off Assembly on Std Dwg W-7 & W-8 is shown using 4" DI Pipe & Fittings. Please advise if the 6" Blow-off Assembly uses 6" DI Pipe and Fittings or 6" CML & CMC Steel Pipe.	**Make the following modifications to the Contract Documents.** Drawings C-6 thru C-13: REPLACE all references to FPUD Std Dwg W-7A (6" Blow-Off Assembly, For Pressure Less Than 250 psi) with Std Dwg W-7 (4" Blow-Off Assembly, for Pressure Less Than 250 psi).
82	Are there any special PPE requirements that we need to be aware of in order to participate in the job walk?	No
83	The specification 15076-2.01.D4 states to use a 5" hand hole at the joint for cement lining repair unless directed by the district engineer. Will this hand hole be required and if so…will 2 hand holes be required due to the size of pipe?	**Make the following modifications to the Contract Documents.** FPUD Std Spec Section 15076: REVISE Paragraph 2.01.D.4 to read: 5-inch minimum diameter hand holes shall be required, unless directed otherwise by the District Engineer, to facilitate interior lining repairs at all joints. Provide one hand hole for 16-inch and smaller diameter pipe, and two handholes for 18-inch through 30-inch diameter pipe. Pipe larger than 18-inch diameter shall receive interior joint lining via entry into the pipe.
84	In section 1 and 2 on drawing sheet 200M-4 there is a buried 6'' airline shown that doesn't match the P&IDs. It appears that the entire airline should in installed above grade and that maybe this buried portion should be removed. Please confirm	**Make the following modifications to the Contract Documents.** There is no buried air line. See revised Sheet 200M-4.
85	Section 11500, Paragraph 2.6 A.1., requires tank roof to be knuckled, but drawings do not show a knuckle. Please clarify.	Tank roof to be knuckled per Section 11500.
86	Section 11500, Paragraph 3.4 D., requires lapped tank roof plates to be seal welded, but does not address if roof plates need to be welded to roof support rafters. Please confirm roof plate does not need to be welded to rafters.	Roof plates shall be seal welded to support rafters.
87	P&ID Sheet No. 373 details a Sample Pump SA-8 drawing off of the PW pipeline. That pump is not included in the Sample Pump schedule in Specification Section 11303. Please advise if this pump is to be included in this project.	**Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 11303 REGENERATIVE TURBINE PUMPS **DELETE Table under Item 2.1.A and REPLACE it with the following** Sample Pump Area 500 Sample Line SA-5 Pump Tag P-351, Sample Line SA-6 Pump Tag P-352, Sample Line SA-7 Pump Tag P-353.Sample Line SA-8 flows by gravity.
88	P&ID Sheet No. 365 details sump pumps P-409A/B with a control panel and they are not included in the Sump Pump and Motor schedule in Specification Section 11307. Please advise is these pumps are to be included in this project.	See RFI #73.
89	The following tanks are detailed on the P&ID and Mechanical drawings but are not included in the tank schedules in either Specification Section 11179 FRP Tanks or 11600 Steel Chemical Tanks: T-600 & T-601 shown on P&ID sheet no. 374; T-610 shown on P&ID sheet no. 377; T-630 shown on sheet no. 379; T-640 shown on sheet no. 380; T-650 shown on P&ID sheet no. 381 and T- 680 shown on P&ID sheet no. 384. Please provide a specification for these tanks if they are to be included in this project.	See chemical storage tank schedule on drawing 600M-9. T-600, T-601, T-610, T-630, T-640, T-650, T-670, and T-680 chemical storage tanks are FRP and should meet Section 11179. Section 11179 FRP Tanks list other tanks to be constructed under this specification. T-620 and T-660 chemical storage tanks are steel chemical tanks and should meet Section 11600.
90	Reference drawing G-6, FPUD General Note #11. What "cut-sheets" are to be provided at the preconstruction meeting?	**Make the following modifications to the Contract Documents:** Drawing G-6: DELETE the last sentence of FPUD GENERAL NOTE Number 11.
91	Reference drawing G-6, FPUD Water Note #22. This paragraphs states "The contractor is required to take precautionary measures to protect any existing facility shown hereon and any other which is not of record or not shown on these plans." What precautionary measures is FPUD considering the contractor to take regarding existing facilities that are not of record and not shown on the plans, and to what extent are these precautions to be implemented in areas where no existing utilities/facilities are shown on the contract drawings?	If the Contractor discovers existing facilities during construction the Contractor shall not adversely affect discovered facilities.
92	Reference specification section 01115-1.3.D. This paragraph requires materials, equipment and tools necessary to complete each MOFO to be on-site and verified by the ENGINEER seven (7) calendar days prior to any MOFO activity. If a piece of equipment to be used for a particular MOFO is not already onsite and will be rented just for the MOFO, this will add costs to the project to have that equipment delivered a week ahead of the MOFO. Please confirm that bids should include the costs for materials, equipment and tools to be delivered to the jobsite seven (7) days prior to a MOFO.	In Specification 01115 Paragraph 1.3D Sentence 2, change the material, equipment, tools necessary to complete each MOFO from 7 calendar days to 1 calendar day.
93	Reference specification section 01115-1.4.D.1. The time period listed has a numerical value of 6 and a word value of 8. Please clarify if this should be 6 or 8.	**Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 01115 CONSTRUCTION SEQUENCE AND COORDINATION Revise Paragraph 1.4.D.1 to read: 1. …within a 6 six hour period…

RFI #	RFI Question	RFI Answer
94	Reference specification section 01310-1.5.A. This paragraph requires the use of Primavera Project Planner (P3) to be used for the schedule. Please advise if Primavera P6 can be used.	Primavera P6 is allowed.
95	Reference specification section 01500-1.14.F. This paragraph states to “Repair existing roads and facilities damaged by CONTRACTOR’S use to original specified conditions or as directed by other Sections.” Is the intent to repair to original specifications, or to the existing condition of road(s) and facilities prior to beginning work?	Restore existing facilities to the condition that existed prior to the beginning of work.
96	Reference specification section 01500-1.18.C. This paragraph states to “Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.” Is the intent of this paragraph to restore these facilities to their original (new) condition, or to the existing condition prior to contractor beginning work?	See RFI #95.
97	Reference specification section 01500-1.19.A. Is the contractor to provide firefighting services in addition to, or in lieu of, the applicable fire department? Is the contractor responsible for minimizing fire danger on property not associated with the project, but located in the vicinity and surrounding area? If so, what is the expectation for “minimizing” fire danger?	Contractor responsible for fire damage resulting from construction operations.
98	Reference specification section 01545-1.3.A.5. This paragraph states “If CONTRACTOR damages an underground structure, CONTRACTOR shall restore it to original condition at no expense to the DISTRICT.” Is the intent of this sentence to restore these structures to their original (new) condition, or to the existing condition prior to contractor beginning work?	See RFI #95.
99	Reference specification section 02050-1.1.A. Please confirm that the DISTRICT (FPUD) will be the generator of any and all hazardous materials on the project.	See RFI #5
100	Reference specification section 15020-2.1.C. “Hangars subject to shock, seismic disturbances, or thrust imposed by the actuation of safety valves, shall include hydraulic shock suppressors.” Please identify which hangars these conditions apply to, where hydraulic shock suppressors need to be installed, to properly estimate the costs.	Make the following modifications to the Contract Documents: SPECIFICATION SECTION 15020 DELETE Item 15020 2.1.C and REPLACE with: "Pipe Hangers: Use of pipe hangers, supports and anchors shall be designed per Specification Section 01600 Item 2.1.2." Make the following modifications to the Contract Documents. SPECIFICATION SECTION 01600 ITEM 1.34.A. The first part of the second paragraph is changed to read: "Restraints for each piece of equipment including pumps, tanks, electrical panels and their supports and anchorages, and each piping system with associated supports, anchors and hangers and lateral restraints shall be designed by the Contractor with consideration to thermal expansion, wind, and seismic forces. Submit seismic design calculations and drawings stamped by a California licensed professional civil or structural engineer. All anchor bolts... " SPECIFICATION SECTION 01600 ITEM 1.34.C. REPLACE the paragraph to read: "Piping: All piping installed shall be anchored to the supporting floor, wall and supported by hangers or overhead system(s) or by other means to resist thermal, wind, vertical, and lateral seismic forces specified above without excessive deflection or pipe stress in compliance with ANSI/ASME B31.1 latest edition. Lateral seismic forces shall be considered acting at the center of gravity of the pipe under consideration. Piping with flexible connections and/or expansion joints shall be anchored such that the intended uses of these joints are maintained in the piping system.
101	Reference specification section 15020-2.1.D. Please identify which hangars the conditions of this paragraph (Hangars Subject to Horizontal Movements) will apply to, to properly estimate the costs.	See RFI #100.
102	Reference specification section 15020-2.1.E. Please identify all hangars which the conditions of this paragraph (piping subject to vibration or vertical expansion and contraction) apply to, to properly estimate the costs.	See RFI #100.
103	Reference specification section 15020-2.1.F. Please provide the locations/quantities of expansion loops or joints in order to properly estimate the costs.	See RFI #100.
104	Reference specification section 15020-2.1.I.2. Please clarify if FRP and/or 316 Stainless Steel material can be used for submerged supports. This section states “…constructed of fiberglass reinforced plastic and Type 316 stainless steel, unless otherwise indicated.”	**Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 15020 Item 15020 2.I.2 DELETE the words "within 24-inches of the water level" from the first sentence.
105	Reference specification section 15020-2.2.A. Please provide the pipeline locations where temperatures other than ambient are expected to occur.	Air piping will be significantly higher temperature than ambient downstream of the compressor. Most all of the piping will vary somewhat from ambient by several degrees. The Contractor shall consult with the equipment manufacturer to determine if significant heat is imparted from the equipment into the process stream necessitating special consideration of the piping or pipe support system design.
106	Reference specification section 15052-1.1.B.4. This paragraph references sheet G-11. Please confirm that this should read sheet G-5.	**Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 15052 Item 15052 1.1B.4.a through f., REPLACE G-11 with G-5.
107	Reference drawing no. 200M-1 and 200M-2, 24” INF line at the tank. Drawing 200M-1 indicates the BFV to be tag #FSV-205 and drawing 200M-2 indicates the BFV to be tag #V-203 on the section cut 2. Please confirm that this valve is FSV-205.	Confirmed. The tag number should read FSV-205. See revised sheet 200M-2.
108	Reference drawing no. 200M-3 and 200M-4, 6” Air Line at the Surface Wash Air Compressors. Drawing 200M-3 indicates an Expansion Joint coming off of the compressors, while drawing 200M-4 indicates these to be flexible couplings. Please clarify if these should be expansion joints or flexible couplings.	**Make the following modifications to the Contract Documents:** The joint is an expansion joint. See revised Sheet 200M-4.

RFI #	RFI Question	RFI Answer
109	Reference drawing no. 300M-3, Section 5, and Specification Section 15100, Partial Valve List Area 300. On drawing 300M-3, FCV-355 is located in the 6" BWS line. Specification Section 15100 listed this valve as being 4". Please confirm that this valve is 6" and not 4".	Confirmed. The valve should be 6". See expanded valve schedule by addendum.
110	Reference drawing no. 200M-3 plan view and drawing no. 200M-4, section 2. Drawing 200M-3 shows a 2" UW line running along the east side of the filters, but section 2 on drawing 200M-4 does not show this line. Please provide a section view of this line to determine its location.	See Drawing C-6 and C-7 for UW water line continuation. Depth of cover shall be per Section 15051.3.1.6.
111	Reference drawing no. 300M-3, Detail A. The 6" REC line coming off of the 16" IMT line has a note indicating a 3" 150 LB FLGD Outlet. Please confirm that this should be a 6" 150 LB FLGD Outlet.	Confirmed. Flanged outlet shall be 6".
112	Make revisions to Specification Section 17329 Primary Sensors and Field Instruments.	**Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 17329 PRIMARY SENSORS AND FIELD INSTRUMENTS REVISE Paragraph 1.8.A to read: 5."SODIUM HYPOCHLORITE" (NaOCl), 11.9 percent solution, Specific Gravity = 1.20. 6."SODIUM HYDROXIDE" (NaOH), 25 percent solution, Specific Gravity = 1.15. 7."PHOSPHORIC ACID" (H3PO4), 85 percent solution, Specific Gravity = 1.69. 8."FERRIC CHLORIDE" (FeCl3), 37 percent solution, Specific Gravity = 1.37. REVISE Paragraph 2.6.A.1 to read: Liquid level indicators shall be provided for each of the chemical storage tanks as shown and specified. Indicators shall be designed for flanged side vessel mounting and suitable for the chemical service as specified in Paragraph 1.8.B of this Section. The level indicators shall consist of a float containing a magnet within the float chamber attached to the tank which follows the liquid level. The level of the float is magnetically transmitted to the indicator.
113	May two or more contractors on the prequalification list submit a bid as a joint venture?	Yes. Any bid by a joint venture shall be in accordance with paragraph 12 of the instructions to bidders and include a power of attorney as set forth therein.
114	Revision to Pre-Qualified CSI list.	**Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 17010 INSTRUMENTATION & CONTROLS - GENERAL REQUIREMENTS REVISE Paragraph 1.1.E: 2. SCADA Integrations 951-541-1575 ADD to Paragraph 1.1.E: 5. Technical Systems, Inc. 949-590-8201 6. George T Hall Company 619-623-4579
115	Revision to Specification Section 01115 Construction Sequence and Coordination	See RFI #304.
116	Re the immersion heater for the FRP Tank specification section 11179 -2.3-A. I have been talking with a Chromalox engineer regarding what is specified and his statements are that there is either a typo regarding the flange nozzle size or else the requirements for the heater kW are not obtainable He says: "I believe there is either a typo or mistake in the spec. The specs call for at least 100kW in a 2" flange. Do they mean 12" flange? Because a 2" flange limits us to a screw-plug heater which caps out around 18kW and is quite long." "Another option if the flange is limited to 2" dia is to put together a skid package with panel, pump and an external circulation heater. This could be an option because it would heat the tank but keep the really hot elements away from the tank material while also providing agitation/circulation of the contents. " Please respond with direction regarding: #1 – The minimum kW of the heater does not need to be 100kW as stated in 11179-2.3-A.3 #2 – The immersion heater flange is to be 12" dia. and not 2" dia. as state in 11179-2.3-A.3 #3 – The skid package listed above from a Chromalox engineer is an acceptable option	The heater flange size is 8-inches as specified in Paragraph 11179.2.1.B.1.f.2). The 2-in flange specified is for installing the tank mounted thermocouple.
117	Referencing Drawing CD-1 detail area 4, the Biotreatment Basin Plan shows "Energy dissipators" on the south side of the basin area and the modified headwall. What is the thickness of the rip rap required per SDRSD D-40 table 7-1? Are we to provide Type 1 or Type 2 per note 5?	Use thickness corresponding to No. 2 Backing stone per callout on CD-1 (1.1 feet). Provide Type 1 sill inside the basin and Type 2 sills outside the basin.
118	Referencing Section 00490 – Bidder's List: Please consider allowing the low bidder to submit this form 3 days after bid opening. With a project this size, it will be very difficult to have a form submitted at time of bid for all subcontractors. Contractors will however, still be required to submit the GFE documentation, Form 4500-3 and Form 4500-4 at time of bid.	See RFI #12
119	Specification Sections 02200-3.10.A and 02223-1.17.A both define rock excavation differently. Please clarify which specification definition should be used for the entirety of the project.	See RFI #44

RFI #	RFI Question	RFI Answer
120	Specification Section 02743-3.7A and 3.8.A describes seal coat and emulsion-aggregate slurry. These specification sections refer the contractor to the SSPWC, which generally states the requirements installation, what is not defined is the width requirement for placing the seal coat and EAS. Confirm the width required for placement along the pipeline alignment.	Refer to FPUD Standard Drawing S-14 and Drawing No. G-10. There are no areas specified to receive an emulsion-aggregate slurry on the Drawings. Chip seal (along East Mission Road (Dwg P-25) and South Mission Road (Dwg P-12)) shall be placed to the full width of the existing asphalt concrete pavement. **Make the following modifications to the Contract Documents:** SPECIFICATION SECTION 02743 - ASPHALT CONCRETE PAVEMENT. ADD paragraph 2.11, CHIP SEAL A. Chip seal shall conform to Section 302-2 of the SSPWC. ADD to paragraph 3.7 B. Apply seal coat extending to the limits of asphalt concrete trench paving, resurfacing, or new construction.
121	The pipeline easement goes through very established private properties, what is the contractor's responsibility for reinstatement of landscaping, paving, sidewalks, irrigation, fencing, curb and gutters?	See Specifications, including General Condition Article 27 and Section 01545 - Protection of the Work and Property
122	Is there fiber optic cable installed as part of this contract? Drawing N-7 says FO Conduit. No information on fiber type. C-21A indicates cable to be installed in existing conduit for part of the run. N-7 shows a reference to conduit "700". Item #700 is not shown on the conduit & cable schedule. If fiber is to be installed, what type, strand count and from where to where? Even if fiber optic is not part of this scope, fiber optic cable type will be needed to determine proper spacing of fiber optic handholes.	See RFI #248 & #249.
123	The sample lines appear to be direct bury PVC leaving the containment trench and meter box per detail 8/GM-7. Is this your intention? And if so the depth of bury appears to have less than one foot of cover. Please advise.	It is our intent that the sample lines be direct bury. Detail 8/GM-7 is not drawn to scale. Depth of cover shall be per Section 15051.3.A.6
124	The electrical transformer pad shown at coordinates 205 & 206 says "SEE ELEC DWGS". Plant Electrical Site Plan shows the transformer as SDG&E Transformer. Is this transformer pad being provided by SDG&E? If not please provide details for this transformer pad.	Contractor shall construct pad per SDG&E design.
125	Drawing C-3 doesn't show the Rip Rap Dissipator as shown on drawing 3/CD-1. Is it your intent to construct the Biotreatment Basin per details shown on CD-1?	Confirmed. Construct bioretention basin per Details 3 and 4/Drawing CD-1.
126	Detail #12 shows a detail for Door Intrusion Switch. This detail is not referenced on any of the man doors or overhead doors and the Intrusion Detection system is not included in the Div. 16 specifications. Which doors are to receive the Intrusion Detection system? Is the Intrusion Detection system rough-in only?	
127	Is the Inter-Plant Communication conduit to be constructed as a duct bank (schedule 40 PVC or EBC w/steel reinforced concrete envelope) or as direct-buried schedule 80 PVC?	As a duct bank (Schedule 40) PVC w/steel reinforced concrete envelope.
128	Please provide the Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. ARV-204 indicated on Contract Drawing(s) 200I-1 and 200M-1.	See expanded valve schedule included by addendum.
129	Please confirm that only one (1) Valve Tag No.CK-200 is required as the Partial Valve List included with Specification Section 15100 Valves (General) lists two (2).	One only. See expanded valve schedule included by addendum.
130	Please confirm that only one (1) Valve Tag No.FCV-284 is required as the Partial Valve List included with Specification Section 15100 Valves (General) lists two (2).	One only. See expanded valve schedule included by addendum.
131	Please provide the location for Valve Tag No. V-205 included with Specification Section 15100 Valves (General) Partial Valve List.	V-205 is no longer used. See expanded valve schedule included by addendum.
132	Please confirm Valve Tag. No. V-262 should be MV-262 as it is has an electric actuator per the Partial Valve List included with Section 15100 Valves (General).	No 262 valves. If 282, valve is V-282 manual 24" V206 with position indication and limit switches. See expanded valve schedule by addendum.
133	Please provide the Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. FCV-300 indicated on Contract Drawing(s) 300I-1.	FCV-300 is a 3" 206 BFV. Valves less than 4" are not included on the valve schedule.
134	Please provide the Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. FSV-315 indicated on Contract Drawing(s) 300I-1 and 300M-5.	See expanded valve schedule included by addendum.
135	Please provide the Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. FSV-360 indicated on Contract Drawing(s) 300I-2 and 300M-1.	See expanded valve schedule included by addendum.
136	Please confirm Valve Tag. No. V-313 should be MV-313 as it is has an electric actuator per the Partial Valve List included with Section 15100 Valves (General).	V-313 is a manual 8" V206 BFV. MV-313 is motor actuated 8" V206 BFV. Both are on sheet 300M-1. See expanded valve schedule included by addendum.
137	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-301 indicated on Contract Drawing(s) 300M-1.	See expanded valve schedule included by addendum.
138	location for Valve Tag No. V-305 included with Specification Section 15100 Valves (General) Partial Valve List.	There is no V-305. See expanded valve schedule included by addendum.
139	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-321 indicated on Contract Drawing(s) 300I-1 and 300M-3.	See expanded valve schedule included by addendum.
140	Please confirm Valve Tag V-341 is to be have a Manual Actuator Type per 300I-1 and not Electric per the Partial Valve List included with Specification Section 15100 Valves (General).	Confirmed. See expanded valve schedule included by addendum.
141	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. ARV-400 indicated on Contract Drawing(s) 400I-1 and 400M-3.	The valve should be 2-in, Type V254 as identified on Drawing 400M-3.

RFI #	RFI Question	RFI Answer
142	location for Valve Tag No. CK-413 included with Specification Section 15100 Valves (General) Partial Valve List.	Valve CK-413 is not part of the project. Deleted by addendum.
143	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. CK-418 indicated on Contract Drawing(s) 400I-6 and 400M-7, -8, -14.	See expanded valve schedule included by addendum.
144	location for Valve Tag No. CK-423 included with Specification Section 15100 Valves (General) Partial Valve List.	Valve CK-423 is not part of the project. Deleted by addendum.
145	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. CK-426 indicated on Contract Drawing(s) 400M-6, -9, -13.	Valve is identified on Drawing 400M-6; an 8-in Type V151.
146	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. CK-428 indicated on Contract Drawing(s) 400I-6 and 400M-7, -8, -14.	See expanded valve schedule included by addendum.
147	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. CK-429 indicated on Contract Drawing(s) 400I-7 and 400M-6, -9, -13.	See expanded valve schedule included by addendum.
148	location for Valve Tag No. CK-433 included with Specification Section 15100 Valves (General) Partial Valve List.	Valve CK-433 is not part of the project. Deleted by addendum.
149	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. CK-436 indicated on Contract Drawing(s) 400M-6, -9, -13.	Valve is identified on Drawing 400M-6; an 8-in Type V151.
150	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. CK-438 indicated on Contract Drawing(s) 400I-6 and 400M-7, -8, -14.	See expanded valve schedule included by addendum.
151	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. CK-439 indicated on Contract Drawing(s) 400I-7 and 400M-6, -9, -13.	See expanded valve schedule included by addendum.
152	location for Valve Tag No. CK-451 included with Specification Section 15100 Valves (General) Partial Valve List.	The valve is shown/identified on Drawings 400M-10 and 400I-8.
153	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. FCV-428 indicated on Contract Drawing(s) 400I-6 and 400M-6, -8, -14.	See expanded valve schedule included by addendum.
154	Please provide information for Valve SPEC Reference No.V65 for Valve Tag No. MV-412 as it is not included with Specification Section 15100 Valves (General).	Use Type V69 as identified on Drawing 400M-9.
155	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. MV-419A indicated on Contract Drawing(s) 400I-7 and 400M-6, -9, -13.	See expanded valve schedule included by addendum.
156	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. MV-422 indicated on Contract Drawing(s) 400I-4 and 400M-6, -7, -9, -13.	Use Type V69 as identified on Drawing 400M-9.
157	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. MV-429A indicated on Contract Drawing(s) 400I-7 and 400M-6, -9, -13.	See expanded valve schedule included by addendum.
158	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. MV-429B indicated on Contract Drawing(s) 400I-7 and 400M-6, -9, -13.	See expanded valve schedule included by addendum.
159	Please provide information for Valve SPEC Reference No.V65 for Valve Tag No. MV-432 as it is not included with Specification Section 15100 Valves (General).	Use Type V69 as identified on Drawing 400M-9.
160	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. MV-439A indicated on Contract Drawing(s) 400I-7 and 400M-6, -9, -13.	See expanded valve schedule included by addendum.
161	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. MV-439B indicated on Contract Drawing(s) 400I-7 and 400M-6, -9, -13.	See expanded valve schedule included by addendum.
162	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-415B indicated on Contract Drawing(s) 400I-4 and 400M-6, -8, -14.	See expanded valve schedule included by addendum.
163	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-418 indicated on Contract Drawing(s) 400I-6 and 400M-6, -8, -14.	See expanded valve schedule included by addendum.
164	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-419A indicated on Contract Drawing(s) 400I-7 and 400M-6, -9, -13.	See expanded valve schedule included by addendum.
165	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-428 indicated on Contract Drawing(s) 400I-6 and 400M-6, -8, -14.	See expanded valve schedule included by addendum.
166	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-429A indicated on Contract Drawing(s) 400I-7 and 400M-6, -9, -13.	See expanded valve schedule included by addendum.
167	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-429B indicated on Contract Drawing(s) 400I-7 and 400M-6, -9, -13.	See expanded valve schedule included by addendum.
168	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-438 indicated on Contract Drawing(s) 400I-6 and 400M-6, -8, -14.	See expanded valve schedule included by addendum.
169	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-439A indicated on Contract Drawing(s) 400I-7 and 400M-6, -9, -13.	See expanded valve schedule included by addendum.
170	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-439B indicated on Contract Drawing(s) 400I-7 and 400M-6, -9, -13.	See expanded valve schedule included by addendum.
171	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-450 indicated on Contract Drawing(s) 400M-10, -11.	See expanded valve schedule included by addendum.
172	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-451 indicated on Contract Drawing(s) 400I-8.	See expanded valve schedule included by addendum.

RFI #	RFI Question	RFI Answer
173	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-455 indicated on Contract Drawing(s) 400M-10.	See expanded valve schedule included by addendum.
174	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-456 indicated on Contract Drawing(s) 400M-10, -11.	See expanded valve schedule included by addendum.
175	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-460A indicated on Contract Drawing(s) 400I-8 and 400M-10, -11.	See expanded valve schedule included by addendum.
176	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-460B indicated on Contract Drawing(s) 400I-8 and 400M-10, -11.	See expanded valve schedule included by addendum.
177	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-460C indicated on Contract Drawing(s) 400I-8 and 400M-10, -11.	See expanded valve schedule included by addendum.
178	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-460D indicated on Contract Drawing(s) 400I-8 and 400M-10, -11.	See expanded valve schedule included by addendum.
179	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-470A indicated on Contract Drawing(s) 400M-10.	Included in original valve schedule.
180	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-470C indicated on Contract Drawing(s) 400M-10, -11.	See expanded valve schedule included by addendum.
181	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. ARV-500 indicated on Contract Drawing(s) 500M-1.	Added. See expanded valve schedule included by addendum.
182	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. ARV-501 indicated on Contract Drawing(s) 500M-1.	Added. See expanded valve schedule included by addendum.
183	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. ARV-502 indicated on Contract Drawing(s) 500M-1.	Added. See expanded valve schedule included by addendum.
184	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. ARV-550 indicated on Contract Drawing(s) 500M-1.	Added. See expanded valve schedule included by addendum.
185	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-501 indicated on Contract Drawing(s) 500M-1.	V-501 is the 24" buried BFV located on the 24" suction line from tank T-500. Replace the valve tag on the 6" drain valve on T-500 on drawing 500M-1 from V-501 to V-500. See expanded valve schedule by addendum.
186	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-550A indicated on Contract Drawing(s) 500I-2.	Added. See expanded valve schedule included by addendum.
187	Please confirm Valve Tag. No. V-670 should be MV-671 as it is has an electric actuator per the Partial Valve List included with Section 15100 Valves (General).	V-670 should be MV-670. See expanded valve schedule by addendum.
188	Valve SPEC Reference No.V348 for Valve Tag No. MV-600 as it is not included with Specification Section 15100 Valves (General). Please confirm 4-in size as this valve is indicated as 3-in on the Chemical Storage Tank Schedule on Contract Drawing 600M-9.	MV-600 does not exist. V-600 is the drain valve for T-600 an is valve type V345 not V348, 4". See revised Specification Section 15100 Valves and expanded valve schedule issued by addendum.
189	Valve SPEC Reference No.V348 for Valve Tag No. MV-601 as it is not included with Specification Section 15100 Valves (General). Please confirm 4-in size as this valve is indicated as 3-in on the Chemical Storage Tank Schedule on Contract Drawing 600M-9.	See RFI #188 but substitute 602 for 600.
190	Valve SPEC Reference No.V348 for Valve Tag No. MV-610 as it is not included with Specification Section 15100 Valves (General). Please confirm 4-in size as this valve is indicated as 3-in on the Chemical Storage Tank Schedule on Contract Drawing 600M-9.	See RFI #188 but substitute 610 for 600.
191	Valve SPEC Reference No.V348 for Valve Tag No. MV-630 as it is not included with Specification Section 15100 Valves (General). Please confirm 4-in size as this valve is indicated as 3-in on the Chemical Storage Tank Schedule on Contract Drawing 600M-9.	See RFI #188 but substitute 630 for 600.
192	Valve SPEC Reference No.V348 for Valve Tag No. MV-640 as it is not included with Specification Section 15100 Valves (General). Please confirm 4-in size as this valve is indicated as 3-in on the Chemical Storage Tank Schedule on Contract Drawing 600M-9.	See RFI #188 but substitute 640 for 600.
193	Valve SPEC Reference No.V348 for Valve Tag No. MV-650 as it is not included with Specification Section 15100 Valves (General). Please confirm 4-in size as this valve is indicated as 3-in on the Chemical Storage Tank Schedule on Contract Drawing 600M-9.	See RFI #188 but substitute 650 for 600.
194	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-660 indicated on Contract Drawing(s) 600M-7.	Should be MV-660 installed as shown on 600I-9. See expanded valve schedule included by addendum.
195	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-670 indicated on Contract Drawing(s) 600M-5.	Should be MV-670. Listed as V-670 on Area 600 partial valve list. See expanded valve schedule included by addendum. See revised sheet 600M-5.
196	Valve SPEC Reference No.V348 for Valve Tag No. MV-680 as it is not included with Specification Section 15100 Valves (General). Please confirm 4-in size as this valve is indicated as 3-in on the Chemical Storage Tank Schedule on Contract Drawing 600M-9.	See RFI #188 but substitute 680 for 600.
197	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. CK-703 indicated on Contract Drawing(s) 700I-1 and 700M-1.	Added. See expanded valve schedule included by addendum.
198	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. CK-720 indicated on Contract Drawing(s) 700I-1.	Added. See expanded valve schedule included by addendum.
199	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-710 indicated on Contract Drawing(s) 700M-1.	Added. See expanded valve schedule included by addendum.

RFI #	RFI Question	RFI Answer
200	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-712 indicated on Contract Drawing(s) 700M-2.	See expanded valve schedule included by addendum and revised sheet 700M-1 and 700M-2.
201	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-740 indicated on Contract Drawing(s) 700M-2.	Added. See expanded valve schedule included by addendum.
202	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-740 indicated on Contract Drawing(s) 700I-1.	Added. See expanded valve schedule included by addendum. 6. **Make the following modifications to the Contract Documents:** SPECIFICATION SECTION 15100 ADD Item 2.M.6 Valve Reference Number - V289: a.Type of Valve: Surge relief valve. b.Type of Service: Sludge. c.Type of end connection: Flanged. d.Size (inches): 4" - 6". e.Body Style: 90 degree elbow design conforming to the center-to-face dimension for long-radius elbows per ASME B16.1 and ASME B16.42. f.Rating and Description: Ductile iron body, body seal 316 stainless steel. Flanges flat faced conforming to ASME B16.42 Class 150. Replaceable seat ring of EDPM. g.Manufacturer and Product: Provide the following: 1)APCO Model SRA-3000A 2)Or Equal
203	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-741 indicated on Contract Drawing(s) 700M-1, -2.	Added. See expanded valve schedule included by addendum.
204	Valve SPEC Reference No. for Valve Tag No. V-811A as this information is not included in Specification Section 15000 Piping Components as directed in the Partial Valve List included with Specification Section 15100 Valves (General).	See expanded valve schedule included by addendum.
205	Please confirm that only one (1) Valve Tag No.V-811B is required as the Partial Valve List included with Specification Section 15100 Valves (General) lists two (2). The one with Valve SPEC Reference V67 is not required.	One only. See expanded valve schedule included by addendum.
206	Valve SPEC Reference No. for Valve Tag No. V-812A as this information is not included in Specification Section 15000 Piping Components as directed in the Partial Valve List included with Specification Section 15100 Valves (General).	See expanded valve schedule included by addendum.
207	Please confirm that only one (1) Valve Tag No.V-812B is required as the Partial Valve List included with Specification Section 15100 Valves (General) lists two (2). The one with Valve SPEC Reference V67 is not required.	One only. See expanded valve schedule included by addendum.
208	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-813 indicated on Contract Drawing(s) GFI-1.	Added. See expanded valve schedule included by addendum.
209	Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type for Valve Tag No. V-820 indicated on Contract Drawing(s) GFI-1 and GFM-8.	Added. See expanded valve schedule included by addendum.
210	Valve SPEC Reference No. for Valve Tag No. V-860 as this information is not included in Specification Section 15000 Piping Components as directed in the Partial Valve List included with Specification Section 15100 Valves (General).	Clarified. See expanded valve schedule included by addendum.
211	Valve SPEC Reference No. for Valve Tag No. V-870 as "None*" listed in the Partial Valve List included with Specification Section 15100 Valves (General) is not enough information.	Clarified. See expanded valve schedule included by addendum.
212	Valve SPEC Reference No. for Valve Tag No. V-884 as this information is not included in Specification Section 15000 Piping Components as directed in the Partial Valve List included with Specification Section 15100 Valves (General).	Clarified. See expanded valve schedule included by addendum.
213	Plan View on Contract Drawing 300M-1 indicates a 3" AVAR V253 on the 16" ROF Discharge from Pumps P311, P312 and P313. Section 1 indicates this as being a 4" AVAR. Contract Drawing 300I-1 indicates this as being ARV-315. Neither V-253 or ARV-315 is listed in the Partial Valve List included with Specification Section 15100 Valves (General). Please confirm that V253 on 300M-1 should be ARV-315 and provide the Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type.	Air Relief Valves on discharge line for Pumps 311, 312 and 313 are 3", valve type V253. See revised sheet 300M-1 and 300M-2.
214	Contract Drawing 400S-1 indicates "PUMP PAD FOR FUTURE PUMP, COVER PL PER MECH DWGS". Neither the Mechanical Drawings for Area 400 (400M-1 thru 59) nor the Miscellaneous Mechanical Details (GM-1 thru GM-9) include details for a cover plate. Additionally, the Contract Drawings and Specification Section 11100 Vertical Turbine Pumps indicate a pump can / cover plate is to be provided for the future pump. Please confirm that a pump can / cover plate is not to be provided under this contract.	Provide a cover plate and gasket drilled but un-tapped per Section C on 400S-7. Plate thickness as recommended by pump manufacturer.
215	Please confirm V-700 on SECTION 1 of Contract Drawing 700M-1 should be V-710 as indicated on 160,000 GAL WWW RECOVERY TANK - PLAN on 700M-1.	Confirmed. V-700 valve callout on section 1 of contract drawing 700M-1 should read V-710.

RFI #	RFI Question	RFI Answer
216	160,000 GAL WWW RECOVERY TANK - PLAN indicates two plug valves with Valve Tag No. V-710. V-710 with PIT-710 to the left (West) of the 16" OF appears to be correct and matches the Partial Valve List included with Specification Section 15100. Please provide a revised Valve Tag No. for the plug valve to the right (East) of the 16" OF. If not already in the Partial Valve List, please add along with the Valve SPEC Reference No., Size (in), Actuator Type, Actuator Designation, Pressure Class and Valve Type.	Confirmed V-710 tag is associated with PIT-710. The valve to the right of the 16" OF should be V-750. See expanded valve schedule by addendum.
217	Please provide a specification section for the four (4) sluice/slide gates indicated on Contract Drawing 700M-4.	See RFI #29
218	Note 19 states "INSTALL NEW 24" BFV TO REPLACE EXIST, TYP OF 2" DET. 5 GFC-6. Det. 5 on GFC-6 shows 2 new 20" BFV with an existing 24" x 24" x 24" tee and exiting 24" x 20" reducers on the main run with a existing 24" pipe coming off the branch run. What is the correct configuration of this tie-in?	**Make the following modifications to the Contract Documents.** DRAWING NO. GFC-2 REVISE Note 19 to read: "INSTALL NEW 20" BFV TO REPLACE EXIST, TYP OF 2"
219	Can the work shown in this detail be accomplished during a shutdown? And if so, what is the allowable time for the duration of the shutdown?	Yes, see Spec Section 01115.1.3.H
220	States: "No piping shall be completely backfilled until testing has been completed." This requirement seems impractical and should be edited to allow testing to take place after the line has been completely backfilled at the contractors risk.	**Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 15051 REVISE Paragraph 3.7.A.2 to read: "2. Buried piping shall be backfilled to the spring line or above prior to testing."
221	GFC-4 calls out for two (2) 1" water services and one (1) 3/4" water service per FPUD STD DWG W-1. GFC-2 shows these as 2" water services. Please advise.	Water service pipe diameter from the water main to the meter shall be 2" CU per Drawing No. GFC-2.
222	Section 15065 3.1.A and B note, "Prior to installation of CPVC or PVC pipe, the CONTRACTOR shall retain the services of an adhesive manufacturer to conduct a single, one day seminar which shall include "hands-on" training regarding safety, handling, preparation, and assembly of pipe. The manufacturer of the adhesives providing the training shall also provide the adhesive products for the project", and "The manufacturer conducting the training shall certify the participants in the seminar, and only those participants shall be allowed to install solvent welded joints in CPVC and PVC piping systems." We ask that this requirement be removed from the specifications.	The seminar is required.
223	Drawing GFA-4, Sheet 80 of 378, Key Note 12 2" Thick Acoustical Wall Panel @ entire wall in Pump Room. Provide specification for Acoustical Panels.	**ADD** attached specification section 09831- Acoustical Panels
224	Reference drawing G-6, FPUD Water Note #22. This paragraphs states "The contractor is required to take precautionary measures to protect any existing facility shown hereon and any other which is not of record or not shown on these plans." What precautionary measures is FPUD considering the contractor to take regarding existing facilities that are not of record and not shown on the plans, and to what extent are these precautions to be implemented in areas where no existing utilities/facilities are shown on the contract drawings?	See RFI #91.
225	Please provide Notes 1 thru 5 as refenced in detail 3/GM-8.	See reissued sheet GM-8.
226	Contract Drawings 500M-1 indicates a 24" PI line running N-S from the 24" PI running E-W and the 24" PW running E-W. Section 3/500M-3 indicates this same section of pipe as 24" CPN. Please confirm that this section of pipe is to be 24" CPN (SS - uncoated and unlined).	The designation "CPN" for the 24" line shown on Section 3/500M-3 should be "PI" and is not stainless steel.
227	GFC-2 Note 6, Is the new fire hydrant connected to the existing 20" water or the new 24" PW?	The new hydrant is connected to the new 24" PW.
228	Bid Item 3. Item 7 of 01150 describes price of over excavation. Should this unit price include the price for replacement/fill material as well?	Yes. **Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 01150 REVISE the first two sentences of Paragraph 1.3.A.7 to read: "7. Remedial grading, consisting of the over excavation of soils and backfill with approved materials, is required at the plant and Gheen sites to provide foundation support for building, slabs, and equipment pads. The price for over excavation of existing soil and backfill is based on the volumetric quantity provided on the Bid Schedule multiplied by the unit cost per cubic yard, as provided by the CONTRACTOR."
229	Please provide specification section / information for the 10 gal sparger tank indicated on contract drawing 600M-2.	Provide 22 gauge, 10 gal. 304 ss open head drum with bolted top ring. Include 3/4" "U" vent utilizing 3/4" sch. 40 pipe and fittings. Modify the 2" Rieke plug to allow for a 1 1/4" sch. 10 pipe to penetrate the plug welded all around. The 1 1/4 sch 10 pipe shall extend to a depth 2 inches above the bottom of the tank, open pipe. The pipe should extend 3" above the plug, and drum cover (lid), and be fitted with and 1 1/2" 304 ss threaded union. Add a 2" bung and Rieke plug into the center of the drum lid.
230	Contract Drawing 600M-1 indicates Sulfuric Acid Tank T-660 with a 3" Tank Drain. Chemical Storage Tanks Schedule on 600M-9 indicates the Overflow and Drain for this tank as being 2 (in). Specification Section 11600-2.3.B.3.a. lists the Bottom Connection as "One 2-inch flanged flush bottom drain pipe connection". Please confirm the drain for T-660 is to be 2 (in) per the Chemical Storage Tanks Schedule on 600M-9 and 11600-2.3.B.3.a	Confirmed. Drain is 2" per tank schedule on 600M-9.

RFI #	RFI Question	RFI Answer
231	Detail 5/GM-6 indicates Tank T-660 receiving a type V348 valve for the installation of a level transmitter. Per the Chemical Storage Tanks Schedule on 600M-9, T-660 does not have a Pressure Level nozzle. Specification Section 11600-2.3.B does not list a nozzle for a level transmitter on this tank. Please confirm that tank T-660 does not receive a level transmitter.	Level transmitter should be "Liquid Level Indicator Indirect Magnetic Type" per Paragraph 17329.2.6, installed as shown on 600I-9.
232	Drawing C-1 has over excavation notes that require clarification. Note 1 provides bore numbers and depths to remove the alluvium to the satisfaction of the inspector. The removal of existing fill is defined only at the bore location, with no boundary or area limit defined. Note 2 states "extent of over excavation for treatment plant site shall extend within the plant perimeter road limits." This too is vague and subjective. Note 3 states "over excavate, scarify and compact in accordance with the Geo-tech report and 02200. The geo-tech reports and section 02200 give differing directions on over excavation. The 4th note states for bidding purposes assume an over excavation quantity of 16,000 cy. In lieu of clear direction we are proceeding with these assumptions: 1.Where no fill is required under structure we will clear & grub per 02200, over excavate 1 foot, scarify, compact, and construct per the structural drawings 2.Where fill is required under structures we will clear & grub per 02200, scarify, compact, and place fill to bottom of structure and construct per the structural drawings 3.Where there are no structures and fill is required we will clear & grub per 02200, scarify, compact, and place fill to subgrade of surface finishes. Please advise.	Reference is made to the General Conditions, Article 55, Soils Investigations. **Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 02200 - EARTHWORK REPLACE the specification section in its entirety with Section 02200 attached hereto.
233	FPUD Final Technical Specification, Section 11500, Paragraph 2.2.B., shows minimum freeboard (S) as 5 feet for the 'bid alternate Gheen' tank. Drg 200/387 shows height from overflow to top of tank shell as 5'0". AWWA D100 defines "freeboard" as the height from lip of overflow up to the underside of rafters. Is it the PUD's intent to define (S) as the minimum ht from lip of overflow up to the (a) underside of the rafters or (b) up to the top of tank shell ht?	The intent is to define the minimum ht from lip to the underside of the rafters.
234	If the minimum freeboard required by AWWA D100 is greater than dimension shown on project drgs for any of the 5 tanks, do we make the tanks taller or do we lower the maximum operating level (MOL(as allowed by AWWA)?	Make the tank taller in this occurrence.
235	Regarding the Gheen tank, based on our calculations, a 130' tank does NOT require anchor bolts. Are anchor bolts mandatory, even if codes do not require them?	Yes, provide anchor bolts per GFS-1.
236	For BWRO systems, as they operate at high recoveries, to operate at 3 drastically varied production capacities maintaining a fixed recovery is hydraulically not ideal and could result in high differential pressures and/or low concentrate flow (low turbulence). As such, we will have to take exceptions on some of the operating conditions summarized in the bid spec. For 3-stages in operation, we propose: o 0.933 mgd, 85% recovery, 50psi boost applied o 1.150 mgd, 85% recovery, 0 – 20 psi boost applied o 0.625 mgd, 83% recovery, 0 psi boost applied, 20 psi of permeate backpressure applied on 1st stage	We have projected operating conditions for the proposed trains and are comfortable with the system hydraulics as designed.
237	For 2-stages in operation, we propose: o 0.252 mgd, 81% recovery, 50 psi boost applied o 0.410 mgd, 82% recovery, 50 psi boost applied o 0.545 mgd, 82% recovery, 50 psi boost applied	We have projected operating conditions for the proposed trains and are comfortable with the system hydraulics as designed.
238	Warranties: 14-day performance test: a deficiency is defined as "average initial permeate water quality and initial net driving pressure being greater than 5% higher than the normalized projected year 0 WQ and operating pressures". Perhaps definition of "Net Driving Pressure" would be helpful in interpreting this statement. In any case, a 5% deviation is not sufficient for us to provide a warranty.	Requirement amended, see revised text in addendum.
239	3-year Performance Warranty: RO system shall require net driving pressure (NDP) no more than 150 psi. Perhaps definition of "Net Driving Pressure" would be helpful in interpreting this statement. At all times during the warranty period, normalized RO permeate quality from the train shall meet the limits listed below, when operating under the conditions stated. The permeate quality limits are not defined in the RFP.	Requirement amended, see revised text in addendum.
240	This is what we will submit to the client/end user: A 7.2% Flux decline/year is equal to a .662 FF, not a .8 FF; 10% flux salt passage increase is being interpreted as 10% salt passage increase/year.	Requirement amended, see revised text in addendum.
241	Please clarify "boost pressure". Does this mean boost pump TDH (not including any losses interstage, in which case net boost pressure is the TDH value minus the interstage losses) OR As "net boost pressure" (defined as boost pump TDH minus interstage losses between stage 1 and 2 (vessel exit and entry losses. Manifold fitting a frictional losses plus any head differential between centerline of typical vessel in stage 1 (middle row of stage 1) and centerline of typical vessel in stage 2 (middle row of stage 2). If this is not defined we will assume 50 psi net boost pressure (pump TDH 55 psi minus 5 psi assumed interstage losses.	Base it on 50 psi delta between suction and discharge of the pump.
242	Based on recent shipments and stock position, average shipment meeting nominal flow (13,300gpd) is not feasible without significant cherry picking and given limited population in finished goods, may not be feasible at all. Suggest average shipment flow to be nominal flow (-10%/+15%) range.	Listed average production flows match the current published specification sheets for the listed elements.

RFI #	RFI Question	RFI Answer
243	Please provide a guaranteed system to protect the membranes from organic fouling. The currently proposed methods do not give protection against organic fouling. Must be added if a 3 year NDP warranty is to be contemplated, along with our definition of clean elements which currently looks like this: Element in the Clean Condition. For the purposes of this warranty, elements are defined to be in the clean condition when they are free from reversible and irreversible fouling (from any source). Toray has no control over the exposure of the elements to foulants of any type during the operation of the plant, and does not guarantee the effectiveness of 'generic" or third party proprietary cleaners to totally remove foulants which may be present on the membrane surface.	We believe the stated warranty conditions are adequately protective against the presence of external foulants.
244	Satisfaction of the District needs to be defined as the stated conductivity profile range.	Requirement amended, see revised text in addendum.
245	All additional system losses need to be defined as per our custom warranty.	Element warranty conditions shall be incorporated without modification or amendment
246	All additional system losses (clarification of the definition of NDP) need to be defined as per our custom warranty. Also, Provisions against irreversible fouling shall apply.	Pressure requirement modified by addendum. Irreversible fouling exclusion included in Paragraph 11162.1.7.B.2.e.
247	SPI and the ROSS will assume the liability of the system performance itself, not the membrane manufacturer.	The membrane elements must meet the specified performance requirements.
248	On the conduit schedule, conduit 700 is shown as a power conduit from a panel board to MV-202. Drawing N-7 indicates conduit 700 is for a fiber optic run. Which is correct? What size conduit is required for the fiber optic run.	Conduit 700 on N-7 has been replaced by a Radio Link between the WRP and SMCUP. 700 has been repurposed per GE-18.
249	Drawing GE-2 shows conduit 749, (2" w/FO), in a duct bank grouped with conduits 140, 141, 142 & 690. Drawing 200E shows the continuation of the duct bank but conduit 749 is not shown. Where does it terminate?	Conduit 749 is to terminate in the Network Server room allowing FO cable to attach to Network Rack.
250	Will the Blue-White MD-3 Hybrid metering pump be accepted as an approved equal for Section 11300?	No.
251	Section 11301 Surge Tank-Will Blacoh Surge Control be accepted as approved equal to provide the Bladder Surge Tanks for this project?	Yes.
252	Drawing 200M-2 calls out a 4HF-Titanium60 Spray Nozzle & 500M-2 calls for 2–5H-SS259 Nozzles. Spray System Co. lists the lowest capacity nozzle for a 4HF as 160, not 60. For the 5H, the lowest capacity is 250, not 259. Please verify that the SSC sizing is correct.	Nozzle shall be 4-inch flanged (HF) made of Titanium Capacity 160 Spray Nozzle(200M-2). Nozzle shall be 2 each 5-inch flanged (HF) made of Stainless Steel Capacity 250 Spray Nozzles (500M-2).
253	15062-1.4-B.5. calls for a "complete" Quality Assurance Control Program (QACP) be provided prior to fabricator acceptance or submittal approval of drawings. The section goes on to list all certs, tests, reports & inspections required. How can a QACP be provided before material even exists & tests/certs/reports/inspections can be done?	Contractor shall have a Quality Assurance Control Program (QACP) for their company that describes quality assurance and quality control measures/processes that are undertaken during the fabrication process.
254	15062-1.5A calls for the possible inspection of the steel piping being manufactured by an Engineer selected independent lab. 15062-1.6A calls for inspection & notification, to the Engineer, of pipe manufacture at the place of manufacture. Does Engineer/District bear this cost, as they alone decide quantity of inspections?	See RFI #56.
255	15062-1.8.B.calls for the Contractor to perform steel pipe material test at no charge to the District and that the District has the right to witness all tests. Should the District decide to witness any test – Does the District bear the cost of "witnessing" the test, as they alone decide the quantity of visits?	See RFI #56.
256	The Valve List references V-47 Ball Valves numerous times. V-47 Ball Valves are not spec'ed in 15100-2.1-D. Please provide necessary valve information.	Ball Valve V47 should be V67. See expanded valve schedule by addendum and revised specification section 15100.
257	Please confirm that Valve #V-290, in the valve list, is a motorized BFV (V197), as shown on #200I-4. & tagged #MV-290.	Confirmed. See expanded valve schedule by addendum.
258	Note 1 calls out Backwater Structure per Detail 1/PL-01. This drawing does not exist, please provide.	See revised Civil sheets.
259	Valve #V-620 is shown on 600M-4, but not listed in the Valve List. Please provide valve list details for this valve.	Valve tag V-620 removed from 600M-4. Aqua Ammonia tank uses different level indicator method.
260	In the Valve List, numerous valves are called out to have a "Pressure Class" of 250psi. For clarity, please confirm that the pressure class stated is for the valve's working pressure rating and is not the flange class bolting pattern required (i.e. 250#DI flanges/ 300# class F flanges)	Pressure Class is for working pressure.
261	The Valve List calls out valves #V-730A & B. These valves are not shown on drawing 700M-4. Please advise location.	Valve are buried and located at sludge beds. See revised C-11.
262	GFM-1 shows valve #V-810 at the tank level transmitter assembly. Please confirm that this valve is a 4" V6 Gate Valve, per Detail 5/GM-6.	Confirmed. See expanded valve schedule by addendum and revised sheet GM-6.
263	Please provide the Davis Bacon Wage Determination for this project. The Davis Bacon CA190001 5/3/2019 report looks to have an error specifically with the Millwright Journeyman. This report has a $6.00 an hour higher rate than CA DIR and the Union CBA. With the amount of millwright work required for this project it is in the Owner's best interest to correct this rate accordingly.	
264	Spec section 16250 indicates Manual Transfer Switch in the header but automatic transfer switch on the footer. The accessories listed are typically provided on automatic transfer switches. Single line drawing GE-3 indicates the 4000A switch is an ATS but in parentheses indicates (manual operation). Single line drawing GFE-2 indicates the 800A switch is an (MTS with manual operation) in parentheses. Please clarify what each switch is supposed to be automatic, manual or non-automatic (non-auto is manual but still electrically operated) operation.	Switches at both sites are to be Automatic Transfer switches, For initial operation they are to be operated in manual mode since portable generators will be used for the immediate future. FPUD wants option for automatic transfer in the future if they decide to place generators at the sites permanently.
265	Reference single line drawing GE-3. Please provide a control schematic for SSRV RO Booster Pumps. Also clarify if emergency bypass or if standard at speed/run bypass is acceptable for the SSRV's (reference spec section 16290, 2.9.F.1)	RO Booster Pumps 1 to 4 are changed to be equipped with VFD's.

RFI #	RFI Question	RFI Answer
266	Reference spec section 16290, 2.9.A indicates the SSRV controller is to be A-B SMC Flex, however, spec section 16482, 2.1.A indicates that the soft starters shall be by manufacturer of Motor Control Centers. Please confirm that the SSRV's can be provided to match the manufacturer of the MCCs.	All free standing SSRV (not in an MCC) are to be Allen-Bradley SMC. Softstarters in MCC lineups are to be manufacturers standard.
267	Reference spec section 16483, 2.2.A.4 indicates 18 pulse drives are to be provided in MCC construction. This drastically increases cost and footprint of MCCs. Please clarify if alternative methods can be used to meet the harmonic mitigation requires of IEEE-519 such as passive or active filters built into the MCC.	P-511, P-512, P-513, and P-514 have been removed from MCC and are freestanding units. Revised GE-3 shows new configuration including active Harmonic Filters.
268	Please provide the target design point for the Horizontal End Suction Centrifugal Pumps. Currently only the min and max flow values are provided.	See revised specification 11306 by addendum.
269	On sheets 400S-1 and 600S-2 there are coated steel support beams for FRP grating. Generally when FRP grating is used an FRP or stainless steel support beam is used. Is a painted steel beam the intent at these locations?	On sheets 400S-1 and 600S-2 change steel supports for FRP grating to 316 stainless steel.
270	On sheet 500S-2 the fascia steel used is called out as a C6x16. The heaviest 6" channel is 13 lbs./ft. There is an MC6x16.3 available. Is that the intended channel size?	On sheet 500S-2 and 500S-8 change C6x16 to MC 6x16.3
271	On sheet 600S-2 we are to provide a 2" FRP pultruded grating which is to span over a 6'-0 area. The maximum span with less than ¼" deflection is 54" or 4'-6". Additional structural supports will be required. Will the district be providing a revised drawing showing structural supports for the FRP grating? If a revised drawing will not be provided what material type will be required for the structural supports?	On sheet 600S-2, 2" pultruded FRP grating shall be SAFE-T-SPAN T 3320. From Fibergrate load tables, for 72" (6') span, deflection for 100 psf Live Load is 0.26" and for 300 lbs concentrated line load deflection is 0.21".
272	Sheet GFA-2 calls for a "2" thick wall mounted acoustical panel, full height on entire walls of pump room". Please provide a specification for the acoustical panels.	See RFI# 223.
273	Specification 10500-2.10 describes exterior building identification signs. Please provide clarification on which buildings will require exterior signage and a description of the wording for each.	
274	Per Spec 05122, para 1.5 A (2), it requires the metal fabricator to be AISC Certified Category II. Per information we have got, this is an outdated standard. We are an AISC Certified Fabricator in Category BU. Do we qualify to bid?	ASCE certified category BU fabricators are qualified to bid.
275	Per General Conditions, Article 40, Builder's Risk (All Risk) – Contractor is responsible for "all risk" coverage in the amount of 100% of the replacement cost. Please confirm this coverage does not include flood or Acts of God coverage in excess of 5% as defined in Public Contract Code 7105 as there is not a separate bid item provided in the bid schedule.	Confirmed
276	Request to consider Scranton Products HDPE Bathroom Partitions as a substitution for Section 10211 - Toilet Compartments	Scranton Products of solid plastic is not an equal substitution to stainless steel partition
277	Request to consider and add Pureflow Filtration as an "or equal" for the Iron & Manganese Removal System.	Unable to verify that this company meets the required criteria, and thus is not consider an equal at this time . Substitutions requests are allowed under Spec Section 01620 PRODUCT OPTIONS AND SUBSTITUTIONS and will be consider if so requested.
278	Request to consider and add Loprest as an "or equal" for the Iron & Manganese Removal System.	Unable to verify that this company meets the required criteria, and thus is not consider an equal at this time . Substitutions requests are allowed under Spec Section 01620 PRODUCT OPTIONS AND SUBSTITUTIONS and will be consider if so requested.
279	Does the district have right of entry agreements in place to install the pipeline within private property and private roads?	Yes, pipelines are within existing District easements.
280	Contract Drawing 400M-1 lists the RO CIP Tank with Tag No. T-400 whereas 400M-10 and 400I-8 list the RO CIP Tank with Tag No. T-450. Please confirm that the RO CIP Tank should be T-450.	The tank tag number should be T-450 per Drawing 400I-8.
281	Pump Station Plan on GFM-3 and Section 2 on GFM-3 reference Details 10 and 12 on GE-24 for the Sump Pump and Float Controls for Sump Pump P-813. Drawing GE-24 is a Plant Electrical Schedule for Panels MPZ-100, -200, -202 and -700. Please provide the details as referenced for the Sump Pump and Float Controls.	
282	Drawing 600M-1 indicates the following chemical feed line sizes and chemical: 1" PA, 1/2" TI, 1-1/2" ROP, 1" H3, 1" CS, 1" FL, 3/4" SAC Drawing 600M-5 indicates the following chemical feed line sizes and chemical: 1" PA, 1" TI, 2" ROP, 1" PA, 1" TI, 1" H, 1" SAC Using the RO CIP System Plan on 400M-10 and the RO Feed Chemical Injection and RO Permeate Chemical Injection Plans on 400M-12, the chemical feed line sizes and chemical are: 1" PA, 1/2" TI, 2" ROP, 1" H (3), 1" CS, 1" FL, 3/4" SAC. Please confirm the chemical feed lines and sizes should be per the Area 400 drawings.	Area 400 Drawings are correct.
283	Drawing 600M-4 indicates a 1" SC line from Chemical Pump Skid P-681/P-682 wheras drawings 600M-1, -5 indicate a 1" FL line. Please confirm the 1" SC (PVC SCH 80) line should be 1" FL (PVDF) for inclusion with Bid Alternate No. 3.	Confirmed.
284	Please confirm the drain lines and appurtenances for the Hydrofluorosilicic Acid and Sulfuric Acid areas should be PVDF in lieu of PVC SCH 80.	Confirmed.

RFI #	RFI Question	RFI Answer
285	Please confirm the drain lines and appurtenances for the Threshold Inhibitor area should be PP in lieu of PVC SCH 80.	Either material is acceptable for the drain lines.
286	Spec section 15041 1.1 A 1. f. list the Area 700 Waste Washwater Tank for cleaning and disinfection. We recommend that this tank be cleaned but excluded from disinfection. Please confirm.	Since water from the tank is brought back to the front of the plant, disinfection is required.
287	Section 01150-1.3.A.2 provides the measurement and payment procedures for Concrete Crack Repair and notes: "The price for crack repair is based on the linear quantity provided on the Bid Schedule…". The Bid Schedule shows this Bid Item as 1-LS. Please confirm that the total lineal footage of crack repair is as shown in the tables on Sheet 700M-3 (194-lf at the East Bed and 224-lf at the West Bed).	Revised Bid Form attached. Item No. 2. Concrete Crack Repair, Unit of Measure = LF, Est. Qty. = 418.
288	Valve #FCV-105 is listed with a Pressure Class of 250 in the valve list. The V404 specs call for class 150 flanges. The Pratt series 300 Plunger valve listed in the V404 specs have the flange and valve working pressure classes as one and the same in their literature. Please clarify this discrepancy.	Specification 15100 clarified: AWWA C207 Class E flange has the same drill pattern as ANSI B16.5 Class 150 flange. Pressure rating for the plunger valve shall be 250 psi. **REVISE SPECIFICATION SECTION 15100, 2.1.R.1**
289	Valve #PCV-102 is listed with a Pressure Class of 250. The V284 specs call for a Class 125 rated body, with adjustable inlet/outlet relief pressures of 20-200 psi. Please clarify this discrepancy.	Specification 15100 clarified: Pressure rating shall be 250 psi. Body is ductile iron. Flange drilling is ANSI B16.42 Class 150, which provides a pressure rating of 250 psi. **REVISE SPECIFICATION SECTION 15100, 2.1.M.1**
290	Valve #V-204 is listed with a Pressure Class of 250. The V206 BFV specs call for these BFVs to have a working pressure rating of 150 psi & 125# flanges. Please clarify this discrepancy.	Specification 15100 clarified: Pressure rating shall be 150 psi. Use V204 (Class 150B). V206 has been reassigned as an RO butterfly valve. **REVISE SPECIFICATION SECTION 15100, 2.1.J.7**
291	Valves #CK-802, 811, 812, 881 are all listed with a Pressure Class of 250 in the valve list. The V89 Check valve spec calls for 125# cast iron bodies, with pressure ratings of 175 psi for valves to 12" & 150 psi WP rating for 14"-20". Please clarify these discrepancies.	Specification 15100 clarified: Pressure rating shall be 250 psi. **REVISE SPECIFICATION SECTION 15100, 2.1.E.2**
292	Valve #CK-885 is listed with a Pressure Class of 250 in the valve list. The V93 duckbill Check valve spec calls for a pressure rating of up to 20 psi, with backpressure on the valve: 0 – 30 inches of water head. Please clarify this discrepancy.	CK-885 is not rated at 205 psi. See revised partial valve list
293	On sheet 400S-1 we are to provide a 2" FRP pultruded grating which is to span over a 6'-0 area. The maximum span with less than ¼" deflection is 54" or 4'-6". Additional structural supports will be required. Will the district be providing a revised drawing showing structural supports for the FRP grating? If a revised drawing will not be provided what material type will be required for the structural supports?	
294	Spec Section 1483.2.2.A.18.b requires all VFD's to have a softstart bypass. This option is not shown on the one-lines (GE-3 / GE-4), the elevation drawings (GE-5), or the control diagram (GE-27). Is this option required? If so, it will affect the layout extensively.	
295	Referring to the conduit schedule: 128 – require conduit and wire size 132 – shows ¾"c with 6-500MCM, with a #2 grd. Please clarify. 696 – shows 1 ½"c with 3-350MCM with a #8 grd. Should that be 3 - #3 with a #8 grd? 699 – shows 2"c with 3-300MCM with a #6 grd. Exceeds wire fill. Please clarify.	
296	Per FRP Gratings on Dwg 400S-1, etc, Dwgs 400S-6, 7, etc. show the Angle seats are Embed Angles. Per Note on 3 / GS-5, our interpretation is these Angle Seats are Stainless Steel. Correct?	
297	Per FRP Grating Supports on Dwg 600S-1, Details C, D, E, F / Dwg 600S-5 show the Angle seats are Ledger Angles. Per Note on 3 / GS-5, our interpretation is these Angle Seats are FRP. Correct?	
298	Per Detail 3 / GS-5, the C9x15 Channel Beams are FRP for both Area 400 & Area 600. Correct?	
299	Per Dwg 600S-2, etc, there are some Ladders shown but having no call-outs. What is the material for these Ladders?	
300	Spec Section 02743 has Trench AC Replacement at 1 ½" Thickness greater than existing. The referenced standard drawing DS-22 show's replace at 1" thicker than existing. What will be required.	County Maintained streets to be restored per County standards. See RFI #35
301	Spec Section 02743- What will be the asphalt seal coat placement area requirements in the San Diego Road. Lane Width or over Grind & Cap Width?	See RFI #120
302	What type of valve is valve tag CK-720 shown on drawing 700M-2	See RFI #198
303	Spec 15000 section 2.2-A and C are clear on when the use of carbon steel vs stainless steel bolt and nuts shall be used, spec section 15051 section 2.1-B.2c appears to contradict what's allowed per section 15000 section 2.2-A, please clarify.	**Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 15000 PIPING COMPONENTS REPLACE the word "carbon" with 316 stainless steel" in Paragraph 2.2.A.
304	Specification section 01115-1.4 C - Gheen Pump Station Improvements - the contractor is given 360 days after NTP to complete the work on the Gheen PS site and if the new 4MG water storage tank and piping is selected as an alternate this additional work must still be complete within the 360 days from NTP timeframe. We have analyzed the schedule with the 4MG water tank and the 360 day timeframe is not enough time to complete this work without significant overtime or double shifts. We request that an additional 90 days be added to the allowed completion time in order to avoid the premium time costs that will need to be included in our bids.	**Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 01115 CONSTRUCTION SEQUENCE AND COORDINATION Revise Paragraph 1.4.C.4 to read: 4. All the work on the Gheen site shall be accomplished within the first 500 days after notice to proceed. Revise Paragraph 1.4.C.5 to read: 5. ...with completion within the first 500 days after notice to proceed. ADD Paragaraph 1.4.C.6 (per RFI #115) to read: 6. Demolition of existing 1 MG Martin Reservoir shall be completed within 90 days of notice to proceed.

RFI #	RFI Question	RFI Answer
305	Specification section 01115-1.4 D -Distribution System Improvements - the contractor is given 360 days after NTP to complete all of the distribution system work. The pipe and valve material will generally take 4-6 weeks for shop drawings, assuming a 3-4 week submittal review and current fabrication time for pipe is 12-15 weeks and valves can be as much as 20-26 weeks. This project having AIS requirements will typically extend lead time durations. The material will not be showing up onsite until a minimum 6 months after NTP. We have analyzed the schedule and feel that a minimum of 12 months of contruction time is needed for the distribution system work. We request that and additional 6 months be added to the allowed completion time for the distribution system work.	**Make the following modifications to the Contract Documents.** SPECIFICATION SECTION 01115 CONSTRUCTION SEQUENCE AND COORDINATION Revise Paragraph 1.4.D.1 to read: 1. ...within a 6 six hour period... Revise Paragraph 1.4.D.5 to read: 5. ...and within 540 days after notice to proceed. Revise Paragraph 1.4.D.6 to read: 5. ...and within 540 days after notice to proceed.
306	Bid Item No. 5 is Rock Excavation with an estimated quantity of 4,200 CY. We are assuming that this quantity is an estimate to cover any Rock excavation work in the plant, offsite pipelines, and the Gheen Site. Does the engineer have an estimate on what portion of this 4,200 CY is within the plant, what portion is with the pipeline work and what portion is at the Gheen site?	
307	We have been unable to locate details for the concrete around the RO and Chemical Facilities. We have attached a highlighted drawing showing the areas where we have been unable to find details. Please provide the concrete thickness and any reinforcing requirements for this concrete work.	
308	Section 11500 of the specifications call out for internal cathodic protection of the tanks. It seems there is already a design in place as the specification keeps referring “as shown in the Drawings” but there are not any CP details in the plans. Will there be an addendum to include CP detail drawings?	Remove the phrase "as shown in the drawings" within spec Section 11500 in relationship to Cathodic Protection, 2.14.A thru J. Under 1.4.C.1 add: "t. Internal tank cathodic protection design including anode, reference cell , and access port locations, complete hanger and connection system design, access handhole and junction box and reference cell placement, silver solder or brazing details, anode encapsulation and PVC cap details, access handhole bolting and nut details, terminal board details, anode lead wire splice to the header wire details, and wire size and insultation information.
309	The responsibility for disconnecting means as well as motor control for valves is required by Specification Section 15100 –Valves. Drawing 200E-3 shows symbol $M mounted on a stanchion for each MV and FCV. This symbol is shown on the Symbol List Drawing GE-1 as a “manual motor starter”. Does this mean you want a second motor starter furnished by the contractor?	
310	Specification 15100 For the V206 valve type it’s specifies Butterfly Valves are required to meet AWWA C504. Typically industrial butterfly valves, high performance are used on RO Systems. Is it possible to remove the AWWA C504 requirement for these valves or for this service, or provide alternative specification for Industrial style valve. Industrial style valves (Bray, Keystone, etc) offer a lot of advantages for the proposed system, namely 1.) They are rated for many times the number of cycles as AWWA valves. 2.) They typically have lower Cv values making the energy costs lower.	Butterfly valve for RO service has been added. See revised Specification Section 15100 and partial valve schedule by addendum.
311	Section 11150 2.1 D states ‘Filter vessels shall possess 2 cells per each filter with a common underdrain’ and 2.3 A states ‘The cells must be able to structurally withstand the operation of just one cell, while the other cell is isolated’, To have one cell in operation while one cell is down, the underdrain must be isolated, not common. Please clarify.	
312	Drawings only show one (1) filter to waste valve. If cells are to be isolated (separate underdrains), two (2) FTW valves are required. Either need to add another nozzle on the opposite side and run the header lateral underdrain all the way through cell 1 to get to the other side or redesign the effluent piping to accommodate FTW.	
313	Section 11150 2.1 D calls for a minimum filtration area of 361 sq ft, and 2.3 A calls for a 30’ side shell length which makes the overall filter length 36’ and the filtration area 414 sq ft, requiring us to bid a much larger tank than necessary. Please confirm required sideshell length.	
314	Section 11150 2.9 Describes backwashing and freeboard simulwash of both cells at the same time – blowers, piping, flows, etc will be excessive and do not match what they’ve designed for in plans/spec. Please confirm that backwashing one cell at a time is correct.	
315	Section 11150 2.11 A.3 We cannot find this valve in the drawings. Please confirm if this is the 10” outlet valve.	
316	Section 11150 2.11 A.5 We believe 3” may be too small for the air scour volume required. Can this be upsized to 4”?	
317	Section 1150 2.13 B calls for 3 cfm for one cell at a time but calls for two 40 HP blowers – 3 cfm for one cell at a time only requires a 20 HP blower (596 cfm for 3 cfm/sft). Please confirm 20 hp blowers will suffice.	
318	Section 11150 1.7 A.3 states ‘As part of the extended warranty, the IMSS shall include annual inspections of the IM vessels and system, which shall include inspection of internals, appurtenances and operation.’ In order to inspect the internals, ie; underdrains and airwash laterals, it would be necessary to remove and replace the filter media. Please clarify what these inspections should consist of.	
319	Apparently there is no reference to NEMA rating for electrical panel enclosures on the one line, panel schedule or floor plan drawings. For panels located outdoor and in wet environments there is a significant price difference for panels rated NEMA-3R and panels rated NEMA-4. Will you please provide the NEMA enclosure rating for the electrical panels shown on Drawings GE-21 through GE-26?	

RFI #	RFI Question	RFI Answer
320	Clarifications to Spec Section 11100	REVISE Paragraph 11100.1.4.C to read: Proof of certification of the entire pumping assembly by a third party in accordance with NSF 61/Annex G Standards. Proof of incorporation of NSF 61 compliant materials if certification not available for listed manufacturers. Include an NSF certified nameplate on each unit as applicable.
321	Clarifications to Spec Section 11162	See Attached edits to Section 11162
322	Clarifications to Spec Section 09900	Regarding coatings, Sherwin Williams is considered an equal.

SECTION 02200 – EARTHWORK

PART 1 – GENERAL

1.1 DESCRIPTION

A. The work of this section includes all earthwork required for construction of the work. Such earthwork shall include, but not be limited to, the loosening, removing, blasting, loading, transporting, depositing, and compacting in its final location of all materials wet and dry, as required for the purposes of completing the work specified in the Contract Documents, which shall include, but not be limited to, the furnishing, placing, and removing of sheeting and bracing necessary to safely support the sides of all excavation; all pumping, ditching, draining, and other required measures for the removal or exclusion of water from excavation; the supporting of structures above and below the ground; all backfilling around structures and all backfilling of trenches and pits; the disposal of excess excavated materials; borrow of materials to make up deficiencies for fills; and all other incidental work or services, all in accordance with the requirements of the Contract Documents.

B. In the event of discrepancies between this section and the geotechnical investigation report, the requirements and recommendations set forth in this section shall govern.

C. Earthwork for pipeline construction shall comply with Section 02223 – Trenching, Excavation, Backfilling, and Compacting

1.2 RELATED SECTIONS

A. Section 01300 – Record Drawings and Submittals

B. Section 01500 – Construction Facilities and Temporary Controls

C. Section 01545 – Protection of the Work and Property

D. Section 01600 – Materials and Equipment

E. Section 01710 – Clean-Up

F. Section 02100 – Site Preparation

G. Section 02140 – Dewatering

H. Section 02160 – Excavation Support Systems

I. Section 02223 – Trenching, Backfilling, and Compacting

J. Section 02274 – Geotextiles

K. Section 02940 – Revegetation

1.3 REFERENCE SPECIFICATIONS, CODE AND STANDARDS

A. Without limiting the generality of other requirements of the Contract Documents, all work specified herein shall conform to the local Grading Ordinances and Codes of the County of San Diego, Chapter 70 of the Uniform Building Code, or exceed the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this section.

1. Commercial Standards:

ASTM D422	Method for Particle-Size Analysis of Soils
ASTM D1140	Test Method for Amount of Material in Soils Finer than the No. 200 (75-um) Sieve
ASTM D1556	Test Method for Density of Soil in Place by the Sand-Cone Method
ASTM D1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3)
ASTM D1633	Test Method for Compressive Strength of Molded Soil-Cement Cylinders
ASTM D2419	Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D2487	Classification of Soils for Engineering Purposes
ASTM D2901	Test Method for Cement Content of Freshly-Mixed Soil-Cement
ASTM D4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D3017	Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D2922	Test Method for Density of Soil and Soil Aggregate in Place by Nuclear Methods
AASHTO T 224	Correction for Coarse Particles in the Soil Compaction Test

1.4 SUBMITTALS

A. Submit shop drawings and other required information in accordance with Section 01300.

B. Excavation Support Systems and Plans

1. The CONTRACTOR'S attention is directed to the provisions for "Shoring and Bracing Drawings" in Section 6705 of the California Labor Code. The CONTRACTOR, prior to beginning any trench or structure excavation 5 feet deep or over shall submit to the DISTRICT and shall be in receipt of the DISTRICT'S written acceptance of the CONTRACTOR'S detailed plan showing design of all shoring, bracing, sloping of the sides of excavation, or other provisions for worker protection against the hazard of caving ground during the excavation of such trenches or structure excavation. The plans shall be prepared by a civil or structural engineer licensed in the State of California and regularly engaged in the design of excavation support systems.

2. As a part of the plan, a note shall be included stating that the registered civil or structural engineer certifies that the plan complies with the CAL-OSHA Construction Safety Orders. If, however, the plan does not comply with the Safety Orders, the plan shall include a note stating that the registered civil or structural engineer certifies that the plan is not less effective than the shoring, bracing, sloping, or other provisions of the Safety Orders. Each copy of the plan shall have an original seal and "wet" signature of a civil or structural engineer registered in the State of California across the seal.

3. The detailed plan showing the design of shoring, bracing, etc. shall include surcharge loads for adjacent embankments, structures, stockpiles, vehicle traffic, construction equipment and other loadings which are reasonably expected to occur. The plan shall indicate the minimum horizontal distances from the top of the excavation to the near side of the surcharge loads for all trench conditions.

4. Nothing contained in this Section shall be construed as relieving the CONTRACTOR of the full responsibility for providing shoring, bracing, sloping or other provisions which are adequate for worker protection.

C. Submit testing laboratory report(s) verifying testing results for the physical characteristics of all material to be used including sieve analysis, sand equivalent, durability, expansion index, resistance (R-) value, organic content, corrosivity, and other tests as ordered by the ENGINEER.

D. Sample of backfill materials shall be submitted for testing.

E. A list and description of compaction equipment intended for use by the CONTRACTOR shall be submitted to the ENGINEER for approval in accordance with the requirements of this section.

1.5 QUALITY ASSURANCE

A. General: All soils testing will be done by a testing laboratory selected by the CONTRACTOR and approved by the DISTRICT. The CONTRACTOR shall bear

the costs of all resting and retesting required to verify conformance with the Contract Documents.

B. In case the tests of the fill or backfill show non-compliance with the required density, the CONTRACTOR shall accomplish such remedy as may be required to ensure compliance. Subsequent testing shall be at the CONTRACTOR'S expense.

C. Sample backfill materials in accordance with ASTM D75.

D. Particle size analysis of soils and aggregates will be performed using ASTM D422.

E. Field density in-place tests will be performed in accordance with ASTM D1556, or by such other means acceptable to the ENGINEER.

F. Determination of sand equivalent value will be performed using ASTM D2419.

G. The expansion index of soils shall be determined in accordance with ASTM D4829.

H. Unified Soil Classification System: References in these Contract Documents to soil classification type and standards are set forth in ASTM D2487 shall have the meanings and definitions indicated in the unified soil classification system. The CONTRACTOR shall be bound by all applicable provisions of ASTM D2487 in the interpretation of soil classifications.

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

1.7 SAFETY PRECAUTIONS

A. Nothing contained in this Section shall be construed as relieving the CONTRACTOR of the full responsibility for providing shoring, bracing, sloping, or other provisions, which are adequate for worker protection.

B. Nothing contained in this section is intended to relieve the CONTRACTOR of its responsibility to carefully examine the Contract Documents and the site where the work is to be performed; to familiarize himself with all the local conditions and federal, state, and, local laws, ordinances, rules, and regulations that may affect the performance of any work; to study all surveys and investigative reports about subsurface and latent physical conditions pertaining to the site; to perform any additional surveys and investigations as the CONTRACTOR deems necessary to complete the work at its proposal price; and to correlate the results of all such data with the requirements of the Contract Documents.

1.8 OBSTRUCTIONS

A. The CONTRACTOR’s attention is directed to the possible existence of pipe and other subsurface improvements which may or may not be shown on the Drawings. Preserve and protect any such improvements whether shown on the Drawings or not. Expose such improvements in advance of the pipeline construction to allow for changes in the alignment as necessary. Where it is

necessary to remove and replace or to relocate such improvements in order to prosecute the work, they shall be removed, maintained, and permanently replaced by the CONTRACTOR at his expense. Protect existing underground utilities in accordance with Section 01545.

1.9 TESTING

A. The CONTRACTOR shall provide and pay for all testing services as described elsewhere in the specifications.

B. The following test procedures shall apply to the sampling, placement and compaction of materials used in fill and backfill:

1. The density of soil in place shall be determined by the sand cone method, ASTM D1556 or by nuclear methods, ASTM D2922 and D3017.

2. The laboratory moisture-density relations of soils shall be determined by ASTM D1557.

3. The relative density of cohesionless soils shall be determined by ASTM D4253 and D4254.

4. Samples of backfill materials shall be obtained in accordance with ASTM D75.

C. “Relative compaction” is the ratio, expressed as a percentage of the in place dry density to the laboratory maximum dry density.

D. The CONTRACTOR shall make excavations for compaction tests at the locations and to the depths designated by the ENGINEER and shall backfill and compact the excavations upon completion of testing. When tests indicate that the compaction is less than the specified relative compaction, the CONTRACTOR shall rework those areas until tests indicate that the specified relative compaction has been obtained.

E. A minimum of one (1) compaction test shall be performed per 100 cubic yards of fill or backfill placed for embankment construction. A minimum of one (1) compaction test shall be performed for every 50 linear feet and one foot of depth of trench backfill.

1.10 WATER FOR CONSTRUCTION

A. Water shall be obtained in accordance with Section 01500.

PART 2 – MATERIALS

2.1 NATIVE EARTH FILL AND BACKFILL

A. Native earth fill and backfill shall be excavated soil materials free of asbestos, organic matter, roots, debris, rocks or lumps larger than 4-inches in maximum

dimension, clods, clay balls, broken pavement and other deleterious materials. Imported materials shall have an expansion index of 50 or less. Qualified personnel under the responsible charge of a licensed geotechnical engineer shall inspect and test the native materials prior to use in fill or backfill, or the imported materials before they are brought to the site.

2.2 IMPORTED MATERIAL

A. Imported material shall conform to that specified for native earth backfill material and shall possess a low corrosivity potential to steel and concrete when tested in accordance with California Tests 643, 422, and 417.

B. Pipe base and Pipe Zone material shall conform to Section 02223 – Trenching, Backfilling and Compacting.

C. Unclassified material shall conform to SSPWC Subsection 300-4.

2.3 STRUCTURAL BACKFILL

A. Structural backfill shall consist of granular material free of asbestos, organic materials, clay balls and deleterious substances and shall have the following gradation:

U.S. Standard Sieve Size	Percent Passing By Weight
3/4-inch	100
1/2- inch	95 - 100
3/8-inch	50 - 100
No. 4	20 - 65
No. 8	10 - 40
No. 40	0 - 20
No. 200	0 - 5

B. Whenever the phrase "structural backfill” is used in these Specifications, it shall mean granular structural backfill material as described above.

C. Excavated material may be used for structural backfill if it conforms to the specification for structural backfill material.

2.4 FILL AND BACKFILL MATERIAL TYPES

A. The CONTRACTOR shall use the types of materials as designated herein for all required fill, backfill, and embankment construction hereunder.

B. Where these Contract Documents conflict with the requirements of any local agency having jurisdiction, or with the requirements of a material manufacturer, the ENGINEER shall be immediately notified. In case of conflict therewith, the CONTRACTOR shall use the most stringent requirement as determined by the ENGINEER.

C. Backfill materials placed against or beneath subsurface structures shall consist of structural backfill or crushed rock as follows:

1. Crushed rock or gravel shall conform to the gradation and quality requirements of SSPWC Section 200-1.2 for the size specified. Unless otherwise specified, crushed rock shall consist of 3/4-inch maximum size.

2. Unless otherwise shown on the Drawings, materials beneath slabs shall consist of a 4-inch thick layer of 3/4-inch or finer crushed rock. Slabs beneath moisture sensitive floor coverings shall be underlain by 2 inches of clean, medium to coarse sand; over a 10-mil polyethylene membrane; over 4 inches of medium to coarse sand or pea gravel.

3. Precast concrete vaults shall be bedded with a 6-inch thick layer of 3/4-inch crushed rock.

4. Backfill materials placed against earth retaining structures or subsurface walls or vaults shall consist of structural backfill material.

D. Permeable material for subsurface drains or where specified shall consist of Class 2 permeable material per Section 68-1.025 of the State (Caltrans) Standard Specifications.

E. Refer to Section 02223 for bedding and backfill material requirements for pipe zone backfill for pipeline construction.

F. Fill and backfill materials used in embankment construction or for remedial grading shall consist of native earth material or imported material as defined herein. Imported materials shall be used only after on-site sources of suitable native materials have been depleted and as approved by the ENGINEER.

2.5 UNSUITABLE MATERIAL

A. Unsuitable material consists of soils which, when classified under the standard method for "Classification of Soils for Engineering Purposes," ASTM D2487, are classified as Pt, OH, CH, MH, or OL. The determination of material which is potentially expansive, organic or generally unsuitable shall be determined by the ENGINEER.

B. In addition, unsuitable material is considered to be any soil containing organic matter, sod or other deleterious materials; having a plastic limit of less than 8 percent when tested in accordance with the requirements of ASTM D4318; and containing more than 25 percent of material, by weight, passing the No. 200 sieve when analyzed according to ASTM D1140; or any soil which, in the ENGINEER’s opinion, contains a sufficient quantity of potentially expansive or organic materials so as to make it unsuitable for the intended use.

C. Oversize material, defined as rock or other irreducible material with a maximum dimension greater than 4 inches shall not be buried or placed in fill or backfill

unless the location, materials, and disposal methods are specifically approved by the ENGINEER (i.e., non-structural fill areas). Oversize material disposal operations must be such that nesting of oversize material does not occur, and that the oversize material is completely surrounded by compacted or densified fill. Oversize material should not be placed within 10 feet vertically of finish grade, within 2 feet of future utilities or underground construction, or within 15 feet horizontally of slope faces.

2.6 GEOTEXTILE FILTER FABRIC

A. Geotextile filter fabric shall conform to the requirements of Section 02274.

2.7 WATER FOR COMPACTION

A. Water used in compaction shall have a maximum chloride concentration of 500 mg/l, a maximum sulfate concentration of 500 mg/l, and shall have a pH of 7.0 to 9.0. Water shall be free of acid, alkali, or organic materials. Salt water will not be allowed.

PART 3 – EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall conduct earthwork as necessary to complete the work as shown on the Contract Drawings and specified herein. The CONTRACTOR shall take the necessary precautionary measures to prevent dust, sediment tracking or other nuisances which might be created by reason of its activities. The necessary precautionary measures shall at a minimum conform to the requirements of the General Provisions. If in the opinion of the ENGINEER adequate site maintenance measures are not being provided, the CONTRACTOR shall alter the work process or make necessary changes for compliance at no additional cost to the DISTRICT.

B. Pursuant to California Code of Regulations, Title 8, Section 1541, at least two working days before the start of excavation, the CONTRACTOR shall notify the Regional Notification Center (Underground Service Alert – 811) and any known owners of underground facilities in the area who are not members of the Regional Notification Center of the proposed excavation.

C. The CONTRACTOR shall protect in place all existing utilities and improvements that are not specified for demolition and/or removal in accordance with Section 01545.

D. Earthwork within public rights-of-way controlled by a state, utility agency, county, or city shall be in accordance with requirements and provisions of the permits issued by those agencies for the construction within their respective rights-of-way. Such permit requirements and provisions which are more restrictive than those specified herein, shall take precedence and supersede the provisions of these Specifications.

E. The use of water jetting for excavation is not allowed under any circumstance.

3.2 SITE PREPARATION

A. Prior to excavation or grading, clear and prepare the existing ground surface in accordance with Section 02100. Areas to be graded or to receive improvements shall be stripped of all vegetation and debris and the resulting materials shall be removed and disposed of off-site.

3.3 PROTECTION

A. Protection of the site shall be responsibility of the CONTRACTOR. Make temporary provisions during the rainy season to adequately slope graded areas and direct surface drainage away from and off the work site. Dispose of the water in a manner to prevent damage to adjacent property and in accordance with regulatory agency requirements.

B. Use plastic sheeting to prevent unprotected slopes from becoming saturated. Install check dams, desilting basins, riprap, sand bags, or other devices or methods necessary to control erosion.

C. Following periods of rainfall, the CONTRACTOR will visually assess rain related damage. At the request of the ENGINEER, the CONTRACTOR shall make excavations in order to evaluate the extent of rain related damage.

D. Rain related damage will be considered to include, but may not be limited to, erosion, sitting, saturation, swelling, structural distress and other adverse conditions identified by the CONTRACTOR or ENGINEER.

E. Where soil has been adversely affected by rain related damage, it shall be reworked or replaced with compacted fill or other remedial measures as directed by the ENGINEER.

F. The CONTRACTOR shall furnish, place, and maintain all supports and shoring that may be required for excavations. Excavations shall be sloped or otherwise supported in accordance with the requirements of the California Division of Occupational Safety and Health and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926), as applicable.

G. Do not operate excavation equipment within 5 feet of existing structures or newly completed construction, or within a distance equal to the height of adjacent earth retaining structures.

3.4 DEWATERING

A. Conduct dewatering as necessary in accordance with Section 02140. Comply with the requirements of permits or conditional waivers issued by the Regional Water Quality Control Board and applicable to the Work. Conduct all pumping, ditching, or other practices for the removal or exclusion of stormwater, groundwater, or wastewater so as to prevent damage to the Work or adjoining property.

3.5 STRUCTURE, ROADWAY, AND EMBANKMENT EXCAVATION

A. Excavation shall include the removal of all materials or obstructions of whatever nature that would interfere with the proper execution and completion of the Work, except for utilities or structures that are to remain or unless noted otherwise. Excavate materials to the lines and grades shown or ordered. Excavations resulting from the removal of buried obstructions which extend below finish grade should be backfilled and compacted with suitable material as specified herein.

B. The CONTRACTOR shall notify the ENGINEER in writing at least 3 days in advance of completion of any structure excavation and shall allow the ENGINEER a review period of at least one day before the exposed excavation is scarified and compacted or is covered with backfill or with any construction materials.

C. After the required excavation has been completed, the ENGINEER will inspect the exposed subgrade to determine the need for any additional excavation. The CONTRACTOR shall perform additional excavation in all areas within the influence of the structure where unsuitable materials such as yielding or deleterious materials exist at the exposed subgrade. Over-excavation shall include the removal of all such unsuitable material that exists directly beneath the planned structure or within a zone defined by a plane projected at 1:1, horizontal to vertical, from the bottom outside edge of structure foundations. Backfill the over-excavated areas with material approved for the intended use in accordance with this Section.

3.6 REMEDIAL GRADING

A. Undocumented fill, native compressible soil or other materials deemed unsuitable for the support of engineered fill shall be over-excavated from all areas to receive fill. Removals should not encroach within a 1:1 plane projected downward and away from the outside bottom edge of existing footings.

B. Cut/fill transitions beneath structure foundations, load bearing slabs, and equipment pads shall be removed by over-excavating five (5) feet horizontally beyond the edge of the structure and to a depth of two (2) feet below the bottom of the foundation or one-third of the maximum fill depth (extending to the bottom of removals), whichever is greater.

C. The Water Treatment Plant yard piping area (to receive crushed rock surfacing and confined by the interior edge of the perimeter road) shall be over-excavated to a depth of two (2) feet below subgrade of crushed rock and backfilled with approved native material.

D. The subgrade exposed in over-excavations shall be scarified to a depth of 8 inches, moisture conditioned between optimum moisture content and 2 percent above optimum, and compacted to a minimum of 90 percent relative compaction in accordance with ASTM D1557.

3.7 EXCAVATION LIMITS FOR VAULTS AND STRUCTURES

A. Excavate to the depths and widths needed to accomplish the construction. Allow for shoring, forms, working space, and structural backfill. Provide smooth surfaces in excavations for uniform bedding or bearing conditions.

B. Do not extend excavations for vaults or conduits deeper than the required or shown elevations unless unsuitable material is encountered. Backfill the over-excavation to the proper elevation with compacted structural backfill material as described in this Section.

3.8 OVER-EXCAVATION NOT ORDERED, SPECIFIED, OR SHOWN

A. Any over-excavation that extends below the grade ordered or specified shall be backfilled and compacted to the required grade with the specified material. Such work shall be performed by the CONTRACTOR with no additional compensation from the DISTRICT.

3.9 ROCK EXCAVATION

A. Classified rock excavation is defined as the removal of solid rock in ledges, bedded deposits, or unstratified masses from within the specified or indicated excavation or trench limits which, by actual demonstration, cannot be reasonably excavated with a 235 Caterpillar track mounted hoe equipped with a standard 9-1/2 ft stick with general duty rippers and rock points, and in good working condition with experienced operators, or equipment of similar capacity. The term “rock excavation” shall be understood to indicate a method of removal and not a geological formation. Boulders larger than one cubic yard will be classified as rock if rock breaking or systematic drilling and blasting are required and are actually utilized for their removal.

B. A certain amount of rock excavation may be necessary to complete the project. An amount has been included on the bid form for bidding purposes. The CONTRACTOR is required to demonstrate to the Construction Manager that excavation to be submitted for payment under the bid item “rock excavation” will classify as rock excavation and obtain written authorization prior to proceeding. The contractor shall provide a separate demonstration and obtain written authorization of the Construction Manager for each area where rock excavation is required. The materials derived from rock excavations shall be designated as rock excavation spoils and shall not be mixed with any other types of excavated materials for quantifying the volume of rock excavation. The CONTRACTOR shall notify the Construction Manager prior to performing rock excavation in any area on any given day.

C. Final payment for rock excavation will be adjusted for the actual volume of rock excavation actually performed by the CONTRACTOR and approved by the Construction Manager.

3.10 MOISTURE CONTROL FOR FILL AND BACKFILL

A. Fill and backfill shall be brought to uniform moisture content throughout the lift prior to compaction operations. Insofar as practical, add water to material at the site of excavation. Supplement by controlled watering of fill and backfill materials. At the time of compaction, the water content of the material shall be at optimum moisture content or within 2 percentage points above optimum. During the compacting operations, maintain optimum moisture content in each lift of the material. Aerate material containing excessive moisture by blading, discing or harrowing until the specified moisture content is achieved.

3.11 COMPACTION REQUIREMENTS

A. All fill and backfill shall be compacted to a minimum of 90 percent relative compaction unless otherwise specified herein, shown on the Drawings, or required by a jurisdictional agency.

B. The upper 12 inches of subgrade beneath asphalt concrete and Portland cement concrete pavements shall be compacted to 95 percent relative compaction.

3.12 SUBGRADE FOR STRUCTURE FOUNDATIONS AND VAULTS

A. Excavate and shape the subgrade to line, grade and cross section. The finished subgrade shall be within a tolerance of +/-0.08-foot of the grade and cross section shown or required. The surface shall be firm and unyielding.

B. Remove yielding, deleterious, or weathered materials where encountered in the subgrade of excavations and replace with structural backfill material. Backfill voids and depressions created by excavation to the required line, grade and cross section with structural backfill material and compact to 90 percent relative compaction.

C. Place crushed rock to a thickness of 6 inches over the full width of the exposed subgrade beneath vaults.

D. If saturated subgrade conditions are encountered in excavations for vaults, and upon the approval of the geotechnical engineer, extend the excavation one foot below the planned subgrade elevation and backfill with crushed rock enveloped in geotextile filter fabric.

3.13 PLACING BACKFILL MATERIAL

A. Remove form materials, trash, and construction debris from the excavation before placing backfill material. Obtain the specified compressive strength and finish of concrete work per the requirements of the specification section pertinent to the Work before backfilling.

B. Do not operate earthmoving equipment within 10 feet of walls of concrete structures. Compact backfill adjacent to concrete walls, vaults, or other structures with hand-operated compaction equipment that will not damage the structure.

C. Place structural backfill material around piping, vaults, or earth retaining structures to the lines and grades ordered or specified. The un-compacted thickness of soil lifts shall not exceed 8 inches. Compact each lift to a minimum of 90 percent relative compaction unless otherwise ordered or specified.

D. Place native earth or imported backfill to the lines and grades shown in the areas that are not required to receive structural backfill. Place native earth backfill in maximum 8-inch thick loose lifts and compact each lift to a minimum of 90 percent relative compaction unless otherwise ordered or specified.

E. Place and compact backfill to 6 inches below finish grade in all areas where native or imported topsoil is to be placed.

3.14 PLACING FILL MATERIAL IN EMBANKMENTS

A. All areas to receive fill shall be observed and/or tested and approved by qualified personnel under the responsible charge of a licensed geotechnical engineer prior to the placement of fill material. If fill material is placed prior to approval of the subgrade, the CONTRACTOR shall remove said fill at the direction of the ENGINEER, prepare the subgrade in accordance with these specifications and obtain approval from the ENGINEER before replacing the fill material.

B. Existing sloping surfaces to receive fill shall be keyed and benched. Excavate horizontal keys at the base of fill slopes and horizontal benches along sloping ground surfaces inclined at 5:1 (horizontal to vertical) or steeper. Keys and benching shall be at least 10 feet wide horizontally and sufficiently wide to permit compaction of fill placed for the entire width of the key. The back cut of horizontal benches shall expose at least 2 vertical feet of competent, native materials.

C. Native earth backfill or imported fill material shall be used for embankment construction. Highly organic soil and deleterious materials removed from keyway excavations shall be segregated and not incorporated into the fill soils.

D. Moisture condition all fill materials as specified in this Section prior to compaction.

E. Prepared subgrade to receive fill shall be scarified to a minimum of 8 inches, watered or dried, as needed, to achieve moisture content above the laboratory optimum moisture content, and compacted to 90 percent relative compaction based on ASTM D1557 laboratory test procedure.

F. Fill shall be placed in lifts of 8-inches or less in loose thickness, moisture conditioned to optimum moisture content and compacted to 90 percent relative compaction.

G. Final fill slopes shall not be steeper than 2:1 (horizontal:vertical). Compact fill slopes using sheepsfoot rollers, by tracking with a dozer, by overbuilding the slope face and cutting back to design grade, or by other methods that will

achieve the specified compaction. Compact slopes to not less than 90 percent relative compaction at a horizontal distance not to exceed one foot from the slope face.

3.15 FINISH GRADING

A. Place fill and grade all ground surfaces to achieve the lines and grades shown on the Drawings. Remove exposed roots and loose rocks exceeding 4 inches in diameter. Round the tops of cut slopes to contour into existing ground with vertical curves with not less than a 5-foot radius. All finished surfaces shall be trimmed neat and smooth.

3.16 DISPOSAL OF EXCESS EXCAVATED MATERIAL

A. The CONTRACTOR shall legally dispose of all excess excavated material offsite. The CONTRACTOR shall make all arrangements for the disposal of excess material and bear all incidental costs for such disposal.

3.17 FINAL CLEAN-UP

A. After finish grading, remove all cleared vegetation, rubbish, loose rocks and other construction waste and legally dispose of such materials. Do not dispose of rocks within the work site by burying.

****END OF SECTION****

SECTION 05311 - STEEL ROOF DECK

PART 1 GENERAL

1.1 DESCRIPTION

A. Contractor shall provide all labor, materials, equipment and incidentals required and install steel roof deck complete as shown on the Drawings and as specified herein.

1.2 RELATED SECTIONS

A. Section 01300, Record Drawings and Submittals

1.3 REFERENCE SPECIFICATIONS AND STANDARDS

A. Steel Deck Institute (SDI)

1. SDI Specifications and Commentary for Steel Roof Deck.

B. American Society for Testing and Materials (ASTM)

1. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

2. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
3. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

C. American Iron and Steel Institute (AISI)

1. AISI SG-673 Specification for the Design of Cold-Formed Steel Structural Members

D. Where reference is made to one of the above standards, the revisions in effect at the time of bid opening shall apply.

1.4 SUBMITTALS

A. Submit, in accordance with Section 01300, shop drawings and product data showing:

1. Location and size of all members.
2. Materials, finishes and details of construction of all members.
3. Manufacturer's load table including design thickness in inches and section properties.
4. Fastener types and layout patterns.
5. Erection marks. Mark each bundle to correspond to the shop drawings.

B. Certification from the Steel Deck Institute (SDI) that the steel roof deck is designed in accordance with SDI specifications.

C. Certification for welders.

1.5 QUALITY ASSURANCE

A. Steel roof deck: Conform to the requirements of the SDI Specifications for Steel Roof Deck.

B. Field welding: Shall be performed by certified welders and in accordance with the AISI Specification. Certification shall be by test within the past 6 months to perform type of work required in conformance with the AISI Specification. Testing to be conducted and witnessed by an independent testing laboratory provided by the Contractor.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle material with cranes and derricks. Do not dump materials off cars or trucks, or handle in any way that will cause damage.

B. Store materials off the ground with one end elevated to provide drainage. Protect from the elements with a waterproof covering, ventilated to avoid condensation.

C. Remove and replace damaged material with new undamaged materials.

1.7 PROJECT/SITE REQUIREMENTS

A. Notify the Engineer of any inaccuracies in alignment or level of structural steel in writing and correct before the deck is placed at no additional cost to the Owner.

1.8 DEFINITIONS

A. Transverse supports - supports which are perpendicular to the direction of the deck ribs.

B. Longitudinal support - supports which are parallel to the direction of the deck ribs.

PART 2 PRODUCTS

2.1 MATERIALS

A. Steel roof deck shall be 1-1/2-in rib depth, type HSB. Deck sheets shall be 36-in wide with nestable side laps. Gauge shall be as shown on the Drawings.

B. Steel roof deck and accessories shall be manufactured from steel conforming to ASTM A653 SQ, Grade 33, 37, 40, 50 or 80.

C. Steel roof deck and accessories shall be galvanized in accordance with ASTM A653, coating designation G90.

D. Provide minimum 20 gauge galvanized closure strips, eave plates, ridge plates, valley plates, cant strips, and butt plates as shown on the Drawings and as specified herein. Provide minimum 14 gauge roof sump pans as shown on the Drawings.

E. Screws shall be self-drilling, self-tapping hex washer head #10 TEKS screws with corrosion resistant coating.

F. Provide galvanized touch-up to repair damaged surfaces. Use Endupor, zinc-rich coating by Dampney Manufacturing Co., Everett, MA; ZiRP, zinc-rich coating by Duncan Galvanizing Corp., Everett, MA; ZRC Cold Galvanizing Compound by ZRC Chemical Products Co., Division of Norfolk Corp., Quincy, MA, or equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install steel roof deck as shown on the Drawings, in accordance with manufacturer's instructions and in accordance with approved shop drawings. Extend deck sheets over three or more spans.

B. End laps of steel roof deck shall be at least 2-in long and shall occur over transverse supporting members.

C. Fasten deck to all supporting steel to accommodate diaphragm action as specified below.

1. Fasten at interior and end transverse supports with 5/8-in diameter arc spot welds at the bottom of every rib at each support and at a spacing not to exceed 12-in with one weld always occurring at the side laps. Fasten partial sheets (those less than 36-in wide) at the bottom of every rib.
2. Fasten at interior and exterior longitudinal supports with 5/8-in diameter are spot welds at a spacing not to exceed 12-in.
3. Connect the deck sheets along their side laps with 1½” top seam weld at a spacing not to exceed 18-in.

D. Maintain contact between deck sheets and between deck sheets and steel supports while fastening steel roof deck to reduce burn holes at welded connections and to eliminate eccentricities between the connected parts at screwed connections.

E. Welds to supporting members at end laps and side laps shall go through both sheets and fuse to the supporting steel.

F. Install screws using tools that prevent fracturing screws, damaging screw heads or stripping threads due to overdriving.

G. Install another screw adjacent to fractured or stripped screws. Remove screws where eccentricities exist between deck sheets and between deck sheets and steel supports and install another screw nearby while maintaining contact between the parts to be connected.

H. Coordinate indicated penetration size, location and details with other trades and details of approved equipment. Pipe and conduit openings in the steel roof deck shall be reinforced according to the manufacturer's recommendation.

1. Cutting and Fitting

a. Cut and fit steel roof deck units and accessories around projections through steel roof deck.
b. Cuts shall be square and free of burrs.
c. Cut openings in steel roof deck true to dimensions.
d. Do not use cutting torches if deck is to be exposed in the finished condition.
e. Reinforce openings 6-in and greater and less than 12-in in greatest dimension with a 24-in by 24-in flat plate, minimum 20 gauge thickness, centered on the opening.

I. Weld closure strips, eave plates, ridge plates, valley plates, cant strips, butt plates, roof sump pans, and reinforcing plates directly to steel deck.

1. Roof Sump Pans and Reinforcing Plates

a. Place roof sump pans and reinforcing plates over openings in steel roof deck and weld to top surface of steel roof deck.
b. Space welds not more than 6-in on center with at least one weld at each corner.
c. Cut opening in roof sump pan or reinforcing plate to accommodate drain or other fixture.

2. Ridge Plates, Valley Plates, Cant Strips and Butt Plates

a. Weld to top surface of steel roof deck at no more than 12-in on center.
b. Lap end joints not less than 3-in.

3. Closure Strips and Eave Plates

a. Install closure strips at all open uncovered ends and edges of steel roof deck and in voids between deck and other construction.
b. Weld to top surface of steel roof deck at not more than 12-in on center to provide support of roof insulation.

J. Do not attach suspended ceilings, light fixtures, ducts, piping, conduits or other utilities to steel roof deck.

3.2 TOUCH-UP PAINTING

A. Clean and repair all steel surfaces which have become abraded or where galvanizing has been damaged due to welding and/or erection procedures.

B. Repair abraded or damaged galvanized areas using the touch-up material specified above to produce a dry film thickness of not less than 6 mils. Conduct all repairs of galvanizing in accordance with ASTM A780.

3.3 INSPECTION

A. The Engineer will inspect steel roof deck in the field for compliance with this Section and the approved shop drawings. The Engineer may reject and require repair or replacement of any steel roof deck or accessories not meeting the requirements of this Section.

****END OF SECTION****

PART 1 - GENERAL

1.1 DESCRIPTION

A. The CONTRACTOR shall furnish, fabricate (where necessary), and install fiberglass reinforced plastic (FRP) grating, with all appurtenances, accessories and incidentals necessary to produce a complete, operable and serviceable installation as shown on the Contract Drawings and as specified herein.

1.2 REFERENCE SPECIFICATIONS, CODE AND STANDARDS

A. The publications listed below (latest revision applicable) form a part of this specification to the extent referenced herein. The publications are referred to within the text by the designation only.

1. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) Test Methods:

a. ASTM D 635 Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
b. ASTM E 84 Surface Burning Characteristics of Building Materials
c. NSF/ANSI STANDARD 61

1.3 SUBMITTALS

A. The CONTRACTOR shall furnish manufacturer's shop drawings clearly showing material sizes, types, styles, part or catalog numbers, complete details for the fabrication and erection of components including, but not limited to, location, lengths, type and sizes of fasteners, clip angles, member sizes, and connection details.

B. The CONTRACTOR shall submit the manufacturer’s published literature including structural design data, structural properties data, grating load/deflection tables, corrosion resistance tables, certificates of compliance, test reports as applicable, concrete anchor systems and their allowable load tables, and design calculations for systems not sized or designed in the contract documents.

C. The CONTRACTOR shall submit a sample piece for acceptance by the Engineer as to quality and color. Sample pieces shall be manufactured by the same method as those to be installed on the Project.

D. CONTRACTOR shall submit layout for FRP grating that is consistent with the Contract Documents. Submittals shall show size of individual pieces of grating, overall framework supporting grating, fastener and support locations and details. CONTRACTOR shall provide calculations stamped by a professional Engineer showing that the layout meets CBC code and design loads specified herein.

E. CONTRACTOR shall submit layout for FRP covers that is consistent with the Contract Documents. Submittals shall show size of individual pieces of covers, overall framework supporting covers, fastener and support locations and details. CONTRACTOR shall provide calculations stamped by a professional Engineer showing that the layout meets CBC code and design loads specified herein.

1.4 QUALITY ASSURANCE

A. All items to be provided shall be furnished only by manufacturers having a minimum of ten (10) years experience in the design and manufacture of similar products and systems. Additionally, if requested, a record of at least five (5) previous, separate, similar successful installations in the last five (5) years shall be provided.

B. Manufacturer shall offer a 3 year limited warranty on FRP grating and appurtenances against defects in materials and workmanship.

C. Manufacturer shall be certified to the ISO 9001-2008 standard.

1.5 PRODUCT DELIVERY AND STORAGE

A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Adhesives, resins and their catalysts and hardeners shall be crated or boxed separately and noted as such to facilitate their movement to a dry indoor storage facility.

B. Storage of Products: All materials shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, other deformations, and other types of damage. Adhesives, resins and their catalysts are to be stored in dry indoor storage facilities between 70 and 85 degrees F until they are required.

PART 2 - PRODUCTS

2.1 GENERAL

A. FRP grating and appurtenance shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet the the requirements of the Contract Documents.

B. FRP grating and appurtenance shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet the dimensions of the FRP grating as shown on the Contract Documents.

C. Resin shall be vinyl ester or other selected by the manufacturer, chemically formulated to provide corrosion resistance to gases from wastewater. The vinyl ester or other resin selected by the manufacturer shall be able to meet the strength and physical properties specified herein

D. All finished surfaces of FRP items and fabrications shall be smooth, resin-rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. No glass fibers shall be apparent in the surface of the resin.

E. All mechanical grating clips shall be manufactured of Type 316SS (stainless steel).

2.2 MOLDED FRP GRATING

A. Manufacture: Grating shall be of a one piece molded construction with tops and bottoms of bearing bars and cross bars in the same plane. Grating shall have *(a* square mesh pattern providing bidirectional strength.

B. Grating shall be reinforced with continuous rovings of equal number of layers in each direction. The top layer of reinforcement shall be no more than 1/8" below the top surface of the grating so as to provide maximum stiffness and prevent resin chipping of unreinforced surfaces. Percentage of glass (by weight) shall not exceed 35% so as to achieve maximum corrosion resistance, and as required to maintain the structural requirements as specified in the Contract Documents.

C. After molding, no dry glass fibers shall be visible on any surface of bearing bars or cross bars. All bars shall be smooth and uniform with no evidence of fiber orientation irregularities, interlaminar voids, porosity, resin rich or resin starved areas.

D. Grating shall be manufactured with an integrally applied grit to the top surface of each bar providing maximum slip resistance.

E. Grating bar intersections are to be filleted to a minimum radius of 1/16” to eliminate local stress concentrations and the possibility of resin cracking at these locations.

F. Fire rating: Grating shall be fire retardant with a tested flame spread rating of 25 or less when tested in accordance with ASTM E 84. Data performed only on the resin shall not be acceptable.

G. Resin system: The resin system used in the manufacture of the grating shall be suitable for exposure to wastewater and gases associated with wastewater.

H. Color: gray

I. Depth: 1 1/2” with a tolerance of plus or minus 1/16".

J. Mesh Configuration: 1/1/2” x 1/1/2” with a tolerance of plus or minus 1/16" mesh centerline to centerline.

K. Load/Deflection: Grating design loads shall be less than manufacturers published maximum recommended loads. Grating shall be designed for a

uniform load of 100 past or concentrated load of 300 lb. Deflection is not to exceed 0.375” or L/D = 120, whichever is less.

L. The manufacturer shall certify that the stiffness of all panels manufactured are never more than 2.5% below the published load-deflection values.

2.3 GRATING FABRICATION

A. Measurements: Grating supplied shall meet the dimensional requirements and tolerances as shown or specified. The CONTRACTOR shall provide and/or verify measurements in field for work fabricated to fit field conditions as required by grating manufacturer to complete the work. When field dimensions are not required, CONTRACTOR shall determine correct size and locations of required holes or cutouts from field dimensions before grating fabrication.

B. Layout: Each grating section shall be readily removable, except where indicated on drawings. Manufacturer to provide openings and holes where located on the contract drawings. Grating openings which fit around protrusions (pipes, cables, machinery, etc.) shall be discontinuous at approximately the centerline of opening so each section of grating is readily removable.

C. Sealing: All shop fabricated grating cuts shall be coated with vinyl ester resin to provide maximum corrosion resistance. All field fabricated grating cuts shall be coated similarly by the CONTRACTOR in accordance with the manufacturer's instructions.

D. Hardware: Type 316 stainless steel hold-down clips shall be provided and spaced at maximum of four feet apart with a minimum of four per piece of grating, or as recommended by the manufacturer.

2.4 FRP COVERS

A. The FRP Covers are to consist of a system of fixed sections to form a continuous cover over the influent channel, splitter box and wet well access, respectively. They are to be designed to contain odors.

B. The FRP Covers are to consist of fixed sections, rigidly mounted to the top of the individual structure walls.

2.5 MANUFACTURER

A. Molded gratings shall be Fibergrate® or equal

PART 3 - EXECUTION

3.1 INSPECTION

A. Shop inspection is authorized as required by the DISTRICT and shall be at DISTRICT's expense. The fabricator shall give ample notice to CONTRACTOR

prior to the beginning of any fabrication work so that inspection may be provided. The grating shall be as free, as commercially possible, from visual defects such as foreign inclusions, delamination, blisters, resin burns, air bubbles and pits. The surface shall have a smooth finish (except for grit top surfaces).

3.2 INSTALLATION

A. CONTRACTOR shall install gratings in accordance with manufacturer's assembly drawings. Fasten grating panels securely in place with hold-down fasteners as specified herein. Field cut, and drill fiberglass reinforced plastic products with carbide or diamond tipped bits and blades. Seal cut or drilled surfaces in accordance with manufacturer's instructions. Follow manufacturer's instructions when cutting or drilling fiberglass products or using resin products; provide adequate ventilation.

****END OF SECTION****

SECTION 09831 - ACOUSTICAL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Acoustical panels.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's technical data.

B. Samples: Minimum 3 inch x 3 inch samples of specified acoustical substrate.

C. Shop Drawings: Submit shop drawings showing how panels are to be laid out on walls.

1.3 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and installation components by a single manufacturer.

B. Fire Performance Characteristics: Identify acoustical wall components with appropriate markings of applicable testing and inspecting organization.
   1. Surface Burning Characteristics: As follows, tested per ASTM E 84.
      a. Flame Spread: 25 or less.
      b. Smoke Developed: 200 or less.

C. Coordination of Work: Coordinate acoustical panel work with installers of related work including, but not limited to light fixtures, mechanical systems, and electrical systems

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Handle acoustical panels carefully to avoid chipping edges or damaged units in any way.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acoustical Panels:
   1. CFAB Cellulose Panels by Acoustical Surfaces, Inc. (Basis of Design)
      a. 123 Columbia Court North, Suite 201, Chaska, MN 55318.
      b. 952-448-5300, Fax: 952-448-2613.
      c. Toll Free: 1-800-448-3134.
   2. Or equal.

2.2 ACOUSTICAL PANELS

A. Product: CFAB Cellulose Panels.
   1. Sizes: 4′×8′ panels.
   2. Thickness: 2″
   3. Densities:
      a. 3lb pcf
   4. Physical Property Data:
      a. Surface Burning Characteristics per ASTM E-84, UL 723:
         1) Flame Spread: 15.
         2) Smoke Developed: <450 (Class A).
      b. Critical Radiant Flux per ASTM E-970: >0.12 w/cm².
      c. Corrosiveness per ASTM C-739: Acceptable.
      d. Fungal Growth per ASTM C-1338: Acceptable.
      e. Thermal Resistance per ASTM C-518: 3.6 – 3.7 R per inch.
      f. Moisture Absorption per ASTM C-739: Acceptable.
      g. Odor Emission per ASTM C-1304: Acceptable.
   5. Acoustical Performance:
      a. The open design and density of panels increases sound absorption to control and deaden sound. Panels achieve high Noise Reduction Coefficient (NRC) ratings based on density specified.
      b. NRC values per thickness:
         1) 2 inch: 1.00 NRC.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer’s printed recommendations.

3.2 PREPARATION

A. Measure each wall area and establish layout of acoustical units to balance border widths at opposite edges of each wall. Coordinate panel layout with mechanical and electrical fixtures.

3.3 INSTALLATION

A. Install panels per manufacturer’s written instructions.

** END OF SECTION **

Fallbrook SMCUP Addendum D Revisions to Section 11162 – RO Equipment

REVISE Paragraph 11162.1.4.B.1.a to read:

Submit a performance projection from the selected membrane manufacturer using the manufacturer's projection software. For each operating condition listed below, project performance with new membrane (Year 0) and membrane after 5 years of operation (Year 5). Use the following constants in the projection of membrane performance

1) 5.0 percent flux decline per year
2) 0.8 fouling factor
3) 7.0 percent salt passage increase per year

REVISE Paragraph 11162.1.4.B.1.h.1) to read:

1) Normalized Trans-Membrane Pressure

REVISE Paragraph 11162.1.7.B.1 to read:

1. The Membrane Supplier shall warrant the performance of the membrane elements for a period of three (3) years from completion of the 14-day performance test. The Membrane Supplier shall guarantee the membrane elements during that three (3) year period in accordance with the performance requirements specified herein and the following prorated replacement conditions if the elements fail to meet the warranted performance.

    a. At all times during the warranty period, the RO system train shall require a Normalized Trans-Membrane (feed – permeate) Pressure of no more than 165 psi to produce design permeate capacity when operated under the Operating Conditions listed herein (Article 1.4-B-1-c).

    b. At all times during the warranty period, the normalized RO permeate quality from the train shall meet a limit of < 5 percent increase over the projected year 5 projection for chloride and TDS, when operated under the conditions stated. The actual RO permeate quality will be normalized to these design conditions as well as the average feed water quality listed in order to determine the membrane performance at warranted conditions.

REVISE Paragraph 11162.1.7.B.3 to read:

3. Should the RO train performance not meet the warranty requirements, the membrane element manufacturer shall provide sufficient replacement elements to achieve the specified train performance. The warranty replacement elements will be provided at a cost of $350/element, less a credit of 1/36 of the purchase price for each unused month of the warranty period.

REVISE Paragraph 11162.3.3.C.3 to read:

3. Ensure that vessel vertical alignment (port to port) is within the vessel manufacturer's tolerance requirements.

REVISE Paragraph 11162.3.5.L.3 to read:

3. The membrane manufacturer shall continue conductivity profiling and identification until all vessel conductivity values are within the stated range.

REVISE Paragraph 11162.3.7.C.1 to read:

1. A deficiency is defined as either.

    a. Any overall normalized conductivity rejection that is not ≥ 96 percent; or

    b. Transmembrane pressure more than 5.0 percent higher than the Year 0 projection.

REVISE Paragraph 11162.3.7.C.3 to read:

3. If all requirements of the specification, including the initial trans-membrane pressure and average initial water quality, are not met within 60 days of startup corrective action must be taken, including replacement of installed RO membrane elements with new elements until the specified performance is met.

SECTION 11306 - HORIZONTAL END SUCTION CENTRIFUGAL PUMPS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section includes all labor, material, tools, incidentals, and equipment necessary to furnish and install frame mounted horizontal end suction centrifugal pumps and electrical motors as specified herein and as shown on the Contract Drawings.

1.2 RELATED SECTIONS

A. Section 01300 – Record Drawings and Submittals

B. Section 01600 – Materials and Equipment

C. Section 01730 – Operation and Maintenance Data

D. Section 09900 – Painting and Coating

E. Section 11162 – RO Equipment

F. Division 16 – Electrical

G. Division 17 – Instrumentation

1.3 REFERENCE SPECIFICATIONS, CODE AND STANDARDS

A. Except as otherwise indicated, the current editions of the following standards apply to the work of this Section:

1.	ANSI/ASME B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800
2.	ANSI/ASME B16.5	Pipe Flanges and Flanged Fittings Dimensions
3.	ANSI/IEEE 112	Test Procedure for Polyphase Induction Motors and Generators
4.	ANSI/IEEE 115	Test Procedure for Synchronous Machines
5.	ANSI/NEMA MG 1	Motor and Generator
6.	ANSI/NEMA MG 12.53	Motor Testing
7.	ASTM A278 Gray Iron	Castings for Pressure-Containing Parts for Temperatures Up to 650^{o}F
8.	ASTM A395	Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures

9.	ASTM B62	Composition Bronze or Ounce Metal Castings
10	ASTM B584	Copper Alloy Sand Castings for General Applications

11. Hydraulic Institute, Inc. (HI) Test Code for Centrifugal Pumps

12. IEEE Standards

13. NEMA Standards

1.4 SUBMITTALS

A. The following shop drawings and data for all pumps, motors, and variable frequency drives shall be submitted in accordance with Section 01300:

1. Name of manufacturer and type or model.

2. Submit manufacturer's catalog data, dimensions, and materials of construction by ASTM reference and grade and information on linings and coatings.

3. Pump performance curves showing head, capacity, horsepower demand, net positive suction head required and pump efficiency over the entire operating range of the pump. Pump manufacturer shall indicate the design operating conditions on the performance curves. For constant speed pumps, the performance curves shall cover maximum diameter, rated and minimum diameter impellers.

4. Manufacturer's catalog data shall include dimensions, motor weight, nominal horsepower, NEMA design, enclosures, frame size, winding insulation class, voltage, phase, and frequency ratings, service factor, full load current at rated horsepower for application voltage, full load speed, minimum full load efficiency, nominal efficiencies at ½ and ¾ loads, power factor at ½, ¾, and full load, and bearing data with recommended lubricants if applicable.

5. Outline drawings showing pump, motor, drive, couplings, drive arrangement.

6. Complete electrical schematic diagrams.

7. Installation and check out instructions including leveling, alignment, grouting, lubrication, and initial start-up procedures.

8. The CONTRACTOR shall submit signed, dated, and certified factory test data for each pump system prior to shipment of equipment showing that the equipment is in compliance with the Contract Documents.

9. Manufacturer's certification of proper installation shall be submitted.

10. CONTRACTOR's certification of satisfactory field testing shall be submitted.

B. Proof of certification of the entire pumping assembly by a third party in accordance with NSF 61 / Annex G Standards. An NSF certified nameplate shall be displayed on each pumping unit.

1.5 QUALITY ASSURANCE

A. The pumps shall be new and of current manufacture. No pump shall be purchased for use on the project prior to the return of approved shop drawings submitted by the CONTRACTOR pursuant to the provisions of Section 01300.

B. The CONTRACTOR shall be responsible for the satisfactory operation of the pumping units under the specified operating conditions, and all necessary propellers, baffles, vanes, and appurtenances furnished with the pumping units.

C. The pump manufacturer shall be responsible for all components and for the satisfactory installation and operation for a completely assembled unit, including the motor and pump.

1.6 DELIVERY, STORAGE AND HANDLING

A. Transport pump units with proper equipment to protect units from dirt and damage.

B. Store units off ground and on firm surfaces. Protect units from damage and corrosion.

1.7 WARRANTY

A. The CONTRACTOR shall obtain from each pump manufacturer a warranty for all components specified herein for one (1) year from the date of Substantial Completion.

B. During the warranty period, the CONTRACTOR shall provide the services of trained pump manufacturer staff to make all performance evaluations and repairs at no cost to the DISTRICT.

C. The CONTRACTOR shall include in its bid all costs to be incurred by the pump manufacturer, under the terms of the warranty.

1.8 UNIT RESPONSIBILITY

A. To assure a properly integrated and compatible system, all equipment described in this section shall be furnished by the Pump Manufacturer, who shall assume full responsibility f or the proper operation of the pumps and associated equipment.

PART 2 - PRODUCTS

2.1 HORIZONTAL PUMP AND MOTOR

A. The CONTRACTOR shall provide and install horizontal pumps, motors, and drives with associated piping, controls, wiring, and appurtenances, complete and operable, in accordance with the Contract Documents.

B. Tag numbers

1. RO Booster Pumps – Two Large: P-311, P-312.

2. RO Booster Pumps – One Small: P-313.

3. IM Backwash Supply Pumps: P-351, P-352, P-353.

4. Waste Wash Water Return Pumps: P-700, P-701.

5. Power Mixing Pump – Disinfection, Stabilization: P-500, P-510.

6. Power Mixing Pump – EQ Tank: P-211.

C. Operating Conditions:

1. RO Booster Pumps – Two Large

a. Number of Units: 2
b. Minimum Flow Capacity (each): 800 gpm
c. Total Dynamic Head at Min Flow: 100 feet
e. Maximum Flow (each): 1600 gpm
f. Total Dynamic Head at Max Flow: 75 feet
h. Drive: Constant Speed
i. Duty Point is 1,130 gpm at 93 feet TDH
j. Minimum Efficiency at Duty Point: 84.7%

2. RO Booster Pumps – One Small

a. Number of Units: 1
b. Minimum Flow Capacity (each): 400 gpm
c. Total Dynamic Head at Max Flow: 90 feet
e. Maximum Flow (each): 800 gpm
f. Total Dynamic Head at Min Flow: 68 feet
h. Drive: Constant Speed
i. Duty Point is 600 gpm at 80 feet TDH
j. Minimum Efficiency at Duty Point: 79.6%

3. IM Backwash Supply Pumps

a. Number of Units: 3
b. Duty Point Flow Capacity (each): 1900 gpm

c. Total Dynamic Head at Duty Point Flow: 100 feet
d. Minimum Efficiency at Duty Point: 81%
e. Maximum Flow (each): 2500 gpm
f. Total Dynamic Head at Max Flow: 80 feet
h. Drive: Constant Speed

4. Waste Wash Water Return Pumps

a. Number of Units: 2
b. Duty Point Flow Capacity (each): 270 gpm
c. Duty Point Total Dynamic Head: 78 feet
d. Minimum Efficiency at Duty Point: 78%
e. Maximum Flow (each): 545 gpm
f. Minimum Total Dynamic Head: 58 feet
h. Drive: Variable Frequency Drive

5. Power Mixing Pump – Disinfection and Stabilization

a. Number of Units: 2
b. Duty Point Flow Capacity (each): 240 gpm
c. Total Dynamic Head at Duty Point Flow: 25 feet
d. Minimum Efficiency at Duty Point: 65%
e. Minimum Flow (each): 165 gpm
f. Total Dynamic Head at Min Flow: 28 feet
h. Drive: Constant Speed

6. Power Mixing Pumps – EQ Tank

a. Number of Units: 1
b. Duty Point Flow Capacity (each): 140 gpm
c. Total Dynamic Head at Duty Point Flow: 17.5 feet
d. Minimum Efficiency at Duty Point: 76%
e. Maximum Flow (each): 210 gpm
f. Total Dynamic Head at Max Flow: 15 feet
h. Drive: Constant Speed

D. Motors for horizontal pumps shall conform to the following requirements:

1. RO Booster Pumps – Two Large

a. Motor: premium efficiency, electric
b. Motor Horsepower: 40
c. Speed: 1750
d. Volts: 460
e. Phase: 3
f. Hertz: 60
g. Minimum Full Load Efficiency: 94.1%
h. Enclosure: TEFC

2. RO Booster Pumps – One Small

a. Motor: premium efficiency, electric
b. Motor Horsepower: 20
c. Speed: 1750
d. Volts: 460
e. Phase: 3
f. Hertz: 60
g. Minimum Full Load Efficiency: 93.0%
h. Enclosure: TEFC

3. IM Backwash Supply Pumps

a. Motor: premium efficiency, electric
b. Minimum Motor Horsepower: 60
c. Maximum Motor Horsepower: 75
d. Speed: 1750
e. Volts: 460
f. Phase: 3
g. Hertz: 60
h Minimum Full Load Efficiency: 95.0%
i. Enclosure: TEFC

4. Waste Wash Water Return Pumps

a. Motor: premium efficiency, electric
b. Motor Horsepower: 15.0
d. Speed: 1750
d. Volts: 460
e. Phase: 3
f. Hertz: 60
g. Minimum Full Load Efficiency: 93.0%
h. Enclosure: TEFC

5. Power Mixing Pump – Disinfection, Stabilization

a. Motor: premium efficiency, electric
b. Motor Horsepower: 3
c. Speed: 1180
d. Volts: 460
e. Phase: 3
f. Hertz: 60
g. Minimum Full Load Efficiency: 89.5%
h. Enclosure: TEFC

6. Power Mixing Pumps – EQ Tank

a. Motor: premium efficiency, electric
b. Motor Horsepower: 2
c. Speed: 690
d. Volts: 460

e. Phase: 3
f. Hertz: 60
g. Minimum Full Load Efficiency: 86.5%
h. Enclosure: TEFC

E. Manufacturers, or approved equal:

1. Pentair Aurora

2. Flowserve

3. Fairbanks Morse

2.2 MATERIALS OF CONSTRUCTION

A. The pump casing shall be of extra heavy cast iron, with minimum tensile strength of 30,000 psi.

B. The impeller shall be one-piece ductile iron, accurately machined and balanced. The impeller shall be keyed to the shaft.

C. Renewable casing wearing rings shall be bronze and mounted in the pump casing. Renewable impeller wear rings shall be of bronze and mounted on the impeller at the suction inlet and held in place with set screws.

D. The pump shall be furnished with single type mechanical seals. Mechanical seals shall be John Crane Company Type I or equal. Seals shall consist of Type 316 stainless steel, Buna elastomers and silicon carbide stationary rings with tungsten carbide rotating rings.

E. Heavy fabricated steel base (with drip lip) to mount the pump and driver shall be furnished. Flexible shaft coupling shall be furnished to connect the driver to the pump. Couplings shall be enclosed in CAL OSHA coupling guard.

2.3 MOTOR

A. The motor shall be designed and built in accordance with the latest NEMA Standards. Each motor shall have a sufficient horsepower rating to operate the pump at any point on the pump's head-capacity curve without overloading the nameplate horsepower rating of the motor, regardless of service factor. The motor shall have a service factor of at least 1.15. The service factor is reserved for variations in voltage and frequency.

2.4 FRAME

A. The pump shall be mounted on a steel baseplate. Pump and motor alignment shall be check in accordance with the Standards of the Hydraulic Institute after the pump has been installed.

2.5 PUMP CONTROLS

A. Control Panels for Pumps P-211, P-500 and P-510

1. Horizontal centrifugal pump shall be furnished with a NEMA 4X control panel enclosure of Type 316 stainless steel construction housing the control components and related accessories.

2. Power supply to the panels shall be single phase, 120 VAC.

3. For all pumps, door mounted components shall include the following as a minimum:

a. A motor RUN (ON) indicator light.
b. A motor FAIL indicator light.
c. Drive controller HAND-OFF-AUTO selector switch.
d. Power ON-OFF (START/STOP S/S) switch.

4. Internal components shall include the following as a minimum:

a. Dry type power transformer.
b. Terminal blocks for interfacing all field wiring.
c. Time delay relays.
d. Interposing control relays.

5. Panel construction, components, and wiring shall comply with the requirements of Sections 17250 Control Panels.

B. Controls for IM Backwash Pumps P-311, P-312 and P-313 and RO Booster Pumps P-351, P-352 and P-353 and Waste Wash Water Return Pumps P-700 and P-701

1. The horizontal centrifugal pump is specified herein. The motor soft starter is specified in Section 16920, Motor Control Center. Door mounted control components for the pumps shall be incorporated into the soft starter. The components shall include:

a. A motor RUN (ON) indicator light.
b. A motor FAIL indicator light.
c. Drive controller HAND-OFF-AUTO selector switch.
d. Power ON-OFF (START/STOP S/S) switch.
e. An alphanumeric LED pump speed display, in units of 0 – 100% speed.

f. A manual pump speed control knob or pushbuttons, for manually adjusting controller speed from the panel face in the ON operating mode.

PART 3 - GENERAL

3.1 INSTALLATION

A. All pumps, motors, and drives shall be installed in accordance with the manufacturer's written recommendations submitted and approved with the shop drawings and in accordance with the Contract Documents. Pump mounting flange shall be sized to match concrete support curb as shown on the Contract Drawings.

B. The manufacturer's authorized service representative shall visit the site for as long as necessary to complete the following and to certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted, and readied for operation.

1. Inspect, check and adjust, if required, the installed equipment.

2. Witness startup and field testing operations.

3. Instruct the DISTRICT's personnel in the operation and maintenance of the equipment, including step-by-step troubleshooting with necessary test equipment. Instruction and materials shall be specific to the models of equipment provided. The representative shall have at least two years' experience or training with equipment provided.

3.2 PUMP TESTING

A. Inspection and Testing Costs: The CONTRACTOR shall be responsible for all costs associated with inspection and testing of materials (including witness testing), products, or equipment at the place of manufacture. Provide for one DISTRICT representative to visit each factory for factory-witness testing.

B. The CONTRACTOR shall provide the necessary oil and grease for initial operation.

C. The following tests shall be conducted on each indicated pump system:

1. Pump Systems: All centrifugal pump systems 10 hp and larger shall be tested at the pump factory in accordance with the Test Code for Centrifugal Pumps of the Standards of the Hydraulic Institute, Inc. (H.I.). The following minimum test data shall be submitted:

a. A minimum of six hydraulic test readings shall be taken between shutoff and 125% of the BEP. Two of these points shall be the normal and rated capacities.
b. Pump curves showing head, flow, bhp, efficiency, and NPSHR.
c. Certification that the pump horsepower demand did not exceed the rated nameplate motor hp at any point on the curve.

2. Test tolerances for the performance testing shall be as follows based on the total dynamic head (TDH) range:

TDH Range (feet)	Rated Point	Shutoff
0-500	+5, -0%	±8%
501-1000	+3, -0%	±6%

3. Vibration Limits shall be per H.I, latest edition.

D. Field Tests

1. The CONTRACTOR shall provide the necessary oil and grease for initial operation.

2. The CONTRACTOR shall be responsible for field testing all pumps after installation to demonstrate satisfactory operation without causing excessive noise, cavitation, vibration, and overheating of the bearings. Proper alignment shall also be verified during field tests to ensure freedom from binding, scraping, shaft runout, or other defects. Field testing shall be witnessed by a representative of the DISTRICT. The CONTRACTOR shall notify the DISTRICT five 5 days in advance of the field tests. After each pumping system has satisfied the requirements, the CONTRACTOR shall certify in writing that it has been satisfactorily tested and that all final adjustments have been made. Certification shall include the date of the field tests, a listing of all persons present during the tests, and the test data. The CONTRACTOR shall bear all costs of field tests, including related services of the Manufacturer's representative.

3. The CONTRACTOR shall be responsible for field testing all motors to check for any deviation from rated voltage, phase or frequency; or improper installation. The motor shall be checked for proper phase and ground connections. The CONTRACTOR shall verify that multivoltage motors are connected for proper voltage. Winding and bearing temperature detectors and space heaters shall be checked for functional operation. Motors shall be tested for proper rotation before connection to the driven equipment. Insulation shall be tested in accordance with NEMA MG-1. The test voltage shall be 1000 VAC plus twice the rated voltage of the motor.

E. In the event of failure of any pump to meet any of the above requirements or efficiencies, the CONTRACTOR shall make all necessary modifications, repairs, or replacements to conform to these specifications at no additional compensation from the DISTRICT.

****END OF SECTION****

SECTION 15100 – VALVES

PART 1 – GENERAL

1.1 DESCRIPTION

A. CONTRACTOR shall furnish all labor, materials, equipment appurtenances, specialty items and services required to provide all valves and appurtenances as shown and specified in the Contract Documents. This Section also covers electric motor operators for valves and gates.

B. Coordination: To ensure that all valves and appurtenant equipment are properly coordinated and will function in accordance with the requirements of the Contract Documents, the CONTRACTOR shall obtain each specific valve and valve actuator from a single supplier. That is all gate valves shall be by a single manufacturer, all plug valves shall be by a single manufacturer, etc.

C. The CONTRACTOR shall retain ultimate responsibility under this Contract for equipment coordination, installation, operation and guarantee, and the CONTRACTOR shall furnish and install all equipment, labor, materials, appurtenances, specialty items and services not provided by the supplier(s) but required for complete and operable systems. The equipment and appurtenances covered by this specification are intended to be standard equipment of proven ability as manufactured by reputable concerns having extensive experience in production of such equipment. The equipment furnished shall be manufactured and installed in accordance with the best practices and methods and shall operate satisfactorily when installed as shown and specified in the Contract Documents.

D. Contractor shall provide valves in accordance with California State law as enacted in Assembly Bill 1953 requiring that no-lead brass by used in the construction of a public water system.

1.2 RELATED SECTIONS

A. Section 01300 – Record Drawings and Submittals

B. Section 01600 Materials and Equipment

C. Section 0173 – Operation and Maintenance Data

D. Section 01740 – Systems and Equipment Training

E. Section 01750 – Spare Parts and Maintenance materials

F. Section 09900 Painting and Coating

G. Section 15000 – Piping Components

H. Section 15020 – Pipe Supports

I. Section 15051 - Buried Piping Installation

J. Section 15052 - Exposed Piping Installation

K. Section 15053 – Ductile Iron Pipe

L. Section 15062 - Steel Pipe

M. Section 15064 - Copper Pipe

N. Section 15065 – PVC and CPVC Pipe

O. Section 15066 – PVDF Pipe

P. Section 15067 – Polypropylene Pipe

Q. Section 15068 - Stainless Steel Pipe

R. Section 15069 – Alloy 20 Pipe

S. Section 15080 – Piping Specialties

T. Section 15094 - Pipe Hangers and Supports

U. Section 15430 – Waste and Vent Piping Systems

V. Section 15450 – Plumbing Fixtures and Trim

W. Section 15801 – Heat Pump Unit Split Systems

X. Division 16 – Electrical

Y. Section 17329 - Primary Sensors and Field Instruments

1.3 REFERENCE SPECIFICATIONS, CODE AND STANDARDS

A. ANSI B16.1, Cast Iron Pipe Flanges and Flanged Fittings.

B. ANSI B16.4, Cast Iron Fittings.

C. ASTM A 48, Standard Specification for Gray Iron Castings.

D. ASTM A 126, Standard Specification for Gray Iron Castings for Valves,

E. Flanges and Pipe Fittings.

F. ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

G. ASTM A 354, Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners.

H. ASTM A 436, Standard Specification for Austenitic Gray Iron Castings.

I. ASTM A 536, Standard Specification for Ductile Iron Castings.

J. ASTM B 62, Standard Specification for Composition Bronze or Ounce Metal Castings.

K. AWWA C110, Ductile Iron and Gray Iron Fittings.

L. AWWA C111, Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.

M. AWWA C115, Flanged Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges.

N. AWWA C500, Gate Valves for Water and Sewerage Systems.

O. AWWA C502, Dry-Barrel Fire Hydrants.

P. AWWA C503, Wet-Barrel Fire Hydrants.

Q. AWWA C504, Rubber-Seated Butterfly Valves.

R. AWWA C506, Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valve Types.

S. AWWA C507, Ball Valves, 6 Inch through 48 Inch.

T. AWWA C508, Swing Check Valves for Waterworks Service, 2 in. through 24 in. NPS.

U. AWWA C509, Resilient-Seated Gate Valves, 3 through 12 NPS, for Water and Sewerage Systems.

V. AWWA C511, Reduced Pressure Principle Backflow-Prevention Assembly.

W. AWWA C550, Protective Epoxy Interior Coatings for Valves and Hydrants.

X. AWWA C800, Underground Service Line Valves and Fittings.

Y. AWWA M44, Distribution Valves: Selection, Installation, Field Testing and Maintenance.

Z. AGMA Standards.

AA. NEMA, National Electrical Manufacturer's Association.

BB. Compliance with DISTRICT Standards and with all regulations, and referenced standard details and approved materials lists.

CC. Motors: All actuator motors and drives shall be sized to be non-overloading over the full range of operating conditions specified herein, and shall comply with all state, federal and local requirements for designated area classification as shown and specified in the Contract Documents.

1.4 SUBMITTALS

A. Where valve tag numbers are shown on the drawings, cross-reference all valve submittals according to tag number. Where valve tag numbers are not shown, submit shop drawings by general valve number

B. Submit for approval the following in accordance with 01300, Record Drawings and, Submittals Requirements:

1. Drawings and Data: Complete fabrication, assembly, foundation, and installation drawings including data and position drawings for all electrically operated valves showing how each valve will be oriented and the amount of clearance at each location, and operation, maintenance and storage instructions, together with detailed specifications and data covering materials used, power drive assembly, parts, devices and other accessories forming a part of the equipment furnished, shall be submitted for review. All engineering calculations required for submittal shall be signed by a California Registered Professional ENGINEER at the CONTRACTOR'S expense and shall be included in the CONTRACTOR'S bid.

2. Submit detailed drawings and data on all valves listed, in this Section, including type, size, service, rating and descriptions, as well as description of all specified requirements and all special features.

3. Detailed wiring diagrams for electric motor actuators identifying all electrical components, output contacts, and wiring terminals for interfacing with other systems.

4. Submit seismic calculations as described in Section 01600.

5. Technical Manuals: Complete operation and maintenance instruction, lubrication schedules and troubleshooting guides shall be submitted for review in accordance with the procedures and requirements set forth in Section 01730, Operation and Maintenance Data, Section 01731; Instruction

of Operations and Maintenance Personnel; and as specified in Divisions 13 and 16.

6. Provide installation certifications for electrically operated valves in accordance with Section 01600.

7. Automatically Actuated Valves:

   a. The CONTRACTOR shall submit a single package for all Type A (including Type A1) automatically actuated valves which provides the following:

      1) A single submittal package for each automated valve including manufacturer's literature for the valve and the actuator. Each package will be clearly marked with the valve tag number identified in the partial valve schedule.
      2) Where the submittal package for one automatically actuated valve is typical for many, the cover sheet of the submittal package shall indicate all the actuated valves for which the submitted package is typical.
      3) Detailed installation drawings depicting the orientation of the actuator on the valve and the orientation of the valve/actuator assembly at the location shown on the drawings.
      4) Wiring diagrams.

   b. Similar to the package for Type A actuators, the CONTRACTOR shall prepare a comparable submittal package for the Type B and C actuators.

8. Verification that painting shall be per Section 09900 and the approved Section 09900 Submittals.

C. Shop Tests:

1. The motor operated valves shall be tested at the valve manufacturer's assembly plant before shipment to ensure that the mechanisms can close the valves in the specified time limit, and for proper seating.

2. Hydrostatic tests shall be performed, when required by the valve specifications included herein.

D. Certificates: Where specified or otherwise required by ENGINEER submit test certificates.

E. Qualifications of the Electric Actuator Supplier (EAS) service staff who will supervise field-installation of electric actuators on valves and gates.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Manufacturer shall have a minimum of 5 years of experience in the production of the equipment to be furnished, and shall show evidence of satisfactory service in at least five (5) installations for at least five (5) years.

2. Each type of valve shall be the product of one manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the site to insure uninterrupted progress of the Work.

1. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete in ample time to not delay that Work.

B. Handle all valves and appurtenances very carefully. Valves which are cracked, dented or otherwise damaged or dropped will not be acceptable.

C. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms or other supports. Protect steel members and packaged materials from corrosion and deterioration.

D. Store all mechanical equipment in covered storage off the ground and prevent condensation.

PART 2 - PRODUCTS

2.1 VALVES

A. General:

1. Conform to the requirements of the attached at the end of this Section. The partial valve schedule is not intended to list all valves under this Contract. The Drawings indicate all valves to be provided and shall be used in conjunction with the partial valve schedules to determine the total number of valves required to complete the work.

2. Not all valves listed herein may be required under this Contract. Valves shall be of the type specified in the partial valve schedule and as shown on the Drawings.

3. Valves shall be inline size except as shown otherwise on the Drawings or otherwise specified. Ratings specified are minimum and are water working pressure, unless noted otherwise or otherwise specified.

4. Valve Reference Number: Where the valves listed below are utilized under this Contract they are identified in the Contract Documents by the valve tag number and valve reference number, or in some cases, by the valve reference number alone.

5. Chemical Services: Where valves are specified or shown for "chemical service", the CONTRACTOR shall submit data confirming the compatibility of the wetted valve materials being furnished with the specific chemical service for the valve. Chemical service shall be as defined in Section 01600, and as noted in the valve list for the specific valve.

B. Gate Valves:

1. Provide valves complete with operating handwheel or operating nut, linings, coatings, valve box, extension stem, anchor, and marker post.

2. Cast or mold onto the valve body or bonnet the name of the manufacturer and the valve size. Do not attach identification plates to the valve body or bonnet.

3. Provide valves with the same type ends as the pipe or fittings, or with ends that have been designed for use on the pipe being installed.

4. Unless otherwise indicated, valves shall be the same size as the pipe in which they are installed.

5. Unless otherwise indicated, valves shall have a working pressure rating not less than the pipe in which they are installed.

6. Valve Reference No.: None – Use for valves on C, GFC and P Drawings

    a. Gate Valve, Resilient Wedge

        1) 4” through 12”, Non-Rising Low Zinc Bronze or Stainless Steel Stem, Ductile-Iron Body and Bonnet, Stainless Steel Trim Bolts, Encapsulated Wedge per AWWA C509 or C515 with 8-mil or greater Epoxy, Coated Interior. Manufactured to AWWA C509 or C515, with 250 PSI Rating.
        2) Gate valves shall be ANK, AFC or other approved equal from the Fallbrook Public Utilities District Approved Materials List

7. Valve Reference No.: None – Use for valves on C, GFC and P Drawings

    a. Gate Valves, Resilient Seated

        1) 14 inches through 24 inches, AWWA C509 or C515, Ductile Iron Body, Stainless Steel Trim Bolts, Encapsulated Wedge, Non-Rising Stem, 8-mil or greater Epoxy Coated Interior per AWWA C550, Minimum 200 PSI Rating.
        2) Gate valves shall be from manufacturers listed on the Fallbrook Public Utilities District Approved Materials List

8. General for all other gate valves:

    a. Valves shall be in conformance with AWWA C500.
    b. Exposed manually operated gate valves shall be equipped with handwheels.
    c. Buried manually operated gate valves shall be furnished with a valve box and a 2-inch square operating nut. The operating nut shall be positioned vertically on top of the valve. The top of the operating nut shall be a maximum 12 inches below the top of the valve box.
    d. Valve key extensions shall be provided and installed on all buried gate valves when the top of the valve nut is greater than 12 inches below the top of the valve box. The extension stem shall be 316 stainless steel, constructed so that when connected to the valve the extension stem shall be vertical.
    e. A minimum of two (2) valve tee wrenches for operating the buried gate valves shall be furnished.
    f. Valves (3" and larger) located more than five feet above the operating floor shall be provided with chainwheels, sprockets, and aluminum chain. The chain shall extend to three feet above the operating floor.

g. Unless otherwise shown or specified, exposed valves shall have flanged ends conforming to ANSI B16.1, Class 125 and buried valves shall have mechanical joint ends conforming to ANSI A21.11.
h. Painting:

1) Interior metal surfaces of cast iron valves, except finished or bearing surfaces, shall be shop painted with fusion bonded epoxy in accordance with the manufacturer's recommendations and AWWA C515.
2) Exterior surfaces of the valves shall be painted as specified under Part 2.10, Painting, of this Section.

i. Electric Motor Actuators where required, as shown on the Contract Drawings, or as specified shall be furnished and installed in accordance with Part 2.4, Electric Motor Actuators, of this Section.

9. Valve Reference Number - V6:

a. Type of Valve: Resilient wedge gate valve.
b. Type of Service: Water
c. Reference Standard: AWWA C509 or C515.
d. Body: Ductile Iron
e. Trim: Stainless Steel 316 SS
f. Type of End Connection: Flanged to ductile iron pipe.
g. Flange: Flanged end dimensions and drilling shall conform with ANSI B16.1, Class 125.
h. Size (inches): 4" - 12".
i. Rating and Description: 250 psi water working pressure, ductile iron wedge fully encapsulated with polyurethane sealing rubber per ASTM D429, and non-rising stem.
j. Operation: Manual, Handwheel
k. Manufacturer and Product: Provide one of the following:

1) AFC, Clow, Kennedy, Mueller, AVK

10. Valve Reference Number – V7:

    a. Type of Valve: Resilient wedge gate valve (buried)
    b. Type of Service: Water
    c. Reference Standard: AWWA C509 or C515.
    d. Body: Ductile Iron
    e. Trim: Stainless Steel
    f. Type of End Connection: Flanged to ductile iron or steel pipe.
    g. Flange: Flanged end dimensions and drilling shall conform with ANSI B16.1, Class 125.
    h. Size (inches): 4" - 12".
    i. Rating and Description: 250 psi water working pressure, ductile iron wedge fully encapsulated with polyurethane sealing rubber per ASTM D429, and non-rising stem.
    j. Operation: Square Nut
    k. Manufacturer and Product: Provide one of the following:

        1) AFC, Clow, Kennedy, Mueller, AVK

C. Plug Valves:

1. General:

    a. Non-lubricated eccentric type valves shall be installed where flow through the valve will be in only one direction.
    b. Exposed plug valves shall have flanged ends conforming to ANSI B16.1, Class 125 and buried valves shall have mechanical joint ends conforming to ANSI A21.11.
    c. Plug valves for liquid service shall supply drip-tight shut-off.
    d. All valves 6 inches in diameter and larger, and all manually operated plug valves installed more than five feet above the operating floor, regardless of size, shall be equipped with a geared operator and handwheel.
    e. Manually operated exposed valves smaller than 6-inches diameter installed five feet or less above the operating floor shall be lever wrench operated, unless otherwise specified or shown.
    f. Exposed valves higher than five feet above the operating floor:

        1) Chainwheels, sprockets, and galvanized steel chain shall be provided for gear operated valves mounted more than five feet above the operating floor.
        2) Chain shall extend to three feet above the operating floor.
        3) Gearing shall be enclosed in a semi-steel housing and shall be suitable for running in a lubricant, with seals provided on all shafts to prevent entry of dirt and water into the operator.
        4) Operator shaft and the gear quadrant shall be supported on permanently lubricated stainless steel bearings.
        5) Operator shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque.

6) Exposed nuts, bolts and washers shall be stainless steel 316.
7) Where lever wrench operated valves are required, each valve shall be furnished with its own lever wrench operator.

g. Buried manually operated plug valves shall be furnished with a valve box, a 2-inch square operating nut and position indicator. The operating nut shall be positioned vertically on top of the valve. The top of the operating nut shall be a maximum 12 inches below the top of the valve box. The position indicator shall be mounted on top of the valve.
h. Valve key extensions shall be provided and installed on all buried plug valves when the top of the valve nut is greater than 12 inches below the top of the valve box. The extension stem shall be 316 stainless steel, constructed so that when connected to the valve the extension stem shall be vertical.
i. Electric motor actuators where required, as shown on the Contract Drawings, or as specified shall be furnished and installed in accordance with Part 2.4, Electric Motor Actuators, of this Section for actuator types and specifications.
j. For buried and submerged applications, the valve assembly shall be furnished with a sealed enclosure and 316 stainless steel bolting hardware.
k. Where buried valves are shown on the Contract Drawings to be provided with extended bonnet and handwheel actuator, the handwheel actuator shall be equipped with a 2-inch square nut for operation with a portable electric motor drive.
l. Painting:

1) Interior ferrous metal surfaces of the valves except finished or bearing surfaces and the plug, shall be shop painted with fusion bonded epoxy in accordance with the manufacturer's recommendations and AWWA C515. Painting system shall be NSF 61 certified for use in potable water applications.
2) Exterior surfaces of the valve and operator shall be painted as specified under Part 2.10, Painting, of this Section.

2. Valve Reference Number - V16:

a. Type of Valve: Eccentric plug valve.
b. Type of Service: Water, sludge, sludge, wastewater
c. Type of end connection: Flanged
d. Size (inches): 1” – 14”.
e. Rating and Description: Eccentric plug valve, tight closing, resilient faced, non-lubricating, drop tight, working pressure
f. Valve body cast iron, ASTM A126, 5 Class B, metal facing plug (stainless steel), pressure rated 175 psi
g. Seat area shall be raised, with raised area completely covered with weld to insure proper seat contact.

h. Shaft bearing, upper and lower, shall be sleeve type metal bearings, sintered, oil impregnated, and permanently lubricated Type 316 stainless steel conforming to ASTM A743 Grade CF-8M. Thrust bearings shall be PTFE.
i. Plug valve shaft seals shall be on the multiple V-ring type (Chevron) and shall be adjustable. All packing shall be replaceable without removing the bonnet or actuator and while the valve is in service. Shaft seals shall be made of Buna N.
j. Manufacturer and Product: Provide one of the following:

1) Dezurik PEC
2) Or equal

3. Valve Reference Number – V17:

a. Type of Valve: Lined plug valve
b. Type of Service: Chemical tank outlets.
c. Type of End Connection: Flanged, Class 150.
d. Size: 1 – 4 inches.
e. Rating and Description:

1) Valves shall be lined plug type rated 275 psig cold water working pressure and drip-tight shutoff with pressure from either direction.
2) Valves shall have PVDF lined ductile iron bodies raised face flanges, adjustable Chevron PTFE packing, and PVDF lined ductile iron plugs.
3) Bolting shall be 316 stainless steel.
4) Valve shall be coated with 10-12 mils Dupont 25P high solids epoxy or equal. Valve seats shall be removable without disconnecting piping and valve plug shall be adjustable in place.

f. Manufacturer:

1) Chemvalve Model 790
2) Or equal.

D. Ball Valves:

1. General:

a. Ball valves on PVC piping shall be manufactured of polyvinyl chloride (PVC), chlorinated PVC (CPVC) or polyvinylidene fluoride (PVDF) material as shown or as specified. PVC shall be Type 1, Grade 1" accordance with ASTM D1784, and shall be dark grey in color. CPVC shall be Type 4, Grade 1.
b. Electric actuators where required, as shown on the Contract Drawings, or as specified herein shall be furnished and installed in accordance with Part 2.4, Electric Motor Actuators, of this Section.

c. Unless otherwise noted, non-metallic ball valves shall be rated for 150 psi at 70 degrees F, and as listed below:

1) PVC: 100 psi min @ 120 degree F.
2) CPVC: 120 psi min @ 120 degree F.
3) PVDF: 130 psi min @ 120 degree F.

2. Valve Reference Number - V48:

a. Type of Valve: Ball valve.
b. Type of Service: water, chemical solutions, sodium hypochlorite solution, aqua ammonia solution.
c. Type of end connection: True union threaded, flanged, or solvent weld.
d. Size (inches): 1/2" – 2 threaded; 21/2” - 6" flanged
e. Rating and Description: PVC, body, Teflon seats, true union, and Viton (FKM) O-ring seals. EPDM elastomers shall be used for ammonia service. PVDF for Fluorosilicic valves. Valve shall provide for 100% flow waterway and quarter turn operation. Valve materials shall be compatible with chemical type.
f. Stems shall have feature double o-rings and have blowout-proof design. The addition of a 1/8” vent hole drilled and deburred by the manufacturer is required.
g. The valve handle shall double as the carrier removal and / or tightening tool.
h. Installation: The valve shall be installed with the vent hole on the upstream side of the system to keep the liquid in the cavity of the ball fluid.
i. Warranty: 2 years
j. Manufacturer: Provide products as manufactured by one of the following:

1) Hayward MFG. Co.
2) Chemtrol TU Series.
3) GF Plastics Systems, Inc.
4) Asahi/America.
5) Or equal.

3. Valve Reference Number - V67:

a. Type of Valve: Ball valve.
b. Type of Service: Water, air.
c. Type of end connection: Threaded
d. Size (inches): 1/4" - 4".
e. Rating and Description: 150 psi, brass body with stainless steel trim, full port and reinforced teflon seats and seals.
f. Manufacturer and Product: Provide the following:

1) Apollo 77FLF-100 Series
2) Or equal.

4. Valve Reference Number - V68:

    a. Type of Valve: Ball valve.
    b. Type of Service: Water.
    c. Type of end connection: Threaded.
    d. Size (inches): 1/2" - 3".
    e. Rating and Description: Brass body, bronze ball and stem with 316 stainless steel trim, TFE seats and seals, and quarter turn operation.
    f. Manufacturer and Product: Provide the following:

        1) Jamesbury Type A.
        2) Or equal.

5. Valve Reference Number – V69:

    a. Type of Valve: Flanged ball valve.
    b. Type of Service: RO membrane trains
    c. Type of end Connection: Flanged, Class 150.
    d. Size (inches): ½" – 4"
    e. Rating and Description:

        1) Valves shall have ASTM A351 GR CF8M stainless steel bodies with Type 316 stainless steel balls.
        2) Valves shall be of the two-piece type with flanged ends.
        3) Seat, body seal and stem packing shall be reinforced PTFE. Valves shall have lever operators.

    f. Manufacturer:

        1) Worcester, Series 818/828
        2) Neles-Jamesbury, Series 9000,
        3) Or equal

6. Valve Reference Number – V70:

    a. Type of Valve: Flanged ball valve.
    b. Type of Service: Water
    c. Type of end Connection: Flanged
    d. Working Pressure: 250 psi
    e. Size (inches): 2" – 6"
    f. Rating and Description:

        1) Valves shall have cast iron or stainless steel body
        2) Ball and stem: 304 stainless
        3) Bearings shall be PTFE
        4) Seats shall be EDPM
        5) Valves shall have lever operators.

g. Manufacturer:

1) Pratt
2) Apollo
3) Or equal

E. Check Valves - Liquid Service:

1. General:

a. Check valves shall absolutely prevent the return of water back through the valve when the upstream pressure decreases below the downstream pressure. The valve shall be tight seating.
b. Unless otherwise shown or specified, valves shall have flanged ends conforming to ANSI B16.1, Class 125.
c. Valves 3 inches in diameter or larger unless otherwise specified or otherwise shown shall be furnished with lever and spring and conform to AWWA C508, as to materials and pressure ratings.
d. Provide a NEMA 4X non-metallic or 316 stainless steel limit switch on each pump discharge check valve as shown or as specified. Switch shall be factory-mounted to the valve body via tapped, threaded connections integral to the valve body. The switch armature shall be field adjustable and shall be engaged by the swing arm on the check valve when the arm is set in the full closed position. Contacts shall be DPDT rated at 5A, 250V minimum.

1) Assembly shall be suitable to be mounted on an outside weight and lever swing check valve without modification of the valve or piping, and shall provide proper signals to permit the control system to function as described above and in Division 13 without causing false pump cutout and alarm indications, when properly adjusted.
2) CONTRACTOR shall make all necessary field adjustments to actuate the limit switch to provide the specified functional features. Provide limit switches as manufactured by one of the following:

a) Square D.
b) General Electric.
c) MicroSwitch Division of Honeywell.
d) Or equal.
e) Painting:

i) Interior metal surfaces of cast iron valves except finished or bearing surfaces shall be shop painted with three coats of an approved two component coal tar epoxy coating applied in accordance with the manufacturer's recommendations. Painting system shall be NSF 61 certified for use in

potable water applications. Coating system thickness shall be 16 mils total applied in three coats. Coating shall be Tnemec 40 Pota-Pox LT (blue) or equal.

ii) Exterior surfaces of the valves shall be painted as specified under Part 2.10, Painting, of this Section.

2. Valve Reference Number - V89:

   a. Type of Valve: Swing check valve.
   b. Type of Service: Water, sewage.
   c. Type of end connection: Flanged.
   d. Size (inches): 2" - 30".
   e. Rating and Description: 250 psi rated pressure, ASTM A536 ductile iron body, cover, disc and lever arm and weight, ASME B16.5 Class 150 flange drilling. ASTM A276 Type 316 stainless steel with EPDM body seat, Type 316 stainless steel disc seat.
   f. Manufacturer and Product: Provide one of the following:

      1) APCO Series 6000.
      2) M&H.

3. Valve Reference Number – V90:

   a. Type of Valve: Swing check valve.
   b. Type of Service: Water, sewage.
   c. Type of end connection: Flanged, Class E.
   d. Size (inches): 2" - 30".
   e. Rating and Description: 125 lb., cast iron body and disc, ASTM 126 flanges rated at AWWA C110 Class 250 (250 psi) for 3” – 24”
   f. Manufacturer and Product: Provide one of the following:

      1) APCO Series 6000.
      2) M&H.

4. Valve Reference Number - V93:

   a. Type of Valve: Duck-billed rubber check valve.
   b. Type of Service: Water.
   c. Type of end connection: Flanged, Slip-on elastomer sleeve.
   d. Size (inches): 1" - 72".
   e. Rating and Description: Pressure rating of up to 20 psi. Backpressure on valve: 0 – 30” water.
   f. Materials: EPDM sleeve with fabric reinforcement, 316 SS clamps and connection hardware.
   g. Manufacturer and Product: Provide one of the following:

      1) Red Valve Tide Flex Series (slip-on sleeve).
      2) Red Valve Series 35 (Flanged).

3) Or equal.

F. Check Valves - Non-Metallic:

1. General:

a. PVC check valves shall be self-contained, straight-through design of polyvinyl chloride (PVC), Type 1, Grade 1 conforming to ASTM D1784.

b. Unless otherwise shown or specified valves shall have flanged ends conforming to ANSI B16.1, Class 125.

1) Unless otherwise noted, non-metallic ball valves shall be rated for 150 psi at 70 degrees F, and as listed below:

a) PVC: 100 psi min @ 120 degree F.
b) CPVC: 120 psi min @ 120 degree F.
c) PVDF: 130 psi min @ 120 degree F.

c. PVC check valves shall be used for all liquid chemical feed systems unless otherwise shown or specified.

2. Valve Reference Number - V134:

a. Type of Valve: Ball check valve.
b. Type of Service: Water, chemical.
c. Type of end connection: True union, threaded and socket.
d. Size (inches): 1/2" - 2".
e. Rating and Description: PVC rated 150 psi at 75 degree F; full port; elastomer ball seal; Teflon-coated sealing seat. Valve shall be capable of operation in a vertical or horizontal position. EPDM elastomers shall be used for ammonia service.
f. Manufacturer and Product: Provide the following:

1) Asahi America.
2) Or equal.

3. Valve Reference Number - V135:

a. Type of Valve: Spring check valve.
b. Type of Service: Chemical, water.
c. Type of end connection: Socket, true union threaded, flanged.
d. Size (inches): 1/2" - 4".
e. Rating and Description: PVC body, viton O-ring seal, PVC spring; capable of operation in either horizontal or vertical position. 150 psi rated at 75 degree F.
f. Manufacturer and Product: Provide the following:

1) Ryan Herco Order 5128-threaded or 5129-socket by George Fischer Inc.
2) Or equal.

4. Valve Reference Number - V136:

a. Type of Valve: PVC swing check valve.
b. Type of Service: Sump discharge, water chemical service.
c. Type of end connection: Flanged.
d. Size (inches): 3/4" - 8".
e. Rating and Description: PVC body and bonnet with EPDM gasket seals and seats or Viton seals and seats for sodium bisulfite service. The disc, swing arm, and top flange bolts shall be PVC. Provide external lever arm and counterweight. The bolts, nuts and washers for the pipe flanges shall be 316 stainless steel. Valve shall be capable of operation in a vertical or horizontal position.
f. The pressure rating at 70 degree F shall be 150 psig for 3" and smaller; 100 psig for 4" - 6"; 70 psig for 8".
g. Manufacturer and Product: Provide one of the following:

1) Asahi/America.
2) Hayward.
3) Or equal.

5. Valve Reference Number - V137:

a. Type of Valve: Self-closing check valve.
b. Type of Service: Sodium Bisulfite, vacuum breaker.
c. Type of end connections: Threaded.
d. Size: 2 inches.
e. Rating and description: PVC body, viton seals, normally closed design, can be mounted in any position, teflon PFA encapsulated stainless steel spring provided rapid closure of poppet against seat. Minimum cracking pressure to open valve: 1.0 to 1.5 psi.
f. The valve shall be rated for 100 psi at 120 degrees F.
g. Manufacturer:

1) Plast-O-Matic, Series CKS.
2) Or equal.

G. Check Valves - Double Door Type:

1. General:

a. Double door check valves for air service shall be suitable for temperatures up to 250 degree F.
b. Valves shall absolutely prevent the return of air back through the valve when the inlet pressure decreases below the delivery pressure.
c. Valve shall be tight seating and operate without hammer or shock.

d. Valve shall be suitable for mounting between flanges furnished with ANSI B16.1, Class 125 drilling.
e. Valves 5 inches and larger shall be fitted with a lifting hook for installation purposes.
f. The check valve doors shall be spring loaded, normally closed, by means of one or more heavy duty Type 316 stainless steel torsion springs. Flow shall cause the doors to open, and upon equipment shut-down, the torsion spring will shut the doors before reverse flow starts and at a point of zero velocity, for non-slam closure.

2. Valve Reference Number - V150:

a. Type of Valve: Double door check valve.
b. Type of Service: Water.
c. Type of end connection: Lug, Wafer.
d. Size (inches): 2" - 48".
e. Rating and Description: 150 lb, ductile iron body with flat face ends, aluminum bronze double doors, 316 stainless hinge shaft and stop shaft, one or more heavy duty 316 stainless steel torsion springs, and Buna-N seals.
f. Manufacturer and Product: Provide the following:

1) Cla Val Series 582
2) Or equal.

3. Valve Reference Number – V151

a. Type of Valve: Double door check valve.
b. Type of Service: Water, corrosive.
c. Type of End Connection: Wafer
d. Size (inches): 3” – 14”
e. Rating and Description:

1) The Check valves in low pressure piping (test pressure less than 250 psig) shall be line size ANSI Class 150 wafer type.
2) Check valves shall be of the spring-assisted metal hinged design with 316 stainless steel bodies, dual 316 stainless steel plates, 316 stainless steel shafts and EPDM flat, full-contact seals.
3) Seals shall be mechanically secured to the valve plates by means of 316 stainless steel clamp plates and fasteners to allow field replacement. The internal assembly shall be secured to the cast center post of the valve by means of 316 stainless steel fasteners.
4) Valve flow coefficient (Cv) values shall conform to the following:

Valve Size [inches]	Minimum Cv
3	160

4	320
6	800
8	1700
10	3000
12	4700
14	5950

5) Manufacturer:

a) Techno Model No. 5051-316
b) Or equal.

H. Check Valves - Air Service:

1. Valve Reference Number - V163:

a. Type of Valve: Check valve.
b. Type of Service: Air.
c. Type of end connection: Threaded.
d. Size (inches): 1/4" - 2".
e. Rating and Description: 125 lb, bronze body, Buna-N disc, brass hinge pin and nut, and bronze cap. Pressure rating of 200 psi at -20 degree F + 150 degree F.
f. Manufacturer and Product: Provide the following:

1) Stockham B-320-B.
2) Or equal.

I. Check Valves - Chemical Service

1. Valve Reference Number – V180

a. Type of Valve: Check valve.
b. Type of Service: Sulfuric Acid tank fill and vent lines.
c. Type of End Connection: Flanged, Class 150.
d. Size (inches): 2 – 4
e. Rating and Description:

1) Hinged plate type with PVDF body and Viton seals.

f. Manufacturer:

1) Techno
2) Or Equal

J. Butterfly Valves:

1. General:

a. Butterfly valves shall conform to the requirements of AWWA C504, Class 150B designed for a maximum flow velocity of 16 feet per second unless otherwise specified. Butterfly valve bodies shall be short laying length, fabricated from cast iron with integrally-cast hubs for shaft bearings. Valve ends shall be as required by valve location on plan.

b. Valve discs shall be ASTM A-48, Class 40 cast iron, or ASTM A-436, Type 1 alloy cast iron unless otherwise specified. All keys and pins used to secure the valve disc to the shaft shall be of Type 316 stainless steel construction.

c. All other pins and fasteners employed in the disc assembly shall be of 316 stainless steel.

d. Shafts shall be turned, ground, polished and fabricated from Type 316 stainless steel. The shafts shall be of one piece construction and designed for a factor of safety of not less than five for the rated shutoff pressure and the maximum torque required. Connection of the valve disc to the shaft shall be suitable for the service conditions specified. The outboard end of the shafts shall be permanently marked to show the disc position in relation to the shaft.

e. Seats shall be natural or synthetic rubber designed to provide bubble tight closure at the pressure class specified. The mating surfaces for valve seats shall be nichrome unless otherwise specified. Design of the seats shall permit the valve to remain in a closed position with full unbalanced pressure on either side of the disc without bulge or water/air penetration. No metal to metal seating surfaces shall be allowed.

f. Valves shall be bubble tight at rated pressures with flow in either direction.

g. Bearings shall be self-lubricating sleeve type. Thrust bearings shall be provided to keep the disc centered regardless of valve position. Thrust bearings which utilize a ferrous metal bearing surface in direct rubbing contact with an opposing ferrous metal surface will not be acceptable. The valve shaft seals for buried valves shall be split adjusting "V" type packing or of the "O" ring type contained in a removable bronze cartridge.

h. The use of a stop or lug cast integrally with or mechanically secured to the body for the purpose of limiting disc travel by means of direct contact or interference with the valve disc in either the open or closed position will not be acceptable.

i. Manually operated valves shall be equipped with an enclosed worm gear drive and nut, handwheel or chain wheel operator:

1) Enclosed worm gear operators shall have a gear ratio designed not to exceed 80 pounds pull to meet the required operator torque.

2) Gears shall be permanently lubricated and totally enclosed.

3) Operators shall be designed to hold the valve disc in any intermediate position without creeping or fluttering.
4) Adjustable stops shall be provided to prevent over-travel in either position, to withstand a pull of 200 pounds.
5) Stops shall be enclosed within the operator housing and be capable of absorbing the full operator torque with minimum safety factor of 5.
6) Operators shall be equipped with a direct coupled indicator.
7) Valves regardless of size, if installed with the operating wheel more than five feet above the operating floor, shall be provided with a chainwheel, sprocket, and aluminum chain. The chain shall extend to three feet above the operating floor.
8) Valve operator shall be designed to fully close or fully open the valve in a minimum of 30 turns. Valves shall open counter-clockwise, and shall have a position indicator.

j. Painting:

1) Interior ferrous metal surfaces of butterfly valves shall be furnished with the following painting system. Surfaces shall be shop painted with three coats of an approved coating applied in accordance with the manufacturer's recommendations. Painting system shall be NSF 61 certified for use in potable water applications. Coating system thickness shall be 16 mils total applied in three coats. Coating shall be Tnemec 40 Pota-Pox LT (blue) or equal.
2) Exterior surfaces of the valves shall be painted as specified under Part 2.10, Painting, of this Section.

k. Electric motor actuators where required, as shown on the Contract Drawings or as specified shall be furnished and installed in accordance with Part 2.4, Electric Motor Actuators, of this Section.
l. Buried manually operated butterfly valves along with those installed underneath trench grating shall be furnished with a valve box, a 2-inch square operating nut and position indicator. The operating nut shall be positioned vertically on top of the valve. The top of the operating nut shall be a maximum 12 inches below the top of the valve box. The position indicator shall be mounted on top of the valve.
m. Valve key extensions shall be provided and installed on all buried butterfly valves when the top of the valve nut is greater than 12 inches below the top of the valve box or grating surface, as applicable. The extension stem shall be 316 stainless steel, constructed so that when connected to the valve the extension stem shall be vertical.
n. T-Handled Operating Wrenches: Provide powder coated operating wrenches (minimum 2) in the sizes and shapes required to operate 2-inch square nut (SN) gear operators located beneath trench grating from the normal operating floor without encumbrances.
o. Limit Switches: Certain manual butterfly valves are required to be provided with limit switches. Switches and associated attachment mountings shall be factory installed and, unless otherwise indicated,

limit switches shall be DPDT rated at 5 amps, 120 volts ac. Check the P&IDs to locate valves requiring limit switches.

2. Valve Reference No.: None. Butterfly Valves shown on the Civil (C) and Pipeline (P) Drawings for working pressures greater than 150 psi and less than 250 psi: Drawing Nos. C-10, P-1, P-10 through P-13, P-15 through P-19.

    a. Butterfly valves shall conform to the requirements of AWWA C504, Class 250B (250 psig differential pressure and maximum flow velocity of 16 feet per second), bidirectional flow, bubble tight at rated pressure, and NSF Standard 61 certified and the following:

        1) Valve Body: Ductile Iron ASTM A536 Grade 65-45-12 with flanged end connections drilled in accordance with ANSI B16.1, Class 125.
        2) Valve Disc: Ductile Iron ASTM A536 Grade 65-45-12 disc with on-center shaft and symmetrical design and Type 316 stainless steel disc edge. Disc shall be retained by pins that extend through the full diameter of the shaft. The pin material shall be the same as the shaft material. Torque plugs or tangential fasteners shall not be allowed.
        3) Seat: For valve sizes 3” through 20”, the seat shall be of one-piece, rubber body construction, simultaneously molded and bonded directly into the body. The seat material shall be either Buna-N or EPDM rubber.
        4) Valve Shaft: The shaft shall be made of ASTM A-564 Type 630 condition H-1150. The shaft seals shall be “V” type packing. Shaft seals shall be of a design allowing replacement without removing the valve shaft. No O-ring or “U” cup packing shall be allowed. The bearing shall be a stainless steel backed teflon material. Bearing load shall not exceed 1/5 of the compressible strength of the bearing or shaft material.
        5) Valves shall be Henry Pratt Model HP250II or approved equal.

    b. Electric motor actuators where required, as shown on the Contract Drawings or as specified shall be furnished and installed in accordance with the requirements for Electric Motor Actuators in this Section.
    c. Limit Switches: Certain manual butterfly valves are required to be provided with limit switches. Switches and associated attachment mountings shall be factory installed and, unless otherwise indicated, limit switches shall be DPDT rated at 5 amps, 120 volts ac. Check the P&IDs to locate valves requiring limit switches.
    d.

3. Valve Reference No.: None. Butterfly Valves shown on the Civil (C), Gheen Facility (GFC) and Pipeline (P) Drawings for working pressures of 150 psi or less:

    a. Butterfly valves shall conform to the requirements of AWWA C504, Class 150B (150 psig differential pressure and maximum flow velocity of 16 feet per second), shall be bubble tight at rated pressure and bidirectional flow, be certified to NSF Standard 61, and conform with the following:

        1) Valve Body: Cast iron ASTM A126 Class B with flanged end connections drilled in accordance with ANSI B16.1, Class 125. Valve ends shall be as required by valve location on plan.
        2) Valve Disc: Cast iron conforming to ASTM A126 Class B in sizes 20" and smaller, or ductile iron conforming to ASTM A536 Grade 65-45-12 in sizes 24" and larger. Disc shall be furnished with Type 316 stainless steel seating edge to mate with the rubber seat on the body. Disc shall be retained by pins that extend through the full diameter of the shaft. The pin material shall be the same as the shaft material. The use of a stop or lug cast integrally with or mechanically secured to the body for the purpose of limiting disc travel by means of direct contact or interference with the valve disc in either the open or closed position will not be acceptable.
        3) Seat: Buna-N rubber located on the valve body. In sizes 20" and smaller, valves shall have bonded seats that meet test procedures outlined in ASTM D-429 Method B. Sizes 24" and larger shall be retained in the valve body by mechanical means without the use of metal retainers or other devices located in the flow stream.
        4) Shaft: Type 304 stainless steel conforming to ASTM A276. Shaft seals shall be standard self-adjusting split V packing. Shaft seals shall be of a design allowing replacement without removing the valve shaft.
        5) Bearings: Sleeve type, corrosion resistant and self-lubricating.
        6) Valves for buried service shall be Henry Pratt Groundhog or approved equal. For non-buried service, valves shall be Henry Pratt 2FII (3” through 20”) or Henry Pratt Triton XR-70 (24” and larger) or approved equal.
        7)

    b.

4. Valve Reference Number - V197:

    a. Type of Valve: Butterfly.
    b. Type of Service: Air, water.
    c. Type of end connection: Flanged, lug, and wafer.
    d. Size (inches): 2" - 20".

e. Rating and Description: Class 150 B, ASTM A126, AWWA C504, cast iron body, stainless steel or Monel keys and pins to secure disc, 316 stainless steel shafts, and cast iron or ductile iron disc with Ni seating edge and rubber seats on body.
f. Manufacturer and Product: Provide one of the following:

1) Pratt Valve Company 2FII
2) DeZurik.
3) Or equal.

5. Valve Reference Number - V198:

a. Type of Valve: Butterfly.
b. Type of Service: Air, water.
c. Type of end connection: Grooved.
d. Size (inches): 2" - 12".
e. Rating and Description: Ductile iron body and disc, EPDM coated dual seal disc, 300 psi, stainless steel shaft and trim.
f. Manufacturer and Product: Provide the following:

1) Victaulic
2) Or equal

6. Valve Reference Number - V201:

a. Type of Valve: Butterfly.
b. Type of Service: Chemical solution, water.
c. Type of end connection: Wafer, lug style.
d. Size (inches): 1-1/2" - 14".
e. Rating and Description: 150 psi at 70 degree F (12” – 14”: 100 psi at 70 degree F), PVC body, viton seat. EPDM elastomers shall be used for ammonia service.
f. Manufacturer and Product: Provide the following:

1) Asahi/America Type 75.
2) Or equal.

7. Valve Reference Number - V204:

a. Type of Valve: Butterfly.
b. Type of Service: Water
c. Type of end connection: Flanged.
d. Size (inches): As noted in the partial valve schedule.
e. Rating and description: Class 150B, AWWA C504 .

1) Butterfly valves shall conform to the requirements of AWWA C504 in all respects, except as may be specifically modified herein. Both workmanship and material shall be of their very best quality and shall be entirely suitable for the service conditions specified.

2) Butterfly valves shall be tested in accordance with AWWA C504 and the requirements specified below:

   a) Each butterfly valve shall be subjected to the performance, leakage, and hydrostatic tests required by Sections 5.3 and 5.4, respectively, of AWWA C504.
   b) The pressure differential specified in Section 5.3 of AWWA C504 shall be applied in both directions.
   c) Each valve shall be completely assembled prior to testing.

3) The valve manufacturer shall provide proof of design tests per AWWA C504.
4) Construction:

   a) Type: Tight-closing rubber seated. Valves will be manually operated unless otherwise shown on the plans or valve schedule. Valves shall have an AWWA C504 Class B designation, suitable for a maximum velocity of 16 feet per second in the upstream pipe section.
   b) Bodies: Bodies shall be fabricated ductile iron conforming to ASTM A536, Grade 65-45-12, with integrally-cast hubs for shaft bearings. Valve bodies shall be cast hubs for shaft bearings. All valves shall be short body. Valve bodies shall be designed for the shutoff pressure specified with a factor of safety of not less than five. The actual port diameter shall not be less than 1-1/4-inch smaller than the nominal valve diameter. All valves shall have flanged ends. Flanged ends shall be flat faced with concentric or phonographically spiraled serrated finish. Flanged ends shall conform to ANSI B16.1, Class 125.

   c) Discs: Ductile iron ASTM A536, Grade 65-45-12, The disc edge shall have a corrosion-resistant edge for mating with the rubber seat and shall be machined or ground through 360 degrees of seat. All keys and pins used to secure the valve disc to the shaft shall be of stainless steel or Monel construction. All other pins and fasteners employed in the disc assembly shall be of Type 316 stainless steel. Discs shall employ a "flow through" design to minimize head loss for valves 30-inches and larger.
   d) Shafts: Turned, ground, polished and fabricated from Type 304, stainless steel or model. The shafts shall be of one or two piece construction and designed for a factor of safety of not less than five for the rated shutoff pressure and the maximum torque required. Connection of the valve disc to the

shaft shall be suitable for the service conditions specified. The outboard end of the shafts shall be permanently marked to show the disc position in relation to the shaft. Shaft shall be mounted horizontally.

e) Seats: Natural or synthetic rubber mounted in the valve body and which, together with the mating seat surface, shall be designed to provide tight closure at the shutoff pressures specified herein. Seats which form, or are incorporated in the flange gasketing will not be acceptable. The mating surfaces for valve seats shall be Type 316 stainless steel, or Nichrome for valves 24 inches or smaller. Rubber seats for valves 24 inches or larger shall be field adjustable around the full 360-degree circumference and shall be replaceable without dismantling the operator, disc or shaft and without removing the valve from the pipeline. Adjusting segments and retainer screws, if used, shall be Type 316 stainless steel. If retaining segments are used, the bolts used to attach the retainer to the body shall not penetrate the rubber seat. The seats for valves 24 inches and larger shall be retained by both cementing and vulcanizing and an additional approved positive means of retention. The positive retention shall be by means of corrosive-resistant devices such as wedge-action segmented retainers or heavy Type 316 stainless steel rings, epoxy-filled hollow rubber seats inserted in an inverted wedge-shaped recess, or other approved means. Design of the seats shall permit the valve to remain in a closed position with full unbalanced pressure on either side of the disc and adjoining pipeline flange on the other side removed without bulge or water penetration under the seat.

f) Bearings: Self-lubricating sleeve type. Thrust bearings shall be provided to keep the disc centered regardless of valve position.

f. Manufacturer and Product: Provide the following:

1) DeZurik AWWA (BAW)
2) Pratt 2FII

8. Valve Reference Number - V205:

a. Type of Valve: Butterfly.
b. Type of Service: IM Systems, Water
c. Type of end connection: Flanged.
d. Size (inches): As noted in the partial valve schedule.
e. Rating and description: Class 250B, AWWA C504.

1) Butterfly valves shall conform to the requirements of AWWA C504 in all respects, except as may be specifically modified herein. Both workmanship and material shall be suitable for the service conditions specified.
2) Butterfly valves shall be tested in accordance with AWWA C504 and the requirements specified below:

    a) Each butterfly valve shall be subjected to the performance, leakage, and hydrostatic tests required by Sections 5.3 and 5.4, respectively, of AWWA C504.
    b) The pressure differential specified in Section 5.3 of AWWA C504 shall be applied in both directions.
    c) Each valve shall be completely assembled prior to testing.

3) The valve manufacturer shall provide proof of design tests per AWWA C504.
4) Construction:

    a) Type: Tight-closing rubber seated. Valves will be manually operated unless otherwise shown on the plans or valve schedule. Valves shall have an AWWA C504 Class B designation, suitable for a maximum velocity of 16 feet per second in the upstream pipe section.
    b) Bodies: Bodies shall be fabricated ductile iron conforming to ASTM A536, Grade 65-45-12, with integrally-cast hubs for shaft bearings. Valve bodies shall be cast hubs for shaft bearings. All valves shall be short body. Valve bodies shall be designed for the shutoff pressure specified with a factor of safety of not less than five. The actual port diameter shall not be less than 1-1/4-inch smaller than the nominal valve diameter. All valves shall have flanged ends. Flanged ends shall be flat faced with concentric or phonographically spiraled serrated finish. Flanged ends shall conform to ANSI B16.1, Class 125.
    c) Discs: Ductile iron ASTM A536, Grade 65-45-12, The disc edge shall have a corrosion-resistant edge for mating with the rubber seat and shall be machined or ground through 360 degrees of seat. All keys and pins used to secure the valve disc to the shaft shall be of stainless steel or Monel construction. All other pins and fasteners employed in the disc assembly shall be of Type 316 stainless steel. Discs shall employ a "flow through" design to minimize head loss for valves 30-inches and larger.
    d) Shafts: Turned, ground, polished and fabricated from Type 304, stainless steel or model. The shafts

shall be of one or two piece construction and designed for a factor of safety of not less than five for the rated shutoff pressure and the maximum torque required. Connection of the valve disc to the shaft shall be suitable for the service conditions specified. The outboard end of the shafts shall be permanently marked to show the disc position in relation to the shaft. Shafts shall be mounted horizontally.

e) Seats: Natural or synthetic rubber mounted in the valve body and which, together with the mating seat surface, shall be designed to provide tight closure at the shutoff pressures specified herein. Seats which form, or are incorporated in the flange gasketing will not be acceptable. The mating surfaces for valve seats shall be Type 316 stainless steel, or Nichrome for valves 24 inches or smaller. Rubber seats for valves 24 inches or larger shall be field adjustable around the full 360-degree circumference and shall be replaceable without dismantling the operator, disc or shaft and without removing the valve from the pipeline. Adjusting segments and retainer screws, if used, shall be Type 316 stainless steel. If retaining segments are used, the bolts used to attach the retainer to the body shall not penetrate the rubber seat. The seats for valves 24 inches and larger shall be retained by both cementing and vulcanizing and an additional approved positive means of retention. The positive retention shall be by means of corrosive-resistant devices such as wedge-action segmented retainers or heavy Type 316 stainless steel rings, epoxy-filled hollow rubber seats inserted in an inverted wedge-shaped recess, or other approved means. Design of the seats shall permit the valve to remain in a closed position with full unbalanced pressure on either side of the disc and adjoining pipeline flange on the other side removed without bulge or water penetration under the seat.

f) Bearings: Self-lubricating sleeve type. Thrust bearings shall be provided to keep the disc centered regardless of valve position.

f. Manufacturer and Product: Provide the following:

1) DeZurik AWWA
2) Pratt HP250II

9. Valve Reference Number - V206:

a. Type of Valve: Butterfly.

b. Type of Service: Water.
c. Type of End Connection: Lug/Wafer.
d. Size (inches): As shown on valve schedule.
e. Rating and Description: Class 150.

1) Body material: 316 stainless steel.
2) Disc material: 316 stainless steel.
3) Shaft material: 316 stainless steel.
4) Packing: Teflon (TFE).
5) Seat: Teflon (TFE) with titanium backup ring.
6) Factory cleaned, packaged, and labeled for oxygen service for oxygen services.

f. Manufacturer and Product: Provide one of the following:

1) DeZurik HP Butterfly Series Fig 643.
2) Keystone K-LOK Series.
3) Or equal.

10. Valve Reference Number – V207

a. Type of Valve: Butterfly
b. Type of Service: RO System Low Pressure
c. Type of End Connection: Lug
d. Size (Inches): 2 – 14
e. Rating and Description:

1) Lug style butterfly valves for general service shall have cast iron or ductile iron bodies with integral cast top plate for direct flush-mounting of manual or power actuators; 316 stainless steel discs; 17-4 PH or 316 stainless steel one-piece shafts; self-lubricating sleeve type bearings; EPDM replaceable resilient seats; and self-adjusting packing.
2) Valves shall be suitable for temperatures up to 250 degrees F and shall be bubble-tight at 175 psi differential pressure (sizes 2 inches to 12 inches) and 150 psi differential pressure (sizes 14 inches and larger).
3) Valve body shall fit between ANSI 125 and 150 pound flanges.

f. Manufacturers:

1) Dezurik BRS Style
2) Keystone 601/602
3) Or equal.

11. Valve Reference Number – V208

a. Type of Valve: Butterfly
b. Type of Service: Chemical Solution

c. Type of End Connection: Lug
d. Size (Inches): 2” – 6”
e. Rating and Description:

1) Lug style butterfly valves shall have stainless steel body; 316 stainless steel discs; 316 stainless steel one-piece shafts; self-lubricating sleeve type bearings;
2) Valves shall be bubble-tight at 175 psi differential pressure

f. Manufacturers:

1) Metso Jamesbury 860 Series
2) Or equal.

12. V209 – Butterfly Valves and Actuators – IM System

a. Valves shall be Bray Series 30, or approved equal, butterfly valves with a neoprene encapsulated or fusion epoxy coated body, nylon coated or stainless steel discs, EPDM seats, Bray Series 70, or approved equal, electric motor actuators, adjustable opening limit stops as required for rate set, and declutching handwheel manual override and speed control block for the following locations:

1) Inlet (10”), 2 for each filter (1 for each cell)
2) Backwash inlet (10”), 2 for each filter (1 for each cell)
3) Backwash outlet (10”), 2 for each filter (1 for each cell)
4) Filter-to-waste outlet (10”), 1 for each filter
5) Air scour inlet (3”), 2 for each filter (1 for each cell)
6) Draindown outlet (8”), 2 for each filter (1 for each cell)

b. Bray Series 30, or approved equal, butterfly valves shall be neoprene encapsulated or fusion epoxy coated bodies, nylon coated or stainless steel discs, EPDM seats, NEMA 4X Bray Series 70, or approved equal, electric motor actuators with remote mounted NEMA 4X enclosure for local/remote control, pushbuttons and lights, with 4-20 mA input/output for the following location:

1) Outlet (6”) modulating capabilities, 2 for each filter (1 for each cell)
2) Back wash outlet (10”) modulating capabilities, 2 for each filter (1 for each cell)

c. Valve position indicators shall clearly indicate valve position.

d. Automatic air vent valves shall be APCO model 200A or equal with threaded cast iron bodies and 316 stainless steel floats for the following locations:

1) Tank air vent (2”), 2 for each vessel (1 for each cell)

2) For each filter, provide miscellaneous drain and isolation valves as shown on the Drawings.

K. Air Release and Vacuum Valves:

1. Valve Reference No.: None – Use for valves on C, GFC and P Drawings

a. Air Release Valves

1) 1 inch to 3 inches NPT, 4" flanged. Cast-Iron Body with stainless steel internal parts. Suction screens required, 300 PSI
2) Valves shall be supplied by a manufacturer from FPUD Approved Materials List.

b. Combination Air Valves

1) 1 inch, 2 inch, 4 inch and 6 inch single-body style. Flanged, cast iron or ductile iron bodies with stainless steel internal parts. Suction screens required, minimum 250 PSI working pressure
2) Valves shall be supplied by a manufacturer from FPUD Approved Materials List.

2. General:

a. Types:

1) Air Release Valves: Air release valves (ARV) shall have a small venting orifice to vent the accumulation of air and other gases with the line or system under pressure.
2) Vacuum Relief Valves: Vacuum relief valves (VRF) shall have a small orifice to admit air and other gasses into the pipe or tank when line pressure decreases below atmospheric pressure.
3) Air and Vacuum Valves: Air and vacuum valves (AVV) shall have a large venting orifice to permit the release of air as the line is filling or relieve the vacuum as the line is draining or is under negative pressure.
4) Combination Air Valves: Combination air valves (CAV) shall have operating features of both the air and vacuum valve and the air release valve. They include both single- and dual-body construction. Size and capacity shall be as specified or shown.
5) Air Valves for Vertical Turbine Pumps: Air valves for vertical turbine pumps shall consist of an air and vacuum valve with throttling device for sizes 3-inch and less, and a dual body construction combination air valve mounted on top of a surge check for sizes 4-inch and larger.

b. Air release valves shall be float operated, compound lever type.

c. Air and vacuum valves shall be designed to protect the float from direct contact of the rushing air and water to prevent the float from closing prematurely in the valve. The seat shall be fastened into the valve cover, and shall be easily removed if necessary. The float shall be center or peripheral guided for positive shutoff into the seat.
d. Combination air valves, unless otherwise specified, shall be single-body construction. Single-body construction shall be designed to provide all functions within one housing.
e. Air valves for vertical turbine pumps (sizes 3-inch and less) shall be designed and constructed as specified for air and vacuum valves except the discharge orifice shall be fitted with a throttling device to regulate and restrict air venting and establish a pressure loading on the rising column of water on pump start. Unless otherwise specified, air valves 4-inch and larger shall be dual body combination air valves except the inlet shall be fitted with a surge check to prevent water column entering the valve on pump start.
f. Valves shall be suitable for working pressures from 0 to 150 psi.
g. Air release valves shall incorporate an isolation valve to allow removal of the valve without shutting down the equipment.
h. The CONTRACTOR shall provide the valve manufacturer with a list of design pressures for each valve and obtain the valve manufacturer's valve selection recommendations in each case.

3. Valve Reference Number – V252:

a. Type of Valve: Air release.
b. Type of Service: Water, drainage.
c. Type of end connection: Threaded or flanged.
d. Size (inches): ½" – 6".
e. Rating and Description:

1) Cast iron body and cover: ASTM A126, Grade B.
2) Float: Stainless steel, ASTM A240
3) Linkage: Stainless steel, ASTM A296, Type 316.
4) Needle: BUNA-N.

f. Manufacturer and Product: Provide the following:

1) APCO Valve and Primer Co. Series 50 for ½", ¾" inlet size.
2) APCO Valve and Primer Co. Series 200 for 1" to 6" inlet size.
3) Or equal.

4. Valve Reference Number – V253:

a. Type of Valve: Combination air release and air vacuum, single body
b. Type of Service: Water, drainage.
c. Type of end connection: Threaded or flanged.
d. Size (inches): 1" to 4", 6" and 8".
e. Rating and Description:

1) Cast iron body and cover: ASTM A126, Grade B.
2) Float: Stainless steel, ASTM A240
3) Linkage: Stainless steel, ASTM A296, Type 316.
4) Needle: BUNA-N.

f. Manufacturer and Product: Provide the following:

1) APCO. Model 143C, 145C, 147C, 149C, 150C, 151C
2) Or equal.

5. Valve Reference Number – V254

a. Type of Valve: Plastic combination air release valve.
b. Type of Service: RO system.
c. Type of End Connection: Threaded
d. Size (inches): 1 - 2
e. Rating and Description:

1) 150 psi minimum rated operating pressure. Valve shall release are with the associated process line under pressure. The valve shall be equipped with an outlet pipe connection to permit the routing of gas to discharge at grade.
2) Valve body and base shall be nylon. Drainage elbow shall be polypropylene. Float shall be foamed polypropylene. Seals shall be EPDM.

f. Manufacturer:

1) A.R.I. Flow Control Accessories, Model D-040
2) Or equal.

6. Valve Reference Number - V255:

a. Type of Valve: Threaded vacuum breaker.
b. Type of Service: RO system.
c. Type of End Connection: Plain; body threaded.
d. Size (inches): 1
e. Rating and Description:

1) Vacuum breakers used in RO system manifolding shall be 1 inch ball/spring type rated 400 psig.
2) They shall be constructed from Type 316 stainless steel bodies, Type 316 stainless steel retaining rings, Type 316 stainless steel springs, and Viton seals.

f. Manufacturer:

1) Durabla Fluid Technology, Model BSSV6
2) Or equal.

7. Valve Reference Number – V256

    a. Type of Valve: Vacuum relief air inlet valve
    b. Type of Service: Water
    c. Type of End Connection: Flanged
    d. Size (inches): 1 - 3”
    e. Body shall be globe-type with integrally cast-on flanged ends.
    f. Internal valve plug and seat shall be heavy cast lead-free bronze.
    g. Seal: Buna-N fastened to the cover. Flow area shall equal or be greater than the valve inlet size to insure full vacuum relief
    h. The plus shall be normally closed, by means of a stainless spring and shall open when vacuum/pressure differential exceeds 0.25 psi.
    i. Valve shall be covered by a steel hood to prevent debris entering.
    j. Rating and Description:

        1) 250 psi minimum rated operating pressure.

    k. Manufacturer:

        1) APCO Series 1500
        2) Or equal

8. Valve Reference Number – V257

    a. Type of Valve: Sewage combination air release/vacuum valve.
    b. Type of Service: Sewage, sludge,
    c. Type of End Connection: Flanged
    d. Size (inches): 1 - 4
    e. Rating and Description:

        1) 250 psi minimum rated operating pressure. Valve shall allow unrestricted venting or re-entry of air through it
        2) Valve shall use two 304 stainless steel floats directly connected to stainless steel shaft to maintain an air gap between the concave float and the top shut-off float. The internal baffle shall be fitted with guide bushings.
        3) The baffle shall retain the Buna-N seat in place.
        4) Valve body, cover and baffle shall be cast iron or ductile iron
        5) Stem, guide busing shall be stainless steel
        6) Painting in compliance with Section 09900.

    f. Manufacturer:

        1) APCO Series 401
        2) Or equal

9. Valve Reference Number – V258

    a. Type of Valve: Pressure relief valve
    b. Type of Service: Aqua Ammonia
    c. Type of end connection: Flanged
    d. Size: 3”
    e. Rating and Description: Pressure and vacuum relief combination valve. Pressure relief shall be by means of a spring loaded pallet and pressure setting shall be adjustable. Vacuum relief shall be by means of a dead weight loaded pallet. Separate air flow ports shall be provided for pressure and vacuum relief. The valve shall have an ANSI 150-pound mounting flange Body and trim materials shall be Type 316 stainless steel Seat shall be PTFE.

    f. Manufacturer and Product:

        1) Protectoseal End of Line Emergency Pressure Vent Series 7800
        2) or equal.

L. Pressure Reducing Valves:

1. Valve Reference Number - V266:

    a. Type of Valve: Pressure reducing valve.
    b. Type of Service: Water.
    c. Type of end connection: Threaded.
    d. Size (inches): 1/2" - 2-1/2".
    e. Rating and Description: Maximum inlet pressure of 300 psi, outlet pressure adjustable from 25 to 75 psi, bronze body, Buna-N diaphragm, and Buna-N valve disc.

    f. Manufacturer and Product: Provide the following:

        1) Watts Regulator, Series LF223.
        2) Or equal.

2. Valve Reference Number - V267:

    a. Type of Valve: Pressure reducing valve.
    b. Type of Service: Water.
    c. Type of end connection: Threaded, flanged.
    d. Size (inches): 4" - 6".
    e. Rating and Description: Class 125, cast iron body, 304 stainless steel trim, internal epoxy coated, and Y strainer. Adjustable Range - 20 - 200 psi (inlet) - 15 - 75 psi (outlet).
    f. Manufacturer and Product: Provide the following:

        1) Cla-Val Co. 92G-01 Series.
        2) Or equal.

3. Valve Reference Number - V268:

    a. Type of Valve: Pressure relief valve.
    b. Type of Service: Water, sewage, chemicals.
    c. Type of end connection: Threaded.
    d. Size (inches): 1" - 1-1/2".
    e. Rating and Description: PVC body with Viton O-ring seals at 75 degree F with maximum operating temperature of 140 degree F. PVDF for FL with Viton O-ring. Threaded stem and locknut for setting control pressure from 10 - 80 psi.
    f. Manufacturer and Product: Provide the following:

        1) RK Industries Model MRB
        2) Or equal.

4. Valve Reference Number - V270:

    a. Type of Valve: Back pressure valve.
    b. Type of Service: Chemicals.
    c. Type of End Connection: Threaded.
    d. Size (inches): 1/4" - 3".
    e. Rating and Description: PVC body, Viton seals discharge pressure of 5 psi to 100 psi, field adjustable with locking nut, and valve rated 150 psi at 70 degree F.
    f. Manufacturer and Product: Provide the following:

        1) Plast-O-Matic RVDM Series.
        2) Or equal.

5. Valve Reference Number - V271:

    a. Type of Valve: Pressure Reducing Regulator.
    b. Type of Service: Air.
    c. Type of End Connection: Threaded.
    d. Valve Size: 1".
    e. Design Air Flow Range: 30 SCFM.
    f. Design Inlet Pressure Range: 80 - 100 psig.
    g. Design Outlet Pressure: 25 psig.
    h. Materials:

        1) Body: 316 SS.
        2) Diagram: TFE coated SS.
        3) Seat Disc: TFE.
        4) Piston Spring: 302 SS.

    i. Manufacturer:

        1) Cascho, Model D.
        2) Or equal.

6. Valve Reference Number – V272:

    a. Type of Valve: Backpressure Regulator.
    b. Type of Service: Sulfuric Acid System.
    c. Requirements: See Section 11300.

M. Pressure Relief Valves:

1. Valve Reference Number - V284:

    a. Type of Valve: Pressure relief valve.
    b. Type of Service: Water.
    c. Type of end connection: Flanged.
    d. Size (inches): 8" - 16".
    e. Rating and Description: 250 psi rated pressure, ASTM A536 ductile iron body, ANSI B16.42 Class 150 flange drilling, 304 stainless steel trim, internal epoxy coated, and Y strainer. Adjustable Range - 20 - 200 psi (inlet) - 20 - 200 psi (outlet) with Option H – pilot system drain to atmosphere.
    f. Manufacturer and Product: Provide the following:

        1) Cla-Val, 50 Series.
        2) Or equal.

2. Valve Reference Number - V285:

    a. Type of Valve: Pressure relief valve.
    b. Type of Service: Water, chemical.
    c. Type of End Connection: Threaded.
    d. Size (inches): 1/8" - 2".
    e. Rating and Description: 5 psi to 100 psi relief setting, PVC or PVDF body, Viton A trim. EPDM elastomers shall be used for ammonia
    f. Manufacturer and Product: Provide the following:

        1) Plast-O-Matic RV Series.
        2) Or equal.

    g. Maximum number of end connections: Two (2).

3. Valve Reference Number - V286:

    a. Type of Valve: Pressure relief valve.
    b. Type of Service: Air.
    c. Type of End Connection: Threaded.
    d. Size (inches): 1/2" - 2".
    e. Rating and Description: Adjustable set pressure to 125 psi, bronze body, diaphragm operated, 316 stainless steel seat, and Monel metal diaphragm.
    f. Manufacturer and Product: Provide the following:

1) Mueller Co., H-9054.
2) Or equal.

g. Maximum number of end connections: Two (2).

4. Valve Reference Number – V287:

a. Type of Valve: Pressure Relief Valve.
b. Type of Service: Sulfuric Acid System.
c. Requirements: See Section 11300.

5. Valve Reference Number – V288:

a. Type of Valve: Surge Relief Valve.
b. Type of Service: Sludge System.
c. Type of End Connection: Flanged.
d. Size (inches): 2- 16”
e. Rating and Description: Adjustable set pressure to 200 psi, ductile iron body, right angle, EPDM seats, stainless steelhardware.
f. Manufacturer and Product: Provide the following:

1) Dezurik/APCO, SRA.
2) Or equal.

6. Valve Reference Number - V289:

a. Type of Valve: Surge relief valve.
b. Type of Service: Sludge.
c. Type of end connection: Flanged.
d. Size (inches): 4" - 6".
e. Body Style: 90 degree elbow design conforming to the center-to-face dimension for long-radius elbows per ASME B16.1 and ASME B16.42.
f. Rating and Description: Ductile iron body, body seal 316 stainless steel. Flanges flat faced conforming to ASME B16.42 Class 150. Replaceable seat ring of EDPM.
g. Manufacturer and Product: Provide the following:

1) APCO Model SRA-3000A
2) Or Equal

N. Globe Valves:

1. Valve Reference Number - V327:

a. Type of Valve: Angle hose valve.

b. Type of Service: Water, chemical.
c. Type of End Connection: Threaded.
d. Size (inches): 1/2" - 1".
e. Rating and Description: 150 lb, wog bronze body, screwed bonnet, and comp. disc.
f. Manufacturer and Product: Provide the following:

1) Crane 17TF, Stockham B-222.
2) Or equal.

2. Valve Reference Number - V328:

a. Type of Valve: Globe/Angle valve.
b. Type of Service: Water.
c. Type of End Connection: Threaded.
d. Size (inches): 1/8" - 3".
e. Rating and Description: Bronze body, bronze bonnet, teflon disc, handwheel, copper-silicone alloy stem, brass packing gland and union bonnet.
f. Manufacturer and Product: Provide the following:

1) Stockham B-222, B-22.
2) Or equal.

g. See Paragraph 2.3.B for Hose Station requirements where Valve Number 328 is shown or specified in conjunction with Hose Station.

3. Valve Reference Number – V329

a. Type of Valve: Cage Guided Globe Valve
b. Type of Service: RO concentrate flow control.
c. Type of End Connection: Flanged, Class 150
d. Size (inches): 2
e. Rating and Description:

1) Valves shall be used as concentrate control valves on RO trains. Design minimum Cv for the valve shall be 4. Design maximum Cv for the valve shall be 60 or greater.
2) The valves shall be flanged (raised face) 4-inch, ANSI Class 150 cage guided globe valves with one stage anti-cavitation trim.
3) The sound pressure level (SPL) shall not exceed 65dB(A) at any point in the specified valve operating range when measured 1 meter downstream of the valve outlet and 1 meter from the pipe surface.
4) The valve bodies, bonnet cage retainers and bolting shall be Type 316 stainless steel. The cages and seating rings shall be 17-4 PH. The valve plugs shall be heat treated Type 420 stainless steel. Packing and seals shall be PTFE.
5) Manufacturer:

a) Fisher Design ET with one stage Cavitrol III trim
b) Masoneilan Model 41615
c) Or equal

O. Diaphragm Valves:

1. General:

a. Unless otherwise noted, non-metallic diaphragm valves shall be rated for 150 psi at 70 degrees F, and as listed below:

1) PVC: 100 psi min @ 120 degree F.
2) CPVC: 120 psi min @ 120 degree F.
3) PVDF: 130 psi min @ 120 degree F.
4) Polypropylene: 150 psi min @ 105 degree F.

2. Valve Reference Number - V345:

a. Type of Valve: Diaphragm valve.
b. Type of Service: Chemical, water.
c. Type of End Connection: Threaded, spigot, solvent weld, flanged.
d. Size (inches): 1/2" - 6".
e. Rating and Description:

1) Body Material: Per compatibility with chemical service.

a) Threshold Inhibitor: Polypropylene
b) Sulfuric Acid: PVDF
Fluorosilicic Acid (FL): PVDF
Other chemicals: CPVC

2) Diaphragm: Per compatibility with chemical service.

a) Threshold Inhibitor: EPDM backed PTFE
b) Sulfuric Acid: EPDM backed PTFE
Fluorosilicic Acid (FL): FPM backed PTFE
All other chemicals: EPDM backed PTFE

3) O-ring: Per compatibility with chemical service.

a) Threshold Inhibitor: EPDM
b) Sulfuric Acid: Viton
Fluorosilicic Acid (FL): Viton
c) All other chemicals: Viton

f. Manufacturer and Product: Provide the following:

1) GF Plastic Systems, Series 5.
2) ITT Dia-Flo,

3) Asahi
4) Or equal.

3. Valve Reference Number - V346:

a. Type of Valve: Diaphragm valve.
b. Type of Service: Water, sewage, chemical.
c. Type of End Connection: Flanged.
d. Size (inches): 1/2" - 20".
e. Rating and Description: Cast iron body, TFE diaphragm, handwheel operator with indicating stem and travel stop.
f. Lining: None for water and sewage. Hard rubber #10 for chlorinated water, Polypropylene for sodium bisulfite solution.
g. Manufacturer and Product: Provide the following:

1) ITT Weir #2431 (1/2" - 20") for water and sewage, ITTWeir #2521 (1/2" - 18") for chlorinated water, ITT Weir #2463 (1/2" - 2") for chemical, ITT Weir #2539 for sodium bisulfite solution.
2) Or equal.

4. Valve Reference Number - V347:

a. Type of Valve: Diaphragm valve.
b. Type of Service: Chemical.
c. Type of End Connection: Flanged.
d. Size (inches): 1/2" - 8".
e. Rating and Description: CPVC body, EPDM diaphragm, 100 psi minimum working pressure.
f. Manufacturer: Provide product as manufactured by the following:

1) Asahi/America.
2) Or equal.

5. Valve Reference Number – V349

a. Type of Valve: Stainless steel diaphragm valve.
b. Type of Service: Threshold inhibitor system.
c. Type of End Connection: Butt-weld or Flanged, Class 150.
d. Size (inches): 1/2 – 2.
e. Rating and Description:

1) Valves shall be butt weld or flanged weir type valves.
2) They shall have Type 316 stainless steel bodies and hardware; EPDM backed Teflon diaphragm; and indicating cast iron sealed bonnet with adjustable travel stop. Stem bushing shall be bronze.

f. Manufacturer:

1) ITT Dia-Flo Figure No 2466 (or No. 2433)-R2-913-S1-B316
2) Or equal

6. Valve Reference Number – V350

a. Type of Valve: Ductile iron diaphragm valve.
b. Type of Service: Chemical, water
c. Type of End Connection: Flanged, Class 150
d. Lining: compatible with chemical
e. Size (inches): 3/4 - 2
f. Rating and Description:

1) Valves shall be flanged ductile iron type valves with lining and Type 316 stainless steel hardware.
2) They shall have an PTFE diaphragm and manual actuator.
3) The valves shall be furnished with an indicating cast iron sealed bonnet with adjustable travel stop; PVDF coated cast iron compressor; stainless steel tube nut; and PVDF coated body and top works.

g. Manufacturer:

1) ITT Dia-Flo Model
2) Or equal

P. Solenoid Valves:

1. General:

a. Solenoid valves shall be of packless construction with threaded ends and threaded conduit connection.
b. Parts in contact with the fluid being handled shall be non-corrodible construction and suitable for the service indicated.
c. Install a strainer upstream of each solenoid valve.

2. Valve Reference Number - V363:

a. Type of Valve: Solenoid valve.
b. Type of Service: Water, air.
c. Type of End Connection: Threaded.
d. Size (inches): 1/4" – 3”.
e. Rating and Description: Normally closed unless otherwise specified or otherwise shown, coils rated for continuous duty, Class H coil, NEMA 4X enclosure, forged brass body, Viton seat, and valve solenoid shall operated on 120V, 60 Hz current.
f. Manufacture and Product: Provide the following:

1) ASCO Bulletins 8210, 8211.
2) Or equal.

3. Valve Reference Number - V365:

    a. Type of Valve: Solenoid valve.
    b. Type of Service: sodium bisulfite.
    c. Type of End Connection: Threaded.
    d. Size: 1/4" and 1/2".
    e. Rating and Description: 140 psi at 75 degree F.

        1) Body shall be constructed of Polyvinyl Chloride.
        2) Seal material shall be Viton.
        3) Valves shall be normally open.
        4) Install a strainer upstream of each solenoid valve.
        5) Solenoid valves shall be suitable for operation on 120 volt, 60 Hz, single phase power. Coil shall meet NEMA-4 requirements.

    f. Manufacturer: Provide solenoid valves of one of the following:

        1) Plast-O-Matic Type EASY-NO.
        2) Automatic Switch Company.
        3) Or approved equal.

Q. Needle Valves:

1. Valve Number - V399:

    a. Type of Valve: Needle valve.
    b. Type of Service: Water.
    c. Type of End Connection: Threaded, Swagelok tube fitting.
    d. Size (inches): 1/8”, ¼”, 3/8”, and Swagelok tube fitting.
    e. Rating and Description: 600 psi maximum pressure rating at 70 degree F (21 degree C), forged brass body, brass bonnet, brass lock nut, brass glands, silicone bronze stem, alloy steel setscrew, virgin TFE packing, and colored phenolic handle.
    f. Manufacturer and Product: Provide the following:

        1) Nupro.
        2) Jenkins.
        3) Or equal.

2. Valve Number - V400:

    a. Type of Valve: Needle valve.
    b. Type of Service: Water, chemical.
    c. Type of End Connection: Threaded (globe or angle).
    d. Size (inches): 1/4" – 1/2”.
    e. Rating and Description: PVC, 125 psi at 125 degree F; CPVC, 175 psi at 125 degree F; PVDF, 175 psi at 125 degree F; Teflon sealed protected threads; rising stem.
    f. Manufacturer and Product: Provide the following:

1) PVC - Ryan Herco 5250, 5251 Series.
2) CPVC - Ryan Herco 5256, 5257 Series.
3) PVDF - Ryan Herco 5258, 5259 Series.
4) Or equal.

3. Valve Number – V403

a. Type of Valve: Pressure transmitter calibration valve
b. Type of Service: Pressure transmitter isolation.
c. Type of end Connection: Threaded
d. Size (inches): 1/2-inch process connection; 1/4-inch calibration connection
e. Rating and Description: Two way valve provided on pressure transmitters to allow calibration without removal from process. All Type 316 stainless steel construction with PTFE or Viton seals.
f. Manufacturer:

1) Parker
2) Swagelok
3) Or equal

R. Plunger Valve

1. Valve Reference Number – V404

a. Type of Valve: Flow control
b. Type of Service: Water
c. Type of Connection: AWWA C207 Class E or ANSI B16.5, Class 150 Flanges
d. Size (inches): 8” - 16”
e. Rating and Description: 250 psi rated pressure, ductile iron body with stainless steel plunger, regulating cylinder, seat and retaining ring, and hardware
f. Valve shall have air admission system downstream
g. Manufacturer:

1) Pratt
2) Or Equal

S. Miscellaneous Valves:

1. Valve Reference Number – V405

a. Type of Valve: PVC sample valves.
b. Type of Service: Water samples.
c. Type of Connection: MNPT x hose
d. Size (inches): 1/4
e. Rating and Description: Sample valves shall be PVC constructed with EPDM seals.

f. Manufacturer:

1) Hayward Universal Stopcock
2) Or Equal

2. Valve Reference Number – V406

a. Type of Valve: 6-way multiport selector.
b. Type of Service: RO train pressure indicator selector.
c. Type of Connection: Threaded.
d. Size (inches): 1/4
e. Rating and Description: Multiport selector valves shall be 6-way rotating plug type valves with 1/4-inch FNPT connections, in which 5 separate impulse lines connect to one outlet dedicated to a common pressure gauge.
f. Materials of construction shall be Type 316 stainless steel with a PTFE sleeve and Viton O-ring.
g. The valves shall be furnished with a lever handle, detent positioning and a 5-position numbered name plate.
h. Manufacturer:

1) Conant Controls
2) Or equal

2.2 ELECTRIC MOTOR ACTUATORS

A. General:

1. Electric motor actuators shall be furnished and installed on gates and valves where indicated on the Contract Drawings, and specified in the Contract Documents and partial valve schedules.

2. The type of electric actuator specified for a given valve, and any special actuator requirements, are summarized in the partial valve schedule.

3. Each valve actuator shall be furnished according to the specified type, and with the specified features, listed in the partial valve schedules.

4. Painting shall be per Section 09900 and the submittals approved under Section 09900.

B. Coordination and Responsibility:

1. It shall be the unit responsibility of the supplier of the driven equipment (gates, valves, etc.) to coordinate the electric motor actuator with the driven equipment to obtain a successfully functioning unit.

2. The coordination shall include mechanical compatibility; opening, closing, and running torque requirements; torque seating or back-seating control

requirements; operating speed and rating of actuator motor; external control requirements.

3. The valve and valve actuator or gate and gate actuator shall be factory-assembled and tested at the valve manufacturer's facility, and shipped directly from the valve manufacturer's facility to the site; or the valve and electric actuator shall be assembled at facilities of a local electric actuator supplier (EAS) contingent on the following:

    a. The EAS shall provide written submittal information from the valve manufacturer and the electric actuator manufacturer to the facility operated by the EAS is certified to conduct assembly and testing that would otherwise be conducted at the factory.
    b. The EAS and actuator manufacturer shall show evidence of having conducted 5 similar projects of similar scope using the actuators specified in the last 5 years.

4. Where existing valves are to be fitted with electric actuators, the CONTRACTOR shall ensure that all field installation labor, testing, and startup services are provided by an Electric Actuator Supplier (EAS) as specified herein.

5. Actuator shall be prototype tested at the driven equipment manufacturer's plant and will be assembled to the driven equipment in the field by the CONTRACTOR under the direction of the actuator manufacturer. The CONTRACTOR shall assign the valve, slide gate, or sluice gate manufacturer the responsibility of any field adjustments required to set the limit switches for the valve actuator to function as required and all costs of this service shall be included in his bid. The CONTRACTOR shall furnish all coordination between the actuator and the driven equipment manufacturer as required to satisfy the above requirements.

6. To minimize spare parts inventory, the CONTRACTOR shall ensure that all actuators, including those specified in other Sections or shown on the Contract Drawings shall be of the same type and supplied by the same manufacturer. The CONTRACTOR shall provide all necessary coordination between the actuator manufacturer and driven equipment manufacturer in order to satisfy the conditions specified herein.

C. Type A: Electric Actuator for Open/Close Operation of Metallic Body Valves or Gates:

1. General:

    a. Type A actuators shall be furnished and installed for non-modulating services where indicated on the Contract Drawings and as specified herein.
    b. The actuator shall be attached to the driven equipment by suitable cast metal stands with a flanged connection for the actuator.

Hardware for the flanged bolted connection shall be Type 316 stainless steel.

2. Valve Actuator Housing:

   a. The electric actuator housing shall be cast iron or aluminum and shall form a single, self-contained, weatherproof housing containing the motor, gearing, control, switches, electronic interfaces, and a separately sealed isolated terminal compartment for external connections. Power supply and control terminals shall be physically isolated from one another to protect against transient voltages. Terminal strips shall be shrouded to prevent accidental contact by personnel. Module shall include a snubber circuit to provide protection from voltage surges.
   b. The Actuator housing shall be rated NEMA 6, IP68 or as otherwise shown in the Partial Valve Schedule.
   c. Where Class I, Group D, Division 1 spaces are identified on the drawings, all electric actuators shown as furnished within the space shall be explosion proof.
   d. Double O-ring seals shall be provided to seal the terminal compartment, the motor enclosure, and the torque and limit switch compartment from rain and moisture. Similarly, O-ring seals shall be provided to seal the compartments from the oil bath gear box.
   e. Separate threaded hubs for NPT conduit connections shall be furnished for power wiring, analog signal wiring and control signal wiring.
   f. Provide a pad and 1/4-20 threaded hole for grounding lug.
   g. Sheet metal or plastic housings attached to the cast metal actuator enclosure for control components shall not be acceptable**.**

3. Reduction Gearing and Shafts:

   a. Reduction gearing shall run in an oil bath gearbox sealed for any operating angle. Shafts shall be mounted in anti-friction bearings. Fill/drain plugs shall be furnished for the required operating position.
   b. Actuators shall be designed so that a hammer blow is imparted to the stem nut when opening or closing a valve, slide gate, or sluice gate. The design shall allow free movement at the stem nut before imparting the hammer blow. The actuator motor shall gain full speed before stem load is encountered.
   c. Where a Type A actuator is specified with a quarter-turn valve, the valve actuator shall be provided with a worm and quadrant gear assembly to operate the valve.

      1) When the partial valve schedule includes a position indicator, as manufactured by Westlok or equal, the indicator shall be furnished in lieu of a position indicator on the actuator gearbox. The position indicator plate shall be

retrofitted with an adapter keyed to mate with the indicator. Position switches shall not be required.

2) When a position indicator is not required, the position indicator plate shall be furnished on the actuator housing with an indicating arrow and name plates to indicate the OPEN and CLOSED position of the valve.

d. The gear reduction assembly for the actuator shall consist of a spur gear (if necessary to meet time requirements), worm gear, and quadrant gear designed to provide the time to open as specified in the partial valve schedule.

e. The assembly shall be grease lubricated for its life of operation and rated for an ambient temperature range from -40 degree C to 95 degree C.

4. Handwheels:

a. A permanently attached handwheel shall be provided for emergency manual operation. The handwheel shall not rotate during electrical operation and shall form an integral part of the mechanism. To place the operator in manual operation, a lever shall be used to mechanically disconnect the motor drive from the gear train. The operator shall return automatically to motor operation as the motor control is energized. The maximum torque required on the handwheel under the most adverse conditions specified herein shall not exceed 60-lb-ft; the maximum force on the handwheel shall not exceed 60 lbs. An arrow and the word "open" shall be cast on the handwheel to indicate the direction to turn the handwheel. The declutch lever shall be padlocked in the disengaged or engaged position. Failure of any primary motor drive gearing shall not inhibit manual operation.

5. Torque Switches:

a. Torque switches shall be furnished for Type A actuators to disconnect the actuator motor and pick up a monitor relay when torque limits are exceeded.

b. Torque switches shall be provided, where required, with mechanical means or bypass switches for driven equipment whose end travel is signaled by torque developed in seating or unseating.

c. Torque switch settings shall be readily adjustable via non-intrusive means without removing any electrical covers.

d. Torque output value will be displayed locally at the actuator via an integral 0 - 100% LCD display.

6. Travel and Position Limit Switches:

a. End of travel and position limit switches shall be provided.

b. Limit switches, cam operated and adjustable, shall be furnished for control, interlocking and indication. Switches shall be wired to

accessible terminal blocks. Switches shall be snap action, double break, rated minimum 5A, 125V AC. Electro-magnetically latching relays set by means of an infrared setting tool are an acceptable alternative.

c. Each actuator shall be provided with 4 independently adjustable auxiliary switches in addition to those required for actuator operation.
d. Position feedback value will be displayed locally at the actuator via an integral 0 - 100% LCD display.

7. Starters:

a. The actuator shall have an integral, 120 VAC operated reversing starter. The contactors shall be mechanically and electrically interlocked. The contactor shall be mounted on a removable chassis along with a 120 V, fused, control power transformer**.**
b. Chassis for the starter shall include a spare fuse cartridge.
c. Phase rotation protection shall be furnished with the starter.

8. Controls:

a. Unless otherwise noted in the partial valve schedule all actuator controls shall be integral to the valve housing.
b. The electric actuator will be furnished with integral controls to provide instant reverse protection for the valve actuator components during valve travel such that an operator cannot initiate travel from full open to full closed, or vice-versa, and instantly reverse the direction of travel by depressing the CLOSE switch.
c. Devices such as selector switches, pushbuttons, indicating lights and nameplates on the exterior of the actuator housing shall be NEMA 4X non-metallic. Fastening hardware shall be Type 316 stainless steel.
d. Actuator shall be provided with an OPEN/STOP/CLOSE pushbutton switch and a LOCAL/OFF/REMOTE SWITCH mounted on the actuator housing. Switches shall be non-intrusive and not penetrate any actuator covers.
e. The switches shall be lockable with a padlock to prevent unauthorized field changes to the position of the control switches.
f. A 120 VAC monitor relay powered by the 120 control voltage at the actuator shall be provided to monitor actuator status. The monitor relay shall be deenergized on phase loss, over torque, opening of the motor temperature switch, or when the “LOR” switch is not in remote.
g. Adjustable torque switches and position limit switches shall be furnished for deenergizing the motor on end of travel. An over-torque limit switch contact shall be wired to the common fault monitor relay for remote indication.

h. Remote inputs for Open/Closed control shall be optically isolated to protect actuator control circuits from high voltage transients. Isolators shall provide protection for transients up to 2 KV.
i. Actuator housing shall include red, amber and green LED's to locally indicate actuator position: green for open; amber for mid-travel; and red for closed. Local diagnostics on the integral LCD display shall indicate motor overload and over torque alarms.
j. A normally open isolated contact output shall be provided to indicate that the valve is in remote control.
k. Contacts shall have a minimum contact rating of 120V, 5A.
l. In addition to the above, control devices and wiring shall be as indicated on the Contract Drawings and in Division 13.

9. Space Heaters: A space heater shall be furnished in the control and switch compartment and in the motor compartment of the actuator. Space heaters shall be powered by the control transformer.

10. Power Supply and Motors:

a. Power supply shall be 480V, 3 phase, 60Hz
b. With a line voltage of not more than +/- 10% of rated voltage, the motor shall develop the rated torque continuously for 15 minutes without exceeding the rated temperature rise and without causing the overload protective devices in the motor starter to trip. When running time exceeds 15 minutes Class H motors shall be used.
c. Motors shall be integral with the actuator, totally enclosed, non-ventilated, with high starting torque and low inertia and inrush current. Motors shall have Class F or Class H insulation. An embedded automatic reset temperature switch shall be provided to disconnect the motor. An internal LED or local diagnostic screen located integrally with the actuator housing shall signal motor overload.
d. Motors shall be sized so that the observed temperature rise by thermometer shall not exceed 55 degree C above an ambient of 40 degree C when operating at fully rated load continuously for either 15 minutes, or twice the stroking time, whichever is longer.

11. Disconnect Switches:

a. Each actuator shall be furnished with a factory-mounted NEMA 4X, 3 pole disconnect switch, or non-automatic circuit breaker with a withstand rating equal to the available fault current as determined by the short circuit study specified in Section 16411.

12. Manufacturer and Product:

a. Rotork IQ3 Series
b. AUMA

13. Spare Parts:

    a. Provide one spare fuse for each actuator furnished.
    b. Provide spare cover screws and seals.

D. Type A1: Electric Actuator for Modulating Operation of Metal Body Valves:

1. General:

    a. Type A1 actuators shall be furnished and installed for modulating services where indicated on the Contract Drawings and as specified herein.
    b. The actuator shall be attached to the driven equipment by suitable cast metal stands with a flanged connection for the actuator. Hardware for the flanged bolted connection shall be Type 316 stainless steel.
    c. Actuators shall be compatible with quarter turn and rising stem valves as required.

2. Valve Actuator housing: Requirements shall be the same as for the Type A Actuator.

3. Reduction Gearing and Shafts: Requirements shall be the same as for the Type A Actuator except without the lost motion device.

4. Handwheels: Requirements shall be the same as for the Type A actuators.

5. Torque Switches: Requirements shall be the same as for the Type A actuator.

6. Travel and Position Limit Switches: Requirements shall be the same as for the Type A actuator.

7. Position Indicators: Requirements shall be the same as for the Type A actuator.

8. Starters:

    a. There shall be installed in the actuator housing a solid state reverser which shall be powered by a fused control transformer in the actuator rated for 1200 starts/hour.

9. Controls:

    a. Requirements shall be the same as the requirements for the Type A actuator, with the following additional requirements.

    b. A remote, 4mA to 20 mA, position control signal shall input from the plant control system via optical isolated circuits a comparator board

with deadband, gain, span, and zero adjustment capability. The control shall be arranged for lock-in-last position.

c. The actuator shall provide a 4mA to 20 mA position feedback signal via a feedback potentiometer for remote indication of the valve position.
d. The actuator control shall include inrush resistors, power fuses and feedback potentiometer.
e. Circuitry shall be arranged to provide for the following:

1) Dry contact that opens for signal loss.

f. Valve shall automatically fail in last position on loss of analog control signal.

10. Space Heaters: The requirements shall be the same as for the Type A actuators.

11. Power Supply and Motors:

a. Power supply shall be 480V, 3 phase, 60 Hertz
b. Actuator motors for the multi-turn modulating service shall be 480V, three phase, 60 hertz, 24V DC.
c. Motor shall be integral with the actuator, totally enclosed, with high starting torque and low inertia and inrush current. Motor shall have Class F or Class H insulation. An embedded automatic reset temperature switch shall be provided to disconnect the motor on thermal overload.
d. Motor shall be sized so that the observed temperature rise by thermometer shall not exceed 55 degree C above an ambient of 40 degree C when operating continuously for 15 minutes at fully rated load.

12. Disconnect Switches:

a. Each actuator shall be furnished with an integral 3 pole disconnect switch, or non-automatic circuit breaker with a withstand rating equal to the available fault current as determined by the short circuit study specified in Section 16311.

13. Manufacturer and Product:

a. Rotork IQ3 Series
b. AUMA

14. Spare Parts:

a. The requirements shall be the same as the requirements for the Type A actuator.

E. Type B: Electric Actuator for Non-Metallic Body Valves:

1. General:

    a. Where actuators are shown for non-metallic body valves, the valve, actuator, and appurtenances shall be furnished by the valve manufacturer.
    b. The valve actuators shall be bi-directional. Unidirectional actuators shall not be acceptable regardless of valve size.
    c. The weight of the actuators shall be compatible with the load bearing capability of the non-metallic body valve. Bracing and support of the actuator, independent of the valve body, shall not be permitted.
    d. The actuator shall be designed for a 100% duty rating.

2. Valve Actuator Housing:

    a. NEMA 4X, anodized cast aluminum alloy base and cover or glass filled polypropylene.
    b. Integral terminal strip within the actuator housing. A separate, sealed termination enclosure shall not be required for the actuator.
    c. A separate, auxiliary conduit entry shall be provided to the actuator housing.

3. Manual Control:

    a. A handwheel or lever shall be provided for manually opening and closing the valve.
    b. The handwheel or lever shall be capable of manually overriding the actuator to open/close the valve.

4. Travel and Position Limit Switches:

    a. Each actuator shall be furnished with an "OPEN" and "CLOSED" limit switch factory wired to the terminal block of the actuator.
    b. In addition, four adjustable limit switches shall be furnished and installed and factory wired to the terminal block of the actuator.
    c. Limit switches shall be SPDT switches rated for *250V, 5A.*

5. Position Indicators:

    a. As standard, the valve actuator shall be provided with an external position indicator showing the open/closed position of the actuator.

6. Controls:

    a. Each electric actuator shall be furnished and installed with a NEMA 4X, non-metallic or anodized aluminum auxiliary control actuator station enclosure that is factory-wired. The NEMA 4X enclosure shall be provided by the manufacturer. The enclosure shall be

externally mounted to the actuator housing, or independently supported adjacent to the actuator.

b. All pilot devices shall be NEMA 4X, Allen Bradley 800H or equal.

c. The enclosure shall be furnished and installed with the following pilot devices:

1) "OPEN" pilot light (green).
2) "CLOSED" pilot light (red).
3) "LOCAL/OFF/REMOTE" 3 position selector switch, maintained contact.
4) "OPEN/CLOSED" selector switch, maintained contact.
5) The local/off/remote switch shall be provided with an additional contact which closes in the remote position to provide for remote indication "VALVE IN REMOTE".

7. Space Heaters: The actuator housing shall be furnished with a thermostatically-controlled space heater for heating the interior of the actuator enclosure.

8. Power Supply and Motors:

a. Power Supply: 120 VAC, 60 Hz, single phase.
b. Motor: 120 VAC capacitor run, split-phase motor, or 24V DC with internal power conversion.
c. Actuator motors shall be extended-duty type designed for frequent cycling or modulating service.
d. Thermal protection: each motor shall be furnished with embedded thermal/overload protection.

9. Disconnect Switches: Provide disconnect switch for the actuator. Disconnect switch is not required to be internal to the actuator housing.

10. Manufacturer and Product:

a. Hayward Controls EYE with the auxiliary electric actuator control station.
b. George Fischer, Type EA20-EA50.

F. Type C: Electric actuators for small diameter metal body valves.

1. General:

a. Actuators shall be suitable for actuation of rotary valves where shown or specified.
b. The actuator will be a single phase AC powered electric actuator, capable of delivering sufficient thrust or torque to operate at the required speed for the applicable process.
c. The safety margin of motor power available for seating and unseating the valve shall be sufficient to ensure torque/thrust limit

trip at maximum valve torque with the supply voltage 10% below nominal.

2. Valve Actuator Housing:

   a. The actuator body shall be constructed of cast aluminum.
   b. The enclosure shall be IP67.

3. Travel and Position Limit Switches:

   a. The ability to adjust the force or torque seating of the valve shall be selectable at the valve controller. Settings such as max torque, dead band etc., shall be configured using push button switches located on the main controller. An LCD display shall be used to view the actuator configuration parameters including:

      1) Actuator Position.
      2) Actuator set point.
      3) Torque settings.
      4) The actuator to be configurable for either LOCAL or REMOTE operation.
      5) Set the closed limit of travel.
      6) Set the open limit of travel.
      7) Input signal field calibration for remote positioning control.
      8) Adjustment of the minimum input signal step change required for movement between 0 to 10%.
      9) The actuator status to be monitored in both Local and Remote control modes.
      10) Alarms and Faults are to be stored and listed by event number and type.
      11) The actuator operating speed must be adjustable down to 50% of the maximum speed in increments of 1%.

4. Controls:

   a. Receive remote open/close command signals, 120 VAC.
   b. Provide four programmable relays to report status:

      1) Valve Open
      2) Valve Closed
      3) Valve in Remote
      4) Critical Alarm

5. Power Supply and Motors:

   a. Power Supply: 120 VAC, 60 Hz, single phase.
   b. Motor: 120 VAC capacitor run, split-phase motor, or 24V DC with internal power conversion.
   c. Actuator motors shall be extended-duty type designed for frequent cycling or modulating service.

d. Thermal protection: each motor shall be furnished with embedded thermal/overload protection.

6. Manufacturer:

a. Rotork, CMA Range
b. Or equal.

G. Type D: Electro-Hydraulic Actuator for Open/Close Operation of Fail Safety Valves:

1. General:

a. Type D actuators shall be furnished and installed for fail safety valves in open/close service where indicated on the Contract Drawings and as specified herein.
b. The actuators will be self-contained with an Electro Hydraulic system operating against an internal fail safe return spring. The Electro Hydraulic control module will be supplied complete with sealed hydraulic, electronic and termination compartment watertight to IP68. The electronic compartment shall be double sealed to ensure protection of internal components during installation by segregating the cable glands and termination compartment. The unit will be configured and commissioned by utilizing a non-intrusive infrared setting tool to eliminate the need for opening the enclosures.
c. The integral Electro-Hydraulic power module will provide the source of hydraulic power to a single acting scotch yoke spring return drive. The hydraulic section of the control module and the scotch yoke will be hydraulic oil filled and sealed to the environment and will operate on a hydraulic pump and bleed principle.
d. The actuator shall be attached to the driven equipment by suitable cast metal stands with a flanged connection for the actuator. Hardware for the flanged bolted connection shall be Type 316 stainless steel.
e. The Actuator housing shall be rated NEMA 6, IP68 or as otherwise shown in the Partial Valve Schedule.
f. Double O-ring seals shall be provided to seal the terminal compartment, the motor enclosure, and the torque and limit switch compartment from rain and moisture. Similarly, O-ring seals shall be provided to seal the compartments from the oil bath gear box.
g. Separate threaded hubs for NPT conduit connections shall be furnished for power wiring, analog signal wiring and control signal wiring.
h. Provide a pad and 1/4-20 threaded hole for grounding lug.
i. Sheet metal or plastic housings attached to the cast metal actuator enclosure for control components shall not be acceptable**.**

2. Reduction Gearing and Shafts:

    a. Reduction gearing shall run in an oil bath gearbox sealed for any operating angle. Shafts shall be mounted in anti-friction bearings. Fill/drain plugs shall be furnished for the required operating position.
    b. Actuators shall be designed so that a hammer blow is imparted to the stem nut when opening or closing a valve. The design shall allow free movement at the stem nut before imparting the hammer blow. The actuator motor shall gain full speed before stem load is encountered.
    c. Where a Type D actuator is specified with a quarter-turn valve, the valve actuator shall be provided with a worm and quadrant gear assembly to operate the valve.

        1) When a position indicator is not required, the position indicator plate shall be furnished on the actuator housing with an indicating arrow and name plates to indicate the OPEN and CLOSED position of the valve.

    d. The gear reduction assembly for the actuator shall consist of a spur gear (if necessary to meet time requirements), worm gear, and quadrant gear designed to provide the time to open as specified in the partial valve schedule.
    e. The assembly shall be grease lubricated for its life of operation and rated for an ambient temperature range from -40 degree C to 95 degree C.

3. Torque Switches:

    a. Torque switches shall be furnished for Type D actuators to disconnect the actuator motor and pick up a monitor relay when torque limits are exceeded.
    b. Torque switches shall be provided, where required, with mechanical means or bypass switches for driven equipment whose end travel is signaled by torque developed in seating or unseating.
    c. Torque switch settings shall be readily adjustable via non-intrusive means without removing any electrical covers.
    d. Torque output value will be displayed locally at the actuator via an integral 0 - 100% LCD display.

4. Travel and Position Limit Switches:

    a. End of travel and position limit switches shall be provided.
    b. Limit switches, cam operated and adjustable, shall be furnished for control, interlocking and indication. Switches shall be wired to accessible terminal blocks. Switches shall be snap action, double break, rated minimum 5A, 125V AC. Electro-magnetically latching relays set by means of an infrared setting tool are an acceptable alternative.

c. Each actuator shall be provided with 4 independently adjustable auxiliary switches in addition to those required for actuator operation.
d. Position feedback value will be displayed locally at the actuator via an integral 0 - 100% LCD display.

5. Starters:

a. The actuator shall have an integral, 120 VAC operated reversing starter. The contactors shall be mechanically and electrically interlocked. The contactor shall be mounted on a removable chassis along with a 120 V, fused, control power transformer.
b. Chassis for the starter shall include a spare fuse cartridge.
c. Phase rotation protection shall be furnished with the starter.

6. Controls:

a. Unless otherwise noted in the partial valve schedule all actuator controls shall be integral to the valve housing.
b. The electro-hydraulic actuator will be furnished with integral controls to provide instant reverse protection for the valve actuator components during valve travel such that an operator cannot initiate travel from full open to full closed, or vice-versa, and instantly reverse the direction of travel by depressing the CLOSE switch.
c. Devices such as selector switches, pushbuttons, indicating lights and nameplates on the exterior of the actuator housing shall be NEMA 4X non-metallic. Fastening hardware shall be Type 316 stainless steel.
d. Actuator shall be provided with an OPEN/STOP/CLOSE pushbutton switch and a LOCAL/OFF/REMOTE SWITCH mounted on the actuator housing. Switches shall be non-intrusive and not penetrate any actuator covers.
e. The switches shall be lockable with a padlock to prevent unauthorized field changes to the position of the control switches.
f. A 120 VAC monitor relay powered by the 120 control voltage at the actuator shall be provided to monitor actuator status. The monitor relay shall be deenergized on phase loss, over torque, opening of the motor temperature switch, or when the “LOR” switch is not in remote.
g. Adjustable torque switches and position limit switches shall be furnished for deenergizing the motor on end of travel. An over-torque limit switch contact shall be wired to the common fault monitor relay for remote indication.
h. Remote inputs for Open/Closed control shall be optically isolated to protect actuator control circuits from high voltage transients. Isolators shall provide protection for transients up to 2 KV.
i. Actuator housing shall include red, amber and green LED’s to locally indicate actuator position: green for open; amber for mid-

travel; and red for closed. Local diagnostics on the integral LCD display shall indicate motor overload and over torque alarms.

j. A normally open isolated contact output shall be provided to indicate that the valve is in remote control.
k. Contacts shall have a minimum contact rating of 120V, 5A.
l. In addition to the above, control devices and wiring shall be as indicated on the Contract Drawings and in Division 13.

7. Space Heaters: A space heater shall be furnished in the control and switch compartment and in the motor compartment of the actuator. Space heaters shall be powered by the control transformer.

8. Power Supply and Motors:

a. Power supply shall be 480V, 3 phase, 60Hz
b. With a line voltage of not more than +/- 10% of rated voltage, the motor shall develop the rated torque continuously for 15 minutes without exceeding the rated temperature rise and without causing the overload protective devices in the motor starter to trip. When running time exceeds 15 minutes Class H motors shall be used.
c. Motors shall be integral with the actuator, totally enclosed, non-ventilated, with high starting torque and low inertia and inrush current. Motors shall have Class F or Class H insulation. An embedded automatic reset temperature switch shall be provided to disconnect the motor. An internal LED or local diagnostic screen located integrally with the actuator housing shall signal motor overload.
d. Motors shall be sized so that the observed temperature rise by thermometer shall not exceed 55 degree C above an ambient of 40 degree C when operating at fully rated load continuously for either 15 minutes, or twice the stroking time, whichever is longer.

9. Disconnect Switches:

a. Each actuator shall be furnished with a factory-mounted NEMA 4X, 3 pole disconnect switch, or non-automatic circuit breaker with a withstand rating equal to the available fault current as determined by the short circuit study specified in Section 16411.

10. Manufacturer and Product:

a. Rotork Skilmatic SI3

11. Spare Parts:

a. Provide one spare fuse for each actuator furnished.
b. Provide spare cover screws and seals.

2.3 VALVE POSITION SWITCH/INDICATORS

A. Quarter-turn valves shall be furnished with a valve position switch/indicator and associated hardware where shown and specified under the valve list partial valve schedule.

B. The valve position monitor shall consist of a NEMA 4X, engineered resin housing position indicator beacon mounted on the top of the housing in a clear, non-metallic cover. In the OPEN position, the beacon will display yellow quadrants; in the CLOSED position, the beacon will display black quadrants.

C. The housing will enclose sealed proximity switch actuated by cams mounted on the extension stem which extends through the housing of the position monitor. Switch shall have SPDT Form C tungsten contacts and shall be hermetically sealed. The contacts shall be rated for 3 Amps at 120 VAC. The switch shall be rated for a temperature range of -20 F to 200 F and shall have an operational lift of 600,000 cycles and repeatability of 0.005 inches.

D. Manufacturer:

1. Westlok 9468 Series II Magnum Position Monitors.

2. Or equal.

2.4 VALVE APPURTENANCES

A. Buried, manually operated valves, including those installed underneath trench grating, shall be furnished with a valve box, a 2-inch square operating nut and position indicator. The operating nut shall be positioned vertically and a maximum of 12 inches below the top of the valve box.

B. Valve Boxes: Provide each buried valve with a valve box in accordance with the District's Approval Materials List.

C. Extension Stems, Stem Guides, Wrenches and Keys:

1. Valve key extensions shall be provided and installed on all buried valves when the top of the valve nut is greater than 12 inches below the top of the valve box or grating surface, as applicable. The extension stem shall be 316

stainless steel, constructed so that when connected to the valve the extension stem shall be vertical.

2. Extension stem shall be at least as large as valve stem it operates.

3. Provide intermediate stem guide for extensions more than 7 feet long.

4. Stem brackets and guides shall be made of cast iron and have fully adjustable bronzed bushed guide block. Fasten brackets to walls with approved expansion bolts.

5. Operating nuts about 2 inches square shall be included with each extension stem and located in floor box or grating recess, as required.

6. Provide operating key or wrench of suitable length and size for each valve that is not readily accessible to direct operation.

D. Floor Boxes: Provide cast iron floor boxes for all valves which are to be operated from floor above valve. Boxes shall be equal in depth to floor slab. Boxes shall have cast iron covers and be fitted with bronze bushing.

E. Chain Operators:

1. All valves more than 5 feet above the operating floor level shall be equipped with chain operator and sprocket wheel bolted directly to the valve operating wheel. The chain shall extend to three feet above the operating floor.

2. Galvanized Steel chain shall be provided. Equip all operators with a 2-inch hook bolt located to keep chain out of walking areas.

F. T-Handle Operating Wrenches: Provide powder coated operating wrenches (minimum 2) in the sizes and shapes required to operate 2-inch square nut (SN) gear operators located beneath trench grating from the normal operating floor without encumbrances.

G.

2.5 MANUAL VALVE ACTUATORS AND OPERATORS

A. Manually operated valves shall be equipped with an enclosed worm gear drive or traveling nut actuator (buried service) or enclosed worm gear drive actuator (non-buried service) and handwheel or chain wheel operator.

B. Gears shall be permanently lubricated and totally enclosed.

C. Actuators shall be designed to hold the valve disc in any intermediate position without creeping or fluttering.

D. Actuators shall be designed to fully close or fully open the valve in a minimum of 30 turns. Valves shall open counter-clockwise.

E. Enclosed worm gear actuators shall have a gear ratio designed not to exceed 80 pounds pull to meet the required operating torque.

F. Adjustable stops shall be provided to prevent overtravel in either position, to withstand a pull of 200 pounds or an input torque of 450 lb./ft. against each stop.

G. Stops shall be enclosed within the operator housing and be capable of absorbing the full operator torque with minimum safety factor of 5.

H. Operators shall be equipped with a direct coupled indicator unless a position switch is to be furnished with the operator.

I. Where butterfly valves are shown in submerged or buried service, valve operators shall be rated for continuous duty at submergence pressures of 15 psi.

J. Furnish extension bonnets, torque tubes, extension stems, valve boxes, covers, and appurtenances as shown on the Contract Drawings and as noted in the partial valve schedule.

K. Extension stems, support brackets, extension bonnet assemblies, and appurtenances for submerged service shall be Type 316 stainless steel.

L. Where indicated on the Contract Drawings and partial valve schedules, worm gear operators shall be furnished with position switch/indicators, mounting brackets, and hardware for Open/Close position indication as specified in Section 2.3.

2.6 PADLOCKED HANDLE COVERS

A. Description: Lockable handle cover, which completely encloses the handle of the vale and prevents any tampering with the valve position. The cover is equipped with integral mounts for three padlocks to secure the cover. Complete removal of the padlock is required for removal of the cover.

B. Materials: Covers shall be constructed of polypropylene and color shall be OSHA orange

C. Provide for all Ball Valve 2-inch to 6-inch and Butterfly valve 3-inch to 12-inch.

D. Manufacturer: Hayward Plastic Valve or equal.

2.7 PAINTING

A. Clean and prime coat exterior ferrous metal surfaces of equipment in the shop in accordance with the requirements of Section 09900, Painting.

B. Coat machined, polished and non-ferrous surfaces including gears, bearing surfaces and similar unpainted surfaces with corrosion prevention compound which shall be maintained during storage and until equipment begins operation.

C. Field painting is under Section 09900, Painting.

D. The CONTRACTOR shall certify, in writing, that the shop primer and coating system is compatible with the finish coating system, in accordance with Section 09900, Painting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all valves and appurtenances in accordance with manufacturer's instructions.

B. Install all valves so that operating handwheels or wrenches may be conveniently turned from operating floor but without interfering with access, and as approved by ENGINEER.

C. Unless otherwise approved install all valves plumb and level. Install valves free from distortion and strain caused by misaligned piping, equipment or other causes.

D. Set valve boxes plumb, and centered with the bodies directly over the valves. Carefully tamp earth fill around each valve box to a distance of 4 feet on all sides of the box, or to the undisturbed trench face, if less than 4 feet.

E. Where valve square nut operators are located beneath trench grating, the CONTRACTOR shall cut an access opening and weld bars across the exposed ends to create a banded opening for T-handle operators.

3.2 FIELD TESTS AND ADJUSTMENTS

A. The CONTRACTOR shall provide the services of a factory-trained technician working for the supplier of automatically actuated valves to conduct field inspection and tests on each of the automatically actuated valves.

B. The EAS shall prepare and submit a test certificate for each of the automatically actuated valves on the letterhead of the supplier of the automatically actuated valves. Each test certificate shall be submitted prior to commencement of the field acceptance testing for the Plant Control System as specified in Division 17.

C. The test certificate for each valve shall include the following information:

1. Confirmation that valve switch settings have been adjusted to provide positive contact closure at the valve actuator.

2. Amperage draw readings for the valve taken at the actuator during travel from full -open to full-closed positions.

3. Verification that all local pilot devices for the actuator, either mounted on the actuator, or located in a remote enclosure, provide local indication and control of the actuator.

4. Verify that the valve functions correctly and meets the specified time and duty cycle requirements of the automatically actuated valves.

5. Confirm that the valve, actuator, and internals, are in good working order.

D. Field acceptance testing of the Plant Control System for a particular area shall not commence until the valve test certificates have been received by the ENGINEER.

3.3 MANUFACTURERS SERVICE

A. The CONTRACTOR shall provide the services of a factory-trained technician working for the supplier of automatically actuated valves to conduct field inspection and tests on each of the automatically actuated valves once installation of the electric actuators is complete and to ensure automatically actuated valves or gates interface properly with the Plant Control System.

B. The CONTRACTOR shall prepare and submit a test certificate for each of the automatically actuated valves on the letterhead of the supplier of the automatically actuated valves. Each test certificate shall be submitted prior to commencement of the field acceptance testing for the Plant Control System as specified in Division 17.

C. The test certificate for each valve shall include the following information:

1. Confirmation that valve switch settings have been adjusted to provide positive contact closure at the valve actuator.

2. Amperage draw readings for the valve taken at the actuator during travel from full -open to full-closed positions.

3. Verification that all local pilot devices for the actuator, either mounted on the actuator, or located in a remote enclosure, provide local indication and control of the actuator.

D. Field acceptance testing of the Plant Control System for a particular area shall not commence until the valve test certificates have been received by the ENGINEER.

E. The supplier of the automatically actuated valves shall include the cost of providing two eight-hour training sessions on the operation, maintenance, and repair of the

automatically actuated valves services shall instruct DISTRICT'S personnel in operation, care and maintenance and supervise initial operation.

****END OF SECTION****

SECTION 16280 – ACTIVE LINE CONDITIONER

PART 1 - GENERAL

1.1 SUMMARY

A. This specification defines the requirements for active line conditioner systems in order to meet IEEE-519-1992 electrical system requirements for harmonic current limits. The Active Line Conditioner (ALC) shall maintain power factor to .98 lagging.

1.2 STANDARDS

A. The active line conditioner system shall be designed in accordance with the applicable sections of the following documents.

ANSI IEEE STD 519-1992
UL 508

B. The products shall include third party approvals by cULus.

1.3 SYSTEM DESCRIPTION

A. System Description

1. Voltage: 480 Volts, 60 Hz, 3 phase, 3 wire plus ground.

2. Current Rating: Provide the rated current as indicated on the drawings

3. Current Transformers:

a. Two current transformers are required and mounted on phases A & C.
b. Current transformers are an integral part of the Active Line Conditioner. When current transformers installed external to the Active Line Conditioner equipment, the contractor shall be responsible for the installation of manufacturer provided current transformers.
c. Current ratings of the current transformers shall be according to full load current of the circuit on which installed, 500, 1000, 3000, or 5000A to 5A secondary acceptable.
d. Current transformers rated for 400 hertz shall be used.
e. The current transformers shall be placed as close to the non-linear load to be conditioned within manufacturer guidelines.

B. Philosophy of Operation

The active line conditioner shall be designed to electronically supply non-fundamental current of magnitudes and phase relationships to satisfy the non-linear load current demand that results in a near sinusoidal current being drawn from the supply.

C. Performance Requirements

1. Response Time:

a. In a steady state condition, the active line conditioner shall have a response time of less than one (1) line cycle.
b. In the event of a load change or transient condition, the response time shall be within three (3) line cycles.

2. Input Power:

a. Voltage: 208 Volt through 480 Volt, 3 phase, 3 wire, plus ground
b. Voltage Tolerance: +/- 10% of nominal
c. Frequency: automatically adapted to from 45 to 70 Hz, +/- 3 Hz
d. Input Circuit Breaker 100k AIC Rated

3. Output Performance

a. Performance of the active line conditioner shall be independent of the impedance of the power source. All performance levels shall be attained whether on the AC lines, backup generator, or output of UPS.
b. Harmonic Correction:

1. Limit the 2nd through 50th order harmonic current to <5% TDD at each installed location indicated herein. Harmonic levels for individual harmonic orders shall comply with respective levels established in ANSI/IEEE std 519-1992, Table 10.3.
2. Limit the THD(V) added to the electrical system immediately upstream of the active line conditioner location(s) to less than or equal to 5%. The active line conditioner shall not correct for utility supplied voltage distortion levels.

c. Reactive Current Compensation shall be to .98 lagging displacement power factor. Leading power factor is not permitted.

1.4 ENVIRONMENTAL CONDITIONS

A. The active line conditioner shall be able to withstand the following environmental conditions without damage or degradation of operating characteristics or life.

1. Operating Ambient Temperature: -20^{0}C to 40^{0}C.
2. Storage Temperature: -40^{0}C to 65^{0}C.
3. Relative Humidity: 0 to 95%, non-condensing.
4. Altitude: Operating to 1000 meters (3300 ft). De-rated for higher elevations.

PART 2 - PRODUCT

2.1 ENCLOSURE

A. Each power correction unit shall be provided in a UL Type 1 rated enclosure.

B. All UL Type 1 enclosed units shall include a door-interlocked circuit breaker that provides power interruption when the door is opened. The circuit breaker shall be lockable in the power-off position. Units shall be disconnected from the power source by a disconnect device or circuit breaker contained in the power distribution center as defined by local and national codes for branch circuit protection.

C. Freestanding units shall include lifting provisions by forklift truck and lifting lugs. Wallmount units weighing more than 80 pounds shall be equipped with a means of lifting such as lifting lugs.

D. Door Mounted Digital HMI Operator Interface.

E. All units shall be provided with a grounding lug. Grounding by the contractor is to be performed according to local and national standards.

F. The paint shall be the manufacturer's standard type and color.

G. All units shall have a door-interlocked disconnect for power interruption when the door is opened.

2.2 OPERATOR CONTROLS and INTERFACE

A. The unit supplied shall not require field programming.

B. Digital keypads shall be required for operation of the Active Line Conditioner. The ALC shall have Ethernet IP communication module to interface with the MCC Ethernet switch.

C. The unit should automatically begin to correct harmonic currents after power up without the need for an operator command.

D. Contacts shall be provided for operator information for run and fault. Each contact shall be rated for .4 Amperes at 125 volts. One form C contact shall be provided for each relay.

2.3 DESIGN

A. All active line conditioners shall be defined as power electronic devices which consist of power semiconductors that inject current into the AC line that will cancel undesirable harmonic currents. A DC bus shall store power for power semiconductor switching. A digital microcontroller shall control the operation of the power converter.

B. Each unit shall be designed with over-current and current limiting self protection. Operation shall continue indefinitely at manufacturer defined safe operating levels without trip off or destruction of the active line conditioner.

C. Two distinct levels of faults shall be employed. Non-critical level faults will provide automatic restart and a return to normal operation upon automatic fault clearance. Critical level faults stop the function of the unit and await operator action and restart.

1. Faults such as AC line power loss shall be automatically restarted upon power restoration. Upon removal of these fault conditions, the active line conditioner shall restart without user action.

2. All other types of faults shall be considered critical and stop the active line conditioner. The run relay shall be disabled and the fault relay enabled. User shall be required to initiate a power reset (cycle power off and on) to restart the active line conditioner.

D. The logic of the active line conditioner shall monitor the load current by utilizing two (2) current transformers (CTs) mounted on phases A and C to direct the function of the power electronic converter.

E. Multiple active line conditioners may be installed in parallel to inject current. The units will function independently. If one unit is stopped or faulted, the remaining units will adjust accordingly to maintain optimum harmonic cancellation levels up to the capacity of the remaining units.

F. Individual unit characteristics, including sample drawings, weight, and watts loss, can be found in the H5 Installation, Operation, and Maintenance Manual.

G. Approved Manufacturers: TCI Harmonic Guard or Pre-Approved Equal.

END OF SECTION

Partial Valve List

Area 100

Valve Tag No.	Valve SPEC Reference No.	Size (in)	Actuator Type	Actuator Designation	Pressure Class	Valve Type	Notes
ARV-102	V253	4	-	-	250	AV	
ARV-103	V253	4	-	-	250	AV	
ARV-104	V253	4	-	-	250	AV	
FSV-100	V205	24	ELECTRO-HYDRAULIC	TYPE D	250	BFV	FLOW SAFETY VALVE
CK-110	V90	24	-	-	250	CV	
MV-110	V205	24	ELECTRIC	TYPE A	250	BFV	
FCV-105	V404	10	ELECTRIC	TYPE A1	250	PLUNGER	
PCV-102	V284	12	-	-	250	PRV	
V-102	V67	4	MANUAL	LEVER	250	BV	
V-103	V67	4	MANUAL	LEVER	250	BV	
V-104	V67	4	MANUAL	LEVER	250	BV	

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Partial Valve List
Area 200

Valve Tag No.	Valve SPEC Reference No.	Size (in)	Actuator Type	Actuator Designation	Pressure Class	Valve Type	Notes
V-200	V205	24	MANUAL	HANDWHEEL	250	BFV	POSITION INDICATION/LIMIT SWITCHES
V-201	V205	24	MANUAL	HANDWHEEL	250	BFV	POSITION INDICATION/LIMIT SWITCHES
CK-200	V93	16				CK	
MV-202	V205	8	ELECTRIC	TYPE A	250	BFV	POSITION INDICATION/LIMIT SWITCHES
V-203	V204	24	MANUAL	HANDWHEEL	150	BFV	POSITION INDICATION/LIMIT SWITCHES
ARV-203	V253	4	-	-	150	AV	
V-213	V67	4	MANUAL	LEVER	150	BV	
V-204	V204	24	MANUAL	HANDWHEEL	150	BFV	POSITION INDICATION/LIMIT SWITCHES
FSV-205	V204	24	ELECTRO-HYDRAULIC	D	150	BVF	FAIL SAFETY VALVE
V-206	V6	6	MANUAL	HANDWHEEL	150	GV	
V-210	V6	4	MANUAL	HANDWHEEL	150	GV	
V-211A	V204	4	MANUAL	HANDWHEEL	150	BFV	
V-211B	V204	4	MANUAL	HANDWHEEL	150	BFV	
ARV-280	V253	4	-	-	150	AV	
V-280	V67	4	MANUAL	LEVER	150	BV	
V-281	V204	24	MANUAL	HANDWHEEL	150	BFV	POSITION INDICATION/LIMIT SWITCHES
FCV-284	V204	12	ELECTRIC	TYPE A1	150	BFV	POSITION INDICATION/LIMIT SWITCHES
MV-210A	V209	8	ELECTRIC	TYPE A	150	BFV	
MV-210B	V209	8	ELECTRIC	TYPE A	150	BFV	
ARV-210A	V253	4	-	-	150	AV	
ARV-210B	V253	4	-	-	150	AV	
V-210A	V67	4	MANUAL	LEVER	150	BV	
V-210B	V67	4	MANUAL	LEVER	150	BV	
ARV-215	V253	4	-	-	150	AV	
V-215	V70	4	MANUAL	LEVER	150	BV	
MV-211A	V197	4	ELECTRIC	TYPE A	150	BFV	
MV-211B	V197	4	ELECTRIC	TYPE A	150	BFV	
MV-214A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-214B	V209	10	ELECTRIC	TYPE A	150	BFV	
FCV-215A	V209	6	ELECTRIC	TYPE A1	150	BFV	
FCV-215B	V209	6	ELECTRIC	TYPE A1	150	BFV	
FCV-216A	V209	10	ELECTRIC	TYPE A1	150	BFV	
FCV-216B	V209	10	ELECTRIC	TYPE A1	150	BFV	
MV-217A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-217B	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-218A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-218B	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-219	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-220A	V209	8	ELECTRIC	TYPE A	150	BFV	
MV-220B	V209	8	ELECTRIC	TYPE A	150	BFV	
ARV-220A	V253	4	-	-	150	AV	
ARV-220B	V253	4	-	-	150	AV	
V-220A	V67	4	MANUAL	LEVER	150	BV	
V-220B	V67	4	MANUAL	LEVER	150	BV	
MV-221A	V197	4	ELECTRIC	TYPE A	150	BFV	
MV-221B	V197	4	ELECTRIC	TYPE A	150	BFV	
MV-224A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-224B	V209	10	ELECTRIC	TYPE A	150	BFV	
FCV-225A	V209	6	ELECTRIC	TYPE A1	150	BFV	
FCV-225B	V209	6	ELECTRIC	TYPE A1	150	BFV	
FCV-226A	V209	10	ELECTRIC	TYPE A1	150	BFV	
FCV-226B	V209	10	ELECTRIC	TYPE A1	150	BFV	

Partial Valve List
Area 200

Valve Tag No.	Valve SPEC Reference No.	Size (in)	Actuator Type	Actuator Designation	Pressure Class	Valve Type	Notes
MV-227A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-227B	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-228A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-228B	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-229	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-230A	V209	8	ELECTRIC	TYPE A	150	BFV	
MV-230B	V209	8	ELECTRIC	TYPE A	150	BFV	
ARV-230A	V253	4	-	-	150	AV	
ARV-230B	V253	4	-	-	150	AV	
V-230A	V67	4	MANUAL	LEVER	150	33	
V-230B	V67	4	MANUAL	LEVER	150	BV	
MV-231A	V197	4	ELECTRIC	TYPE A	150	BFV	
MV-231B	V197	4	ELECTRIC	TYPE A	150	BFV	
MV-234A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-234B	V209	10	ELECTRIC	TYPE A	150	BFV	
FCV-235A	V209	6	ELECTRIC	TYPE A1	150	BFV	
FCV-235B	V209	6	ELECTRIC	TYPE A1	150	BFV	
FCV-236A	V209	10	ELECTRIC	TYPE A1	150	BFV	
FCV-236B	V209	10	ELECTRIC	TYPE A1	150	BFV	
MV-237A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-237B	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-238A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-238B	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-239	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-240A	V209	8	ELECTRIC	TYPE A	150	BFV	
MV-240B	V209	8	ELECTRIC	TYPE A	150	BFV	
ARV-240A	V253	4	-	-	150	AV	
ARV-240B	V253	4	-	-	150	AV	
V-240A	V67	4	MANUAL	LEVER	150	BV	
V-240B	V67	4	MANUAL	LEVER	150	BV	
MV-241A	V197	4	ELECTRIC	TYPE A	150	BFV	
MV-241B	V197	4	ELECTRIC	TYPE A	150	BFV	
MV-244A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-244B	V209	10	ELECTRIC	TYPE A	150	BFV	
FCV-245A	V209	6	ELECTRIC	TYPE A1	150	BFV	
FCV-245B	V209	6	ELECTRIC	TYPE A1	150	BFV	
FCV-246A	V209	10	ELECTRIC	TYPE A1	150	BFV	
FCV-246B	V209	10	ELECTRIC	TYPE A1	150	BFV	
MV-247A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-247B	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-248A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-248B	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-249	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-250A	V209	8	ELECTRIC	TYPE A	150	BFV	
MV-250B	V209	8	ELECTRIC	TYPE A	150	BFV	
ARV-250A	V253	4	-	-	150	AV	
ARV-250B	V253	4	-	-	150	AV	
V-250A	V67	4	MANUAL	LEVER	150	BV	
V-250B	V67	4	MANUAL	LEVER	150	BV	
MV-251A	V197	4	ELECTRIC	TYPE A	150	BFV	
MV-251B	V197	4	ELECTRIC	TYPE A	150	BFV	
MV-254A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-254B	V209	10	ELECTRIC	TYPE A	150	BFV	
FCV-255A	V209	6	ELECTRIC	TYPE A1	150	BFV	
FCV-255B	V209	6	ELECTRIC	TYPE A1	150	BFV	
FCV-256A	V209	10	ELECTRIC	TYPE A1	150	BFV	
FCV-256B	V209	10	ELECTRIC	TYPE A1	150	BFV	
MV-257A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-257B	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-258A	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-258B	V209	10	ELECTRIC	TYPE A	150	BFV	
MV-259	V209	10	ELECTRIC	TYPE A	150	BFV	
V-282	V209	24	MANUAL		150	BFV	POSITION INDICATION/LIMIT SWITCHES
MV-290	V197	6	ELECTRIC	TYPE A		BFV	AIR

Partial Valve List

Area 200

Valve Tag No.	Valve SPEC Reference No.	Size (in)	Actuator Type	Actuator Designation	Pressure Class	Valve Type	Notes
V-291	V197	6	ELECTRIC	HANDWHEEL		BFV	AIR
V-292	V197	6	ELECTRIC	HANDWHEEL		BFV	AIR
V-214	V70	4	-	-	150	BV	
ARV-204	V253	4			150	AV	

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Partial Valve List
Area 300

Valve Tag No.	Valve SPEC Reference No.	Size (in)	Actuator Type	Actuator Designation	Pressure Class	Valve Type	Notes
CK-300	V89	16	-	-	150	CV	
V-300	V204	16	MANUAL	HANDWHEEL	150	BFV	
V-302	V204	16	MANUAL	HANDWHEEL	150	BFV	
V-303	V204	16	MANUAL	HANDWHEEL	150	BFV	POSITION INDICATOR/LIMIT SWITCHES
V-313	V204	8	MANUAL	HANDWHEEL	150	BFV	
CK-313	V89	8	-	-	150	CV	
MV-313	V204	8	ELECTRIC	TYPE A	150	BFV	
V-311	V204	12	MANUAL	HANDWHEEL	150	BFV	
CK-311	V89	10	-	-	150	CV	
MV-311	V204	10	ELECTRIC	TYPE A	150	BFV	
V-312	V204	12	MANUAL	HANDWHEEL	150	BFV	
CK-312	V89	10	-	-	150	CV	
MV-312	V204	10	ELECTRIC	TYPE A	150	BFV	
FCV-340A	V204	14	ELECTRIC	TYPE A1	150	BFV	
FCV-340B	V204	8	ELECTRIC	TYPE A1	150	BFV	
FCV-340C	V204	6	ELECTRIC	TYPE A1	150	BFV	
FCV-341	V204	4	ELECTRIC	TYPE A	150	BFV	
V-341	V204	4	MANUAL	HANDWHEEL	150	BFV	
V-351	V204	14	MANUAL	HANDWHEEL	150	BFV	
MV-351	V204	8	ELECTRIC	TYPE A	150	BFV	
CK-351	V89	8	-	-	150	CV	
V-352	V204	14	MANUAL	HANDWHEEL	150	BFV	
MV-352	V204	8	ELECTRIC	TYPE A	150	BFV	
CK-352	V89	8	-	-	150	CV	
V-353	V204	14	MANUAL	HANDWHEEL	150	BFV	
MV-353	V204	8	ELECTRIC	TYPE A	150	BFV	
CK-353	V89	8	-	-	150	CV	
MV-355	V204	16	ELECTRIC	TYPE A	150	BFV	
FCV-355	V204	6	ELECTRIC	TYPE A1	150	BFV	
V-304	V204	6	MANUAL	HANDWHEEL	150	BFV	
V-310	V6	4	MANUAL	HANDWHEEL	150	GV	
CK-301	V93	16	-	-	150	CV	
V-321	V204	16	MANUAL	HANDWHEEL	150	BFV	
FSV-315	V204	10	ELECTRO-HYDRO	TYPE D	150	BFV	FLOW SAFETY VALVE
FSV-360	V204	16	ELECTRIC-HYDRO	TYPE D	150	BFV	FLOW SAFETY VALVE
V-301	V6	6	MANUAL	HANDWHEEL		GV	

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Partial Valve List
Area 400

Valve Tag No.	Valve SPEC Reference No.	Size (in)	Actuator Type	Actuator Designation	Pressure Class	Valve Type	Notes
V-401A	V207	10	MANUAL	HANDWHEEL	150	BFV	
V-402A	V207	10	MANUAL	HANDWHEEL	150	BFV	
V-401B	V207	10	MANUAL	HANDWHEEL	150	BFV	
V-402B	V207	10	MANUAL	HANDWHEEL	150	BFV	
V-401C	V207	10	MANUAL	HANDWHEEL	150	BFV	
V-402C	V207	10	MANUAL	HANDWHEEL	150	BFV	
V-470A	V207	4	MANUAL	HANDWHEEL	150	BFV	
V-470B	V207	2	MANUAL	HANDWHEEL	150	BFV	
V-410	V207	8	MANUAL	HANDWHEEL	150	BFV	
MV-410	V207	8	ELECTRIC	TYPE A	150	BFV	
CK-411	V151	8			150	CV	
V-411	V206	8	MANUAL	HANDWHEEL	150	BFV	
V-420	V207	8	MANUAL	HANDWHEEL	150	BFV	
MV-420	V207	8	ELECTRIC	TYPE A	150	BFV	
CK-421	V151	8			150	CV	
V-421	V206	8	MANUAL	HANDWHEEL	150	BFV	
V-430	V207	8	MANUAL	HANDWHEEL	150	BFV	
MV-430	V207	8	ELECTRIC	TYPE A	150	BFV	
CK-431	V151	8			150	CV	
V-431	V206	8	MANUAL	HANDWHEEL	150	BFV	
MV-412	V69	1 1/2	ELECTRIC	TYPE C	150	BV	PROVIDE REMOTE CONTROL STATION
V-413A	V206	8	MANUAL	HANDWHEEL	150	BFV	POSITION INDICATOR
V-413B	V206	6	MANUAL	HANDWHEEL	150	BFV	POSITION INDICATOR
V-413C	V206	6	MANUAL	HANDWHEEL	150	BFV	
V-412	V206	6	MANUAL	SQUARE NUT	150	BFV	POSITION INDICATOR
V-415A	V206	6	MANUAL	SQUARE NUT	150	BFV	
V-415B	V206	4	Manual	Square Nut	150	BFV	
V-423B	V206	6	MANUAL	HANDWHEEL	150	BFV	POSITION INDICATOR
V-423C	V206	6	MANUAL	HANDWHEEL	150	BFV	
V-422	V206	6	MANUAL	SQUARE NUT	150	BFV	POSITION INDICATOR
V-425A	V206	6	MANUAL	SQUARE NUT	150	BFV	
V-425B	V206	4	MANUAL	SQUARE NUT	150	BFV	
MV-432	V69	1 1/2	ELECTRIC	TYPE C	150	BV	
V-433A	V206	8	MANUAL	HANDWHEEL	150	BFV	PROVIDE REMOTE CONTROL STATION
V-433B	V206	6	MANUAL	HANDWHEEL	150	BFV	POSITION INDICATOR
V-433C	V206	6	MANUAL	HANDWHEEL	150	BFV	
V-432	V206	6	MANUAL	SQUARE NUT	150	BFV	POSITION INDICATOR
V-435A	V206	6	MANUAL	SQUARE NUT	150	BFV	
V-435B	V206	4	MANUAL	SQUARE NUT	150	BFV	
V-417A	V206	4	MANUAL	HANDWHEEL	150	BFV	
CK-417	V151	4			150	CV	
V-417B	V206	4	MANUAL	HANDWHEEL	150	BFV	
V-415C	V206	4	MANUAL	SQUARE NUT	150	BFV	
V-415D	V206	3	MANUAL	SQUARE NUT	150	BFV	
V-427A	V206	4	MANUAL	HANDWHEEL	150	BFV	
CK-427	V151	4			150	CV	
V-427B	V206	4	MANUAL	HANDWHEEL	150	BFV	
V-425C	V206	4	MANUAL	SQUARE NUT	150	BFV	
V-425D	V206	3	MANUAL	SQUARE NUT	150	BFV	
V-437A	V206	4	MANUAL	HANDWHEEL	150	BFV	
CK-437	V151	4	NA		150	CV	
V-437B	V206	4	MANUAL	HANDWHEEL	150	BFV	
V-435C	V206	4	MANUAL	SQUARE NUT	150	BFV	
V-435D	V206	3	MANUAL	SQUARE NUT	150	BFV	
MV-419B	V207	4	ELECTRIC	TYPE C	150	BFV	
CK-419	V151	8			150	CV	
MV-419A	V207	8	ELECTRIC	TYPE A	150	BFV	
V-419A	V207	8	MANUAL	SQUARE NUT	150	BFV	PROVIDE REMOTE CONTROL STATION
V-419B	V207	4	MANUAL	SQUARE NUT	150	BFV	
MV-429B	V207	4	ELECTRIC	TYPE C	150	BFV	PROVIDE REMOTE CONTROL STATION
CK-429	V151	8			150	CV	
MV-429A	V207	8	ELECTRIC	TYPE A	150	BFV	
V-429A	V207	8	MANUAL	SQUARE NUT	150	BFV	PROVIDE REMOTE CONTROL STATION
V-429B	V207	4	MANUAL	SQUARE NUT	150	BFV	
MV-439B	V207	4	ELECTRIC	TYPE C	150	BFV	PROVIDE REMOTE CONTROL STATION
CK-439	V151	8			150	CV	
MV-439A	V207	8	ELECTRIC	TYPE A	150	BFV	
V-439A	V207	8	MANUAL	SQUARE NUT	150	BFV	PROVIDE REMOTE CONTROL STATION
V-439B	V207	4	MANUAL	SQUARE NUT	150	BFV	

Partial Valve List
Area 400

Valve Tag No.	Valve SPEC Reference No.	Size (in)	Actuator Type	Actuator Designation	Pressure Class	Valve Type	Notes
FCV-418	V329	2	ELECTRIC	TYPE A1	150	GV	PROVIDE REMOTE CONTROL STATION
CK-418	V151	3			150	CV	
V-418	V207	3	MANUAL	SQUARE NUT	150	BFV	
FCV-428	V329	2	ELECTRIC	TYPE A1	150	GV	PROVIDE REMOTE CONTROL STATION
CK-428	V151	3			150	CV	
V-428	V207	3	MANUAL	SQUARE NUT	150	BFV	
FCV-438	V329	2	ELECTRIC	TYPE A1	150	GV	PROVIDE REMOTE CONTROL STATION
CK-438	V151	3			150	CV	
V-438	V207	3	MANUAL	SQUARE NUT	150	BFV	
V-470C	V207	4	Manual	Handwheel	150	BFV	PROVIDE REMOTE CONTROL STATION
V-450	V207	8	Manual	Handwheel	150	BFV	
CK-451	V151	6	NA		150	CV	
V-451	V207	6	MANUAL	HANDWHEEL	150	BFV	
V-455	V207	6	MANUAL	HANDWHEEL	150	BFV	
V-456	V207	6	MANUAL	HANDWHEEL	150	BFV	
V-460A	V207	6	MANUAL	HANDWHEEL	150	BFV	
V-460D	V207	6	MANUAL	HANDWHEEL	150	BFV	
V-460C	V207	6	MANUAL	HANDWHEEL	150	BFV	
V-460B	V207	6	MANUAL	HANDWHEEL	150	BFV	
MV-422	V69	1 1/2	ELECTRIC	TYPE C	150	BV	
V-415B	V206	4	MANUAL	HANDWHEEL	150	BFV	PROVIDE REMOTE CONTROL STATION

Partial Valve List							
Area 500							
Valve Tag No.	Valve SPEC Reference No.	Size (in)	Actuator Type	Actuator Designation	Pressure Class	Valve Type	Notes
MV-510	V204	24	ELECTRIC	TYPE A	150	BFV	
V-501	SEE 15100 2.1.J	24	MANUAL	SQUARE NUT	150	BFV	BURIED
V-511	SEE 15100 2.1.J	12	MANUAL	SQUARE NUT	150	BFV	BURIED
V-512	SEE 15100 2.1.J	12	MANUAL	SQUARE NUT	150	BFV	BURIED
V-513	SEE 15100 2.1.J	12	MANUAL	SQUARE NUT	150	BFV	BURIED
V-514	SEE 15100 2.1.J	12	MANUAL	SQUARE NUT	150	BFV	BURIED
CK-511	V90	10	-	-	250	CV	
CK-512	V90	10	-	-	250	CV	
CK-513	V90	10	-	-	250	CV	
CK-514	V90	10	-	-	250	CV	
MV-511	V205	10	ELECTRIC	TYPE A	250	BFV	POSITION INDICATION/LIMIT SWITCHES
MV-512	V205	10	ELECTRIC	TYPE A	250	BFV	POSITION INDICATION/LIMIT SWITCHES
MV-513	V205	10	ELECTRIC	TYPE A	250	BFV	POSITION INDICATION/LIMIT SWITCHES
MV-514	V205	10	ELECTRIC	TYPE A	250	BFV	POSITION INDICATION/LIMIT SWITCHES
V-501A	V204	6	MANUAL	HANDWHEEL	150	BFV	
V-501B	V204	4	MANUAL	HANDWHEEL	150	BFV	
V-550	V205	24	MANUAL	HANDWHEEL	250	BFV	POSITION INDICATION/LIMIT SWITCHES
V-551	V205	24	MANUAL	HANDWHEEL	250	BFV	POSITION INDICATION/LIMIT SWITCHES
V-552	SEE 15100 2.1.J	12	MANUAL	SQUARE NUT	250	BFV	BURIED, SEE C-10
V-553	V205	12	MANUAL	SQUARE NUT	250	BFV	BURIED, SEE C-10
V-554	V205	24	MANUAL	HANDWHEEL	250	BFV	POSITION INDICATION/LIMIT SWITCHES
ARV-511	V253	4	-	-	250	AV	
ARV-512	V253	4	-	-	250	AV	
ARV-513	V253	4	-	-	250	AV	
ARV-514	V253	4	-	-	250	AV	
V-510A	V204	6	MANUAL	HANDWHEEL	150	BFV	
V-510B	V204	4	MANUAL	HANDWHEEL	150	BFV	
CK-500	V93	16	-	-	150	CV	
V-555	V205	24	MANUAL	HANDWHEEL	250	BFV	POSITION INDICATION/LIMIT SWITCHES
V-530	V205	24	MANUAL	SQUARE NUT	250	BFV	POSITION INDICATION/LIMIT SWITCHES
V-540	V6	4	MANUAL	HANDWHEEL	150	GV	
ARV-550	V253	4	-	-	250	ARV	
V-550A	V70	4	MANUAL	HANDWHEEL		BV	
V-500	V6	6	MANUAL	HANDWHEEL	150	GV	
V-511A	V70	4	MANUAL	HANDWHEEL	250	BV	
V-512A	V70	4	MANUAL	HANDWHEEL	250	BV	
V-513A	V70	4	MANUAL	HANDWHEEL	250	BV	
V-514A	V70	4	MANUAL	HANDWHEEL	250	BV	
ARV-500	V253	4	-	-	250	AV	
ARV-501	V254	4	-	-	250	AV	
ARV-502	V255	4	-	-	250	AV	

Partial Valve List							
Area 500							
Valve Tag No.	Valve SPEC Reference No.	Size (in)	Actuator Type	Actuator Designation	Pressure Class	Valve Type	Notes
V-500	V6	6	MANUAL	HANDWHEEL	150	GV	

Partial Valve List
Area 600

Valve Tag No.	Valve SPEC Reference No.	Size (in)	Actuator Type	Actuator Designation	Pressure Class	Valve Type	Notes
V-600	V345	2				DIAPHRAGM	
V-601	V345	2				DIAPHRAGM	
V-610	V345	2				DIAPHRAGM	
V-630	V345	2				DIAPHRAGM	
V-640	V345	2				DIAPHRAGM	
V-650	V345	2				DIAPHRAGM	
MV-660	V345	2	A	ELEC	150	DIAPHRAGM	POSITION INDICATION/LIMIT SWITCHES
MV-670	V345	2	A	ELEC	150	DIAPHRAGM	POSITION INDICATION/LIMIT SWITCHES
V-680	V345	2				DIAPHRAGM	

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Partial Valve List							
Area 700							
Valve Tag No.	Valve SPEC Reference No.	Size (in)	Actuator Type	Actuator Designation	Pressure Class	Valve Type	Notes
MV-720	V204	24	ELECTRIC	TYPE A	150	BFV	POSITION INDICATOR/LIMIT SWITCHES
MV-700	V204	6	ELECTRIC	TYPE A	150	BFV	
MV-701	V204	6	ELECTRIC	TYPE A	150	BFV	
CK-700	V89	6	-	-	150	CV	
CK-701	V89	6	-	-	150	CV	
V-700	V16	8	MANUAL	HANDWHEEL	150	PLUG	
V-701	V16	8	MANUAL	HANDWHEEL	150	PLUG	
V-705A	V16	4	MANUAL	HANDWHEEL	150	PLUG	
V-705B	V16	4	MANUAL	HANDWHEEL	150	PLUG	
V-705C	V16	4	MANUAL	HANDWHEEL	150	PLUG	
V-705D	V16	4	MANUAL	HANDWHEEL	150	PLUG	
V-705E	V16	4	MANUAL	HANDWHEEL	150	PLUG	
V-710	V16	4	MANUAL	HANDWHEEL	150	PLUG	
V-711	V16	4	MANUAL	HANDWHEEL	150	PLUG	
CK-720	V150	24			150	CV	
V-730A	V16	4	MANUAL	HANDWHEEL	150	PLUG	SLUDGE BED
V-730B	V16	4	MANUAL	HANDWHEEL	150	PLUG	SLUDGE BED
V-729	V16	4	MANUAL	SQUARE NUT	150	PLUG	BURIED
V-703	V6	4	MANUAL	SQUARE NUT	150	GV	
CK-703	V93	16	-	-	150	CV	
V-741	V16	4	MANUAL	HANDWHEEL	150	PLUG	
V-750	V16	6	MANUAL	HANDWHEEL	150	PLUG	
V-740	V289	4	-	-	150	PRV	

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Partial Valve List							
Area 800 - Gheen							
Valve Tag No.	Valve SPEC Reference No.	Size (in)	Actuator Type	Actuator Designation	Pressure Class	Valve Type	Notes
V-801	V205	16	MANUAL	HANDWHEEL	250	BFV	POSITION INDICATION
CK-802	V89	24	-	-	250	CV	
V-811A	See 15100 2.I.J.	20	MANUAL	SQUARE NUT	250	BFV	BURIED
V-811B	V70	4			250	BV	
CK-811	V89	10	-	-	250	CV	
MV-811	V205	10	ELECTRIC	TYPE A	250	BFV	
ARV-811	V253	4	-	-	250	AV	
V-812A	See 15100 2.I.J.	20	MANUAL	SQUARE NUT	250	BFV	BURIED
V-812B	V70	4			250	BV	
CK-812	V89	10	-	-	250	CV	
MV-812	V205	10	ELECTRIC	TYPE A	250	BFV	
ARV-812	V253	4	-	-	250	AV	
V-860	See 15100 2.I.J.	24	MANUAL	SQUARE NUT	250	BFV	BURIED, See GFC-6
ARV-850	V253	4	-	-	250	AV	
V-870	See 15100 2.I.J.	24	MANUAL	SQUARE NUT	250	BFV	BID ALTERNATIVE 2, BURIED, See GFC-6
V-880	V205	16	MANUAL	HANDWHEEL	250	BFV	BID ALT 1; POSITION INDICATION/LIMIT SWITCHES
CK-881	V89	16	-	-	250	CV	BID ALTERNATIVE 1
V-882	V205	16	MANUAL	HANDWHEEL	250	BFV	BID ALTERNATIVE 1
V-883	V6	10	MANUAL	HANDWHEEL	250	GATE	BID ALTERNATIVE 1
V-884	See 15100 2.I.J.	24	MANUAL	SQUARE NUT	250	BFV	BID ALTERNATIVE 1; BURIED
CK-885	V93	16	-	-	20	CV	BID ALTERNATIVE 1
ARV-841	V253	4	-	-	250	AV	
V-841	V70	4	MANUAL	LEVER	250	BV	
V-850	V70	4	MANUAL	LEVER	250	BV	
ARV-800	V253	4	-	-	250	AV	
V-800	V70	4	MANUAL	LEVER	250	BV	
V-820	See 15100 2.I.J.	24	MANUAL	SQUARE NUT	250	BFV	BURIED
V-810	V6	4	MANUAL	HANDWHEEL	250	GV	
CK-810	V93	10				CV	
V-813	V6	4	MANUAL	HANDWHEEL	250	GV	Blowoff See GFC-2

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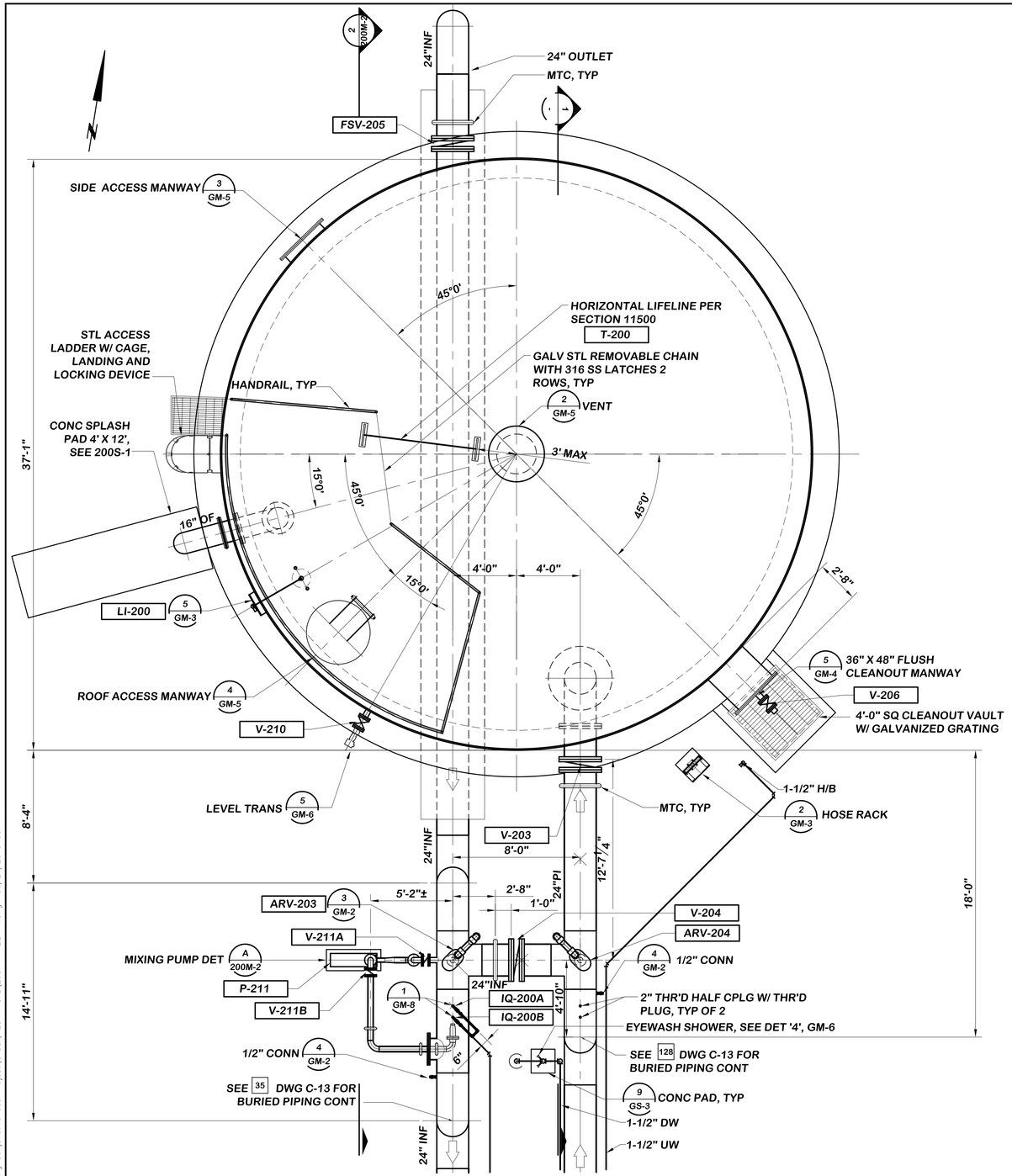
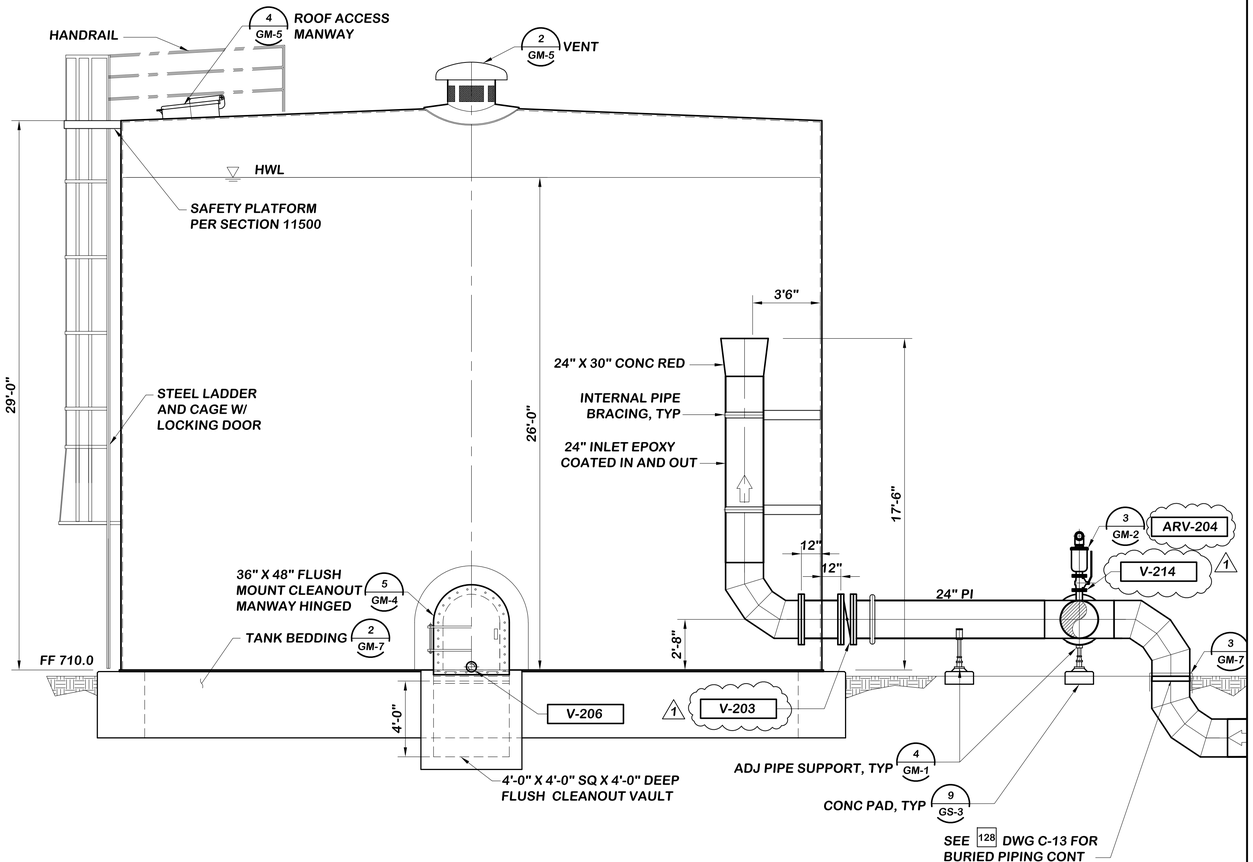


EQUALIZATION TANK PLAN

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



SECTION

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

1

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED CALLOUTS	06/19/19	IEC

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RLG
DRAWN BY RLG
CHECKED BY RK

Infrastructure ENGINEERING CORPORATION
14271 Danielson Street
Poway, California 92064
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www.iecorporation.com

REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA

06/16/2017
DATE

FPUD Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 200 - EQUALIZATION TANK PLAN AND SECTION

DRAWING NO. 200M-1
SHEET NO. 120 OF 387
CLIENT JOB NO. 2744

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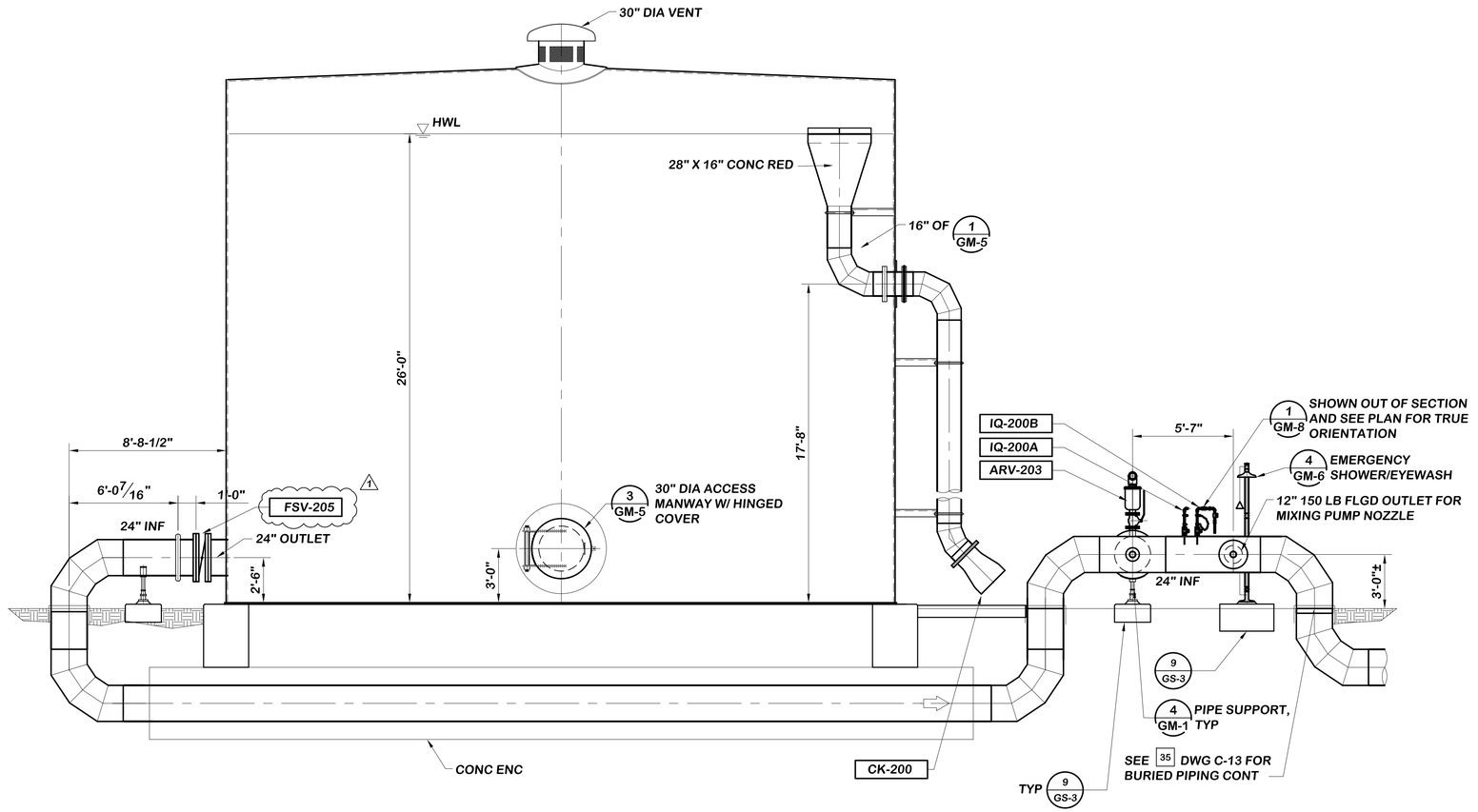
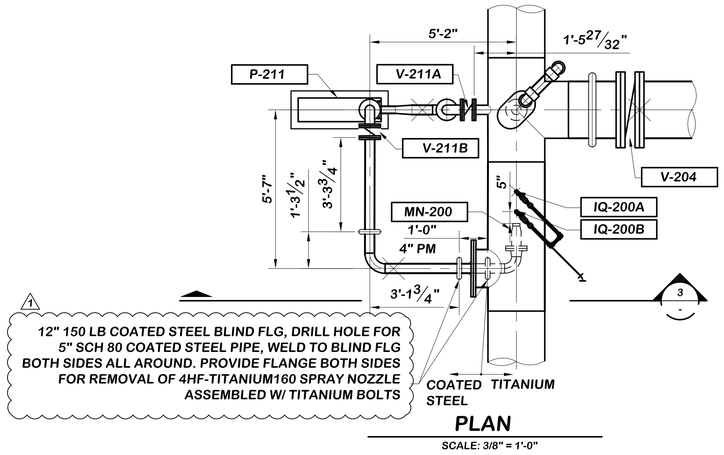
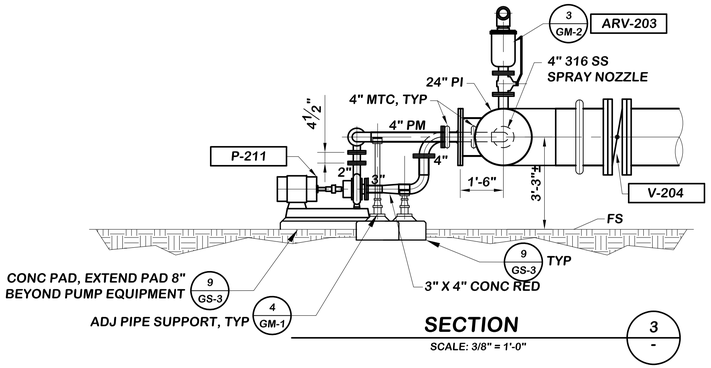


SECTION 2 / 200M-1
SCALE: 1/4" = 1'-0"



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



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

MIXING PUMP DETAIL A / 200M-1
SCALE: 1/4" = 1'-0"

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED CALLOUTS	06/18/19	IEC

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RLG
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REGISTERED PROFESSIONAL ENGINEER — ROSS N. MAXWELL — No. C82681 Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 200 - EQUALIZATION TANK SECTIONS

DRAWING NO. 200M-2
SHEET NO. 121 OF 387
CLIENT JOB NO. 2744

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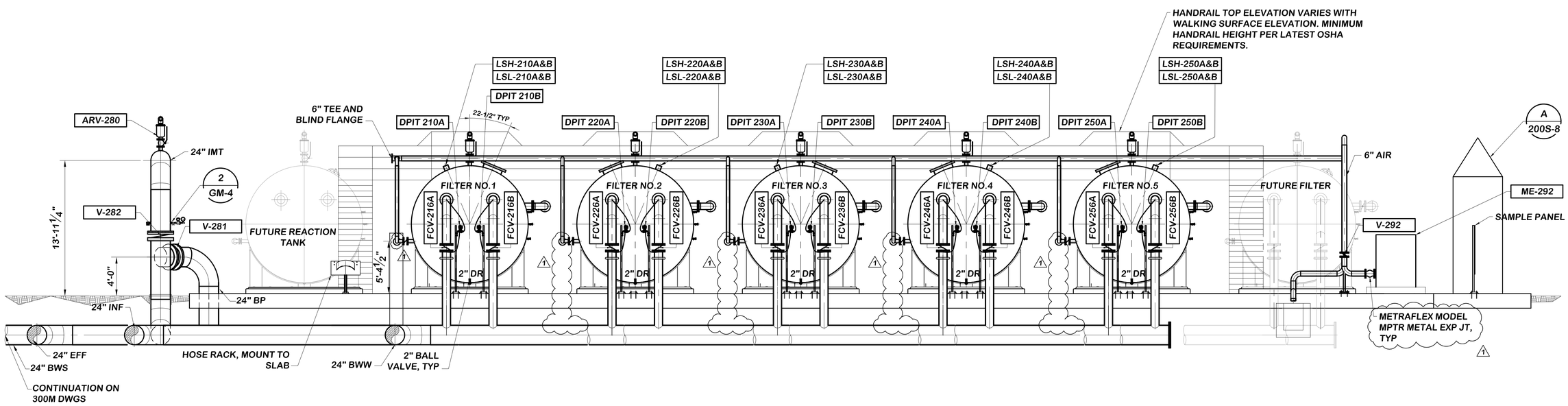
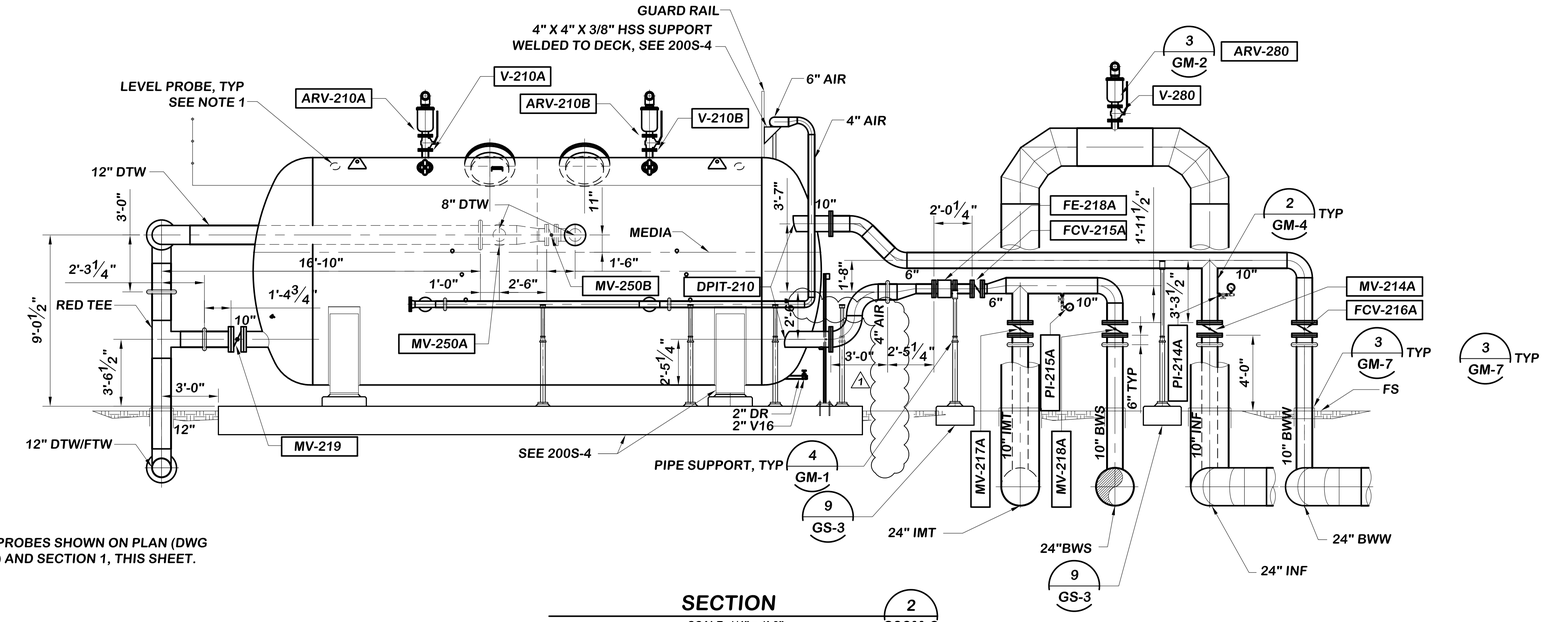


SECTION

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

1 / 200M-3



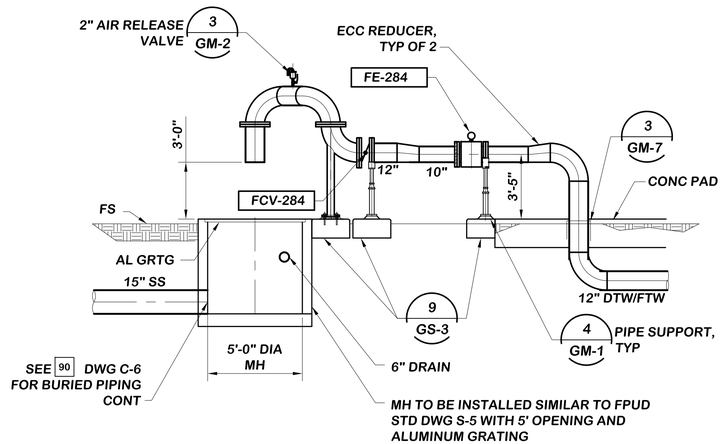
SECTION

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

2 / 200M-3

NOTES:

1. LEVEL PROBES SHOWN ON PLAN (DWG 200M-3) AND SECTION 1, THIS SHEET.



DRAIN DISCHARGE DETAIL

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

A / 200M-3

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED CALLOUT IN SECTION 1	06/18/19	IEC
2	REVISED PIPING IN SECTIONS 1 & 2	06/18/19	IEC

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RLG
DRAWN BY RLG
CHECKED BY RK

Infrastructure ENGINEERING CORPORATION
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REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA

06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

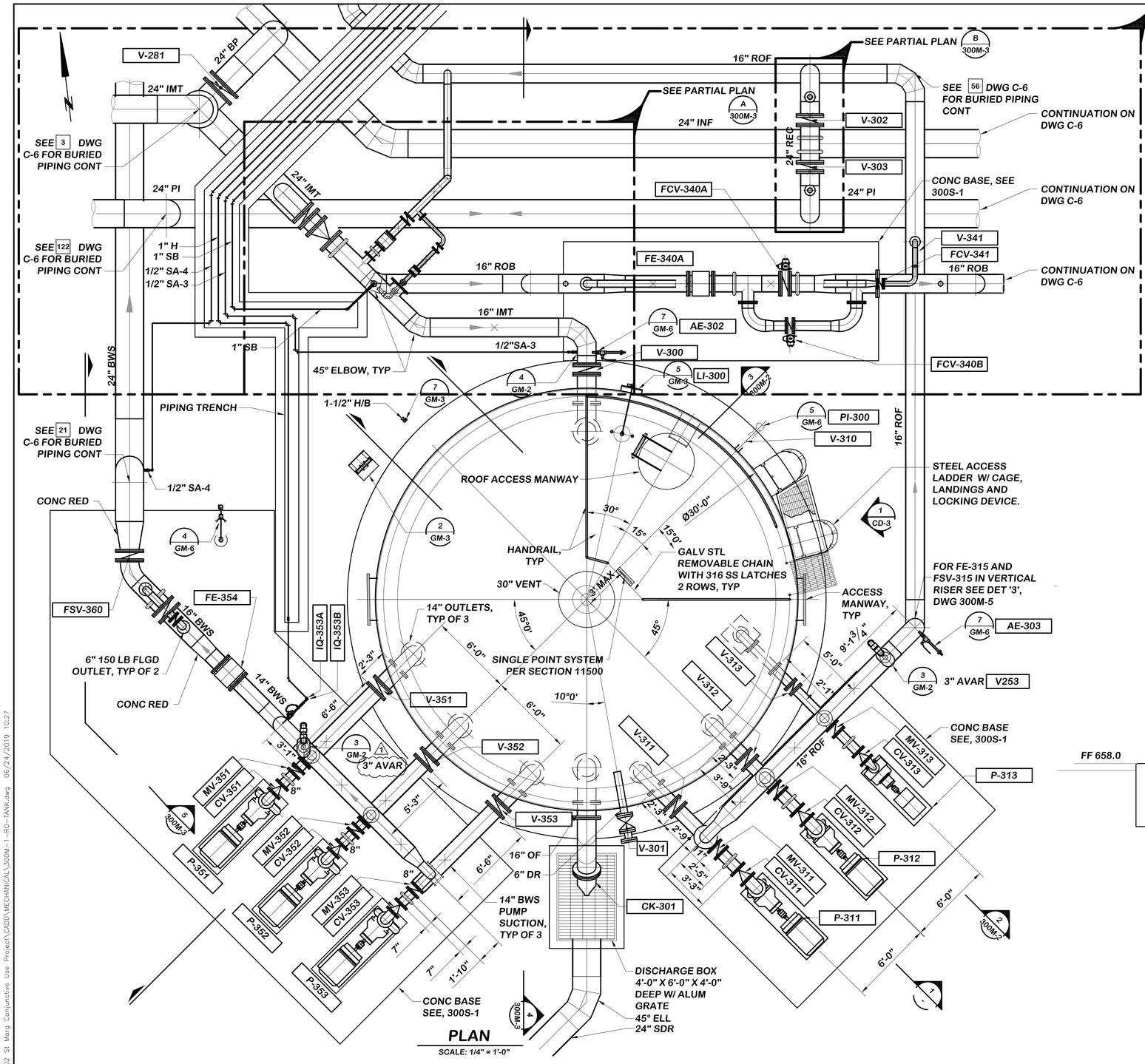
APPROVED BY:

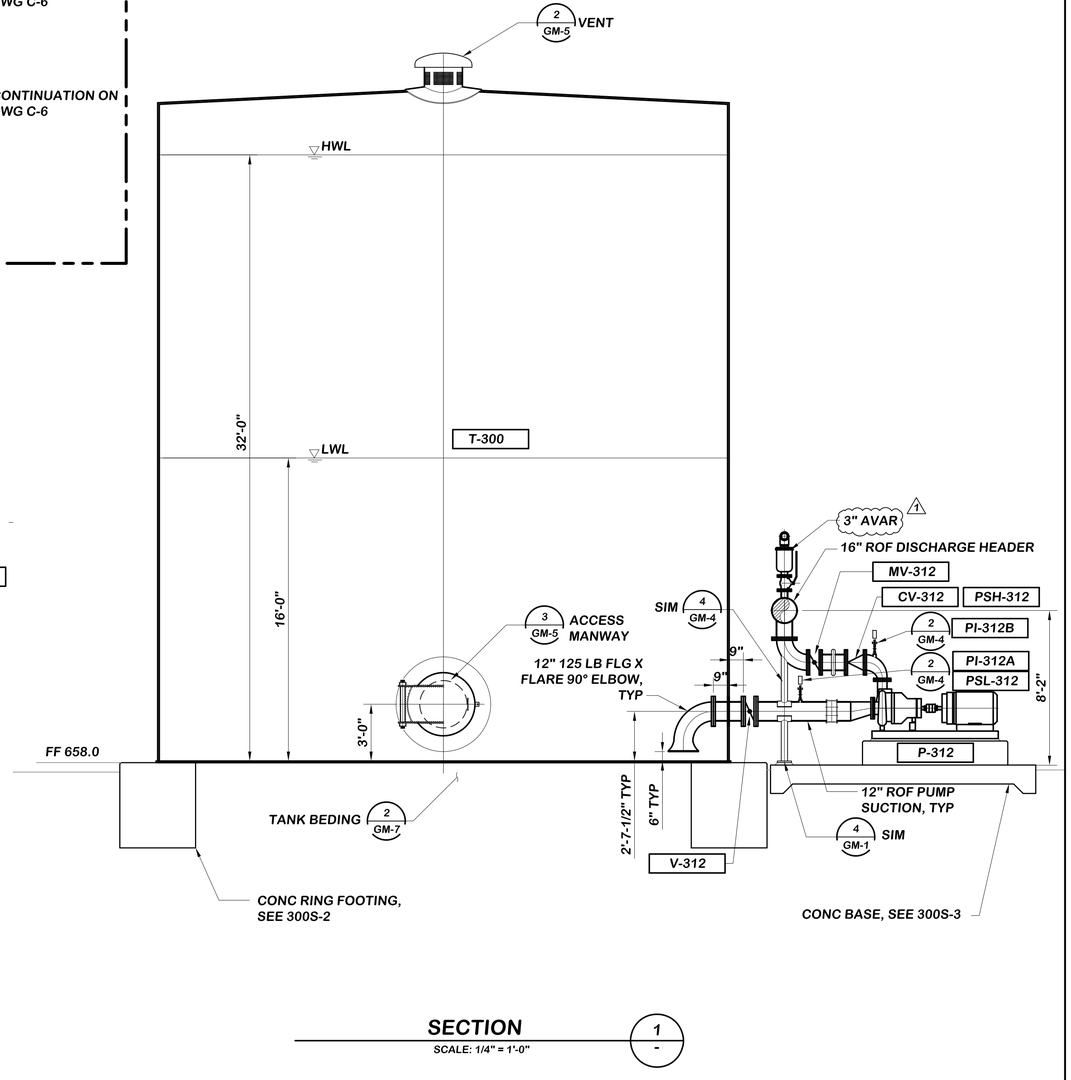
JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 200 - IRON AND MAGANESE FILTRATION - SECTIONS

DRAWING NO. 200M-4
SHEET NO. 123 OF 387
CLIENT JOB NO. 2744





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

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED AVAR CALLOUT	06/18/19	IEC

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RLG
DRAWN BY RLG
CHECKED BY RK

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REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA
06/16/2017 DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

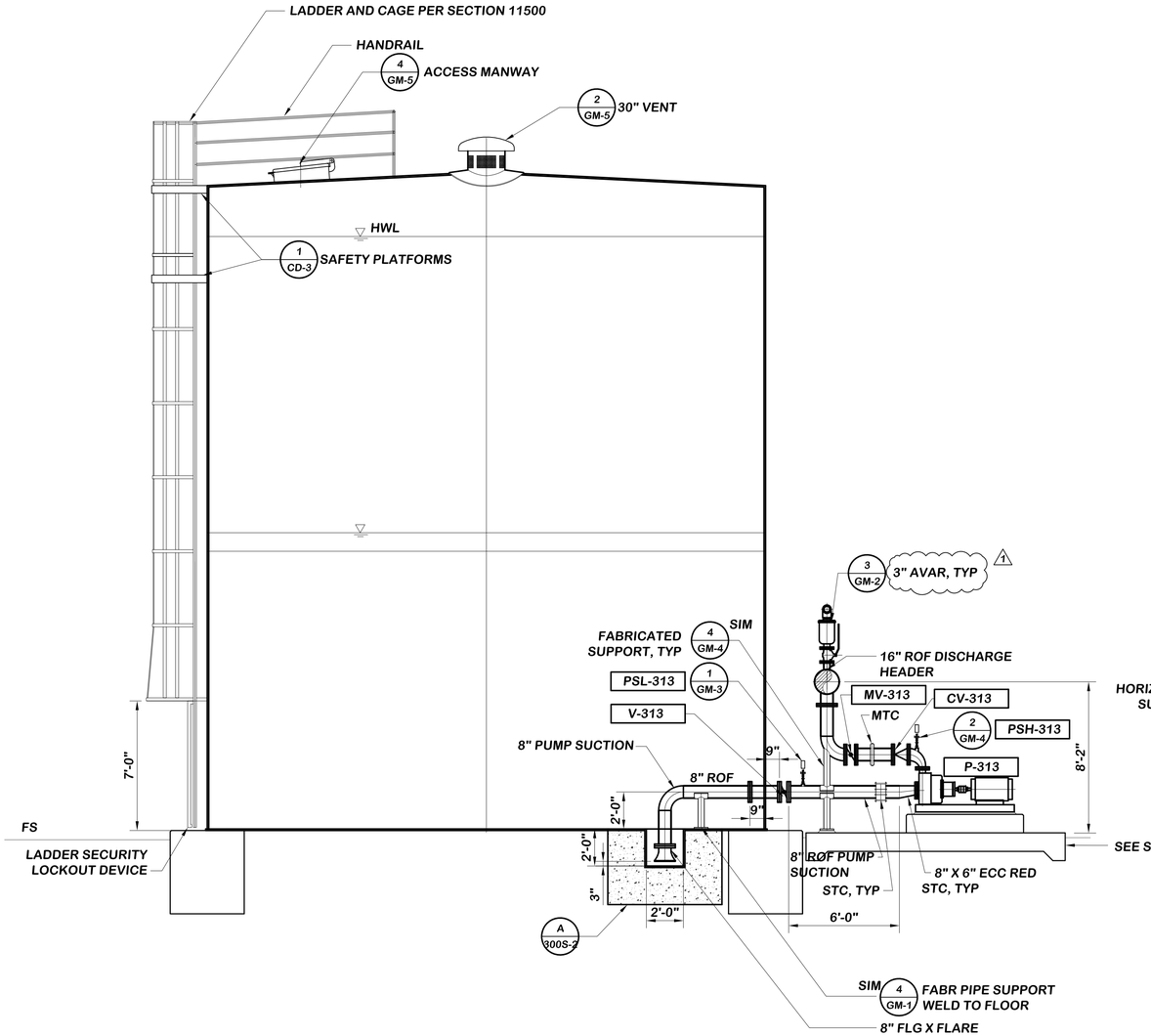
APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

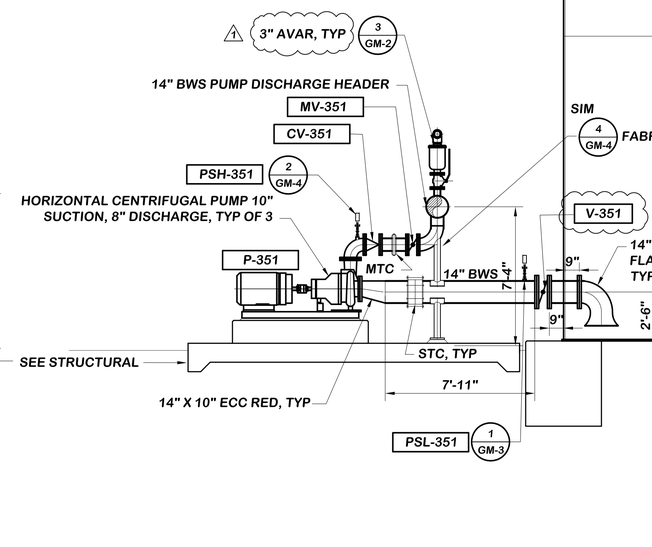
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

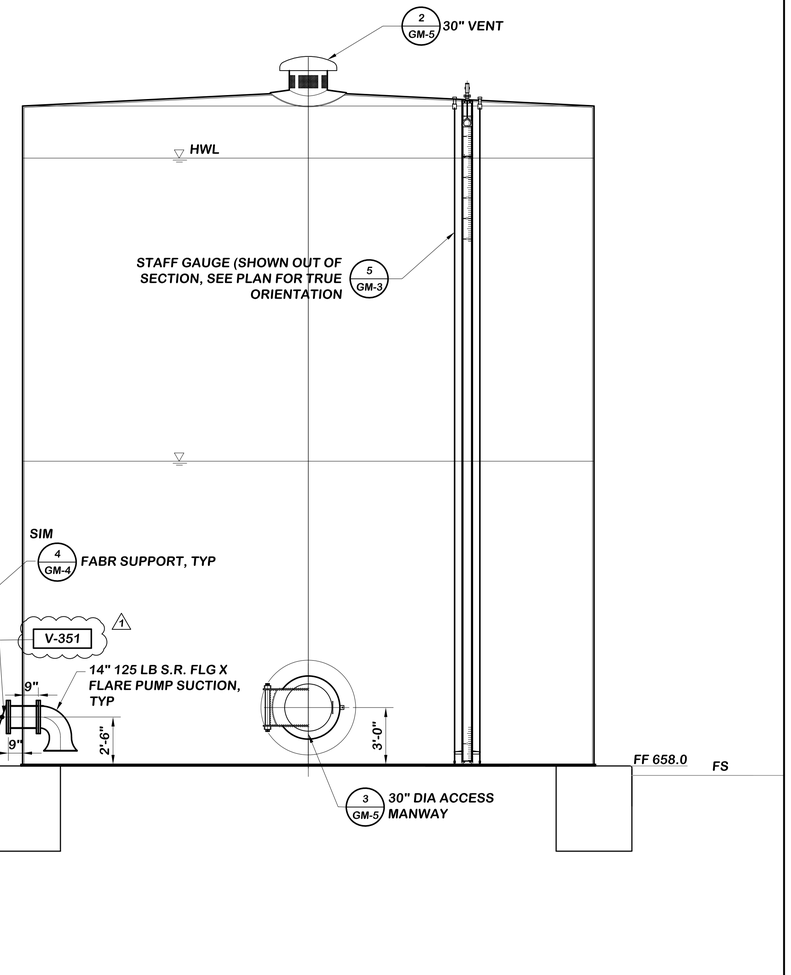
AREA 300 - RO FEED TANK AND BOOSTER PS - PLAN & SECTION

DRAWING NO. 300M-1
SHEET NO. 126 OF 387
CLIENT JOB NO. 2744



SECTION 2 — 300M-1
SCALE: 1/4" = 1'-0"





SECTION 3 — 300M-1
SCALE: 1/4" = 1'-0"

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED CALLOUTS	06/18/19	IEC

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RLG
DRAWN BY RLG
CHECKED BY RK

Infrastructure ENGINEERING CORPORATION
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www.iecorporation.com

REGISTERED PROFESSIONAL ENGINEER — ROSS N. MAXWELL — No. C82681 Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 300 - RO FEED TANK AND BOOSTER PS - SECTIONS

DRAWING NO. 300M-2
SHEET NO. 127 OF 387
CLIENT JOB NO. 2744

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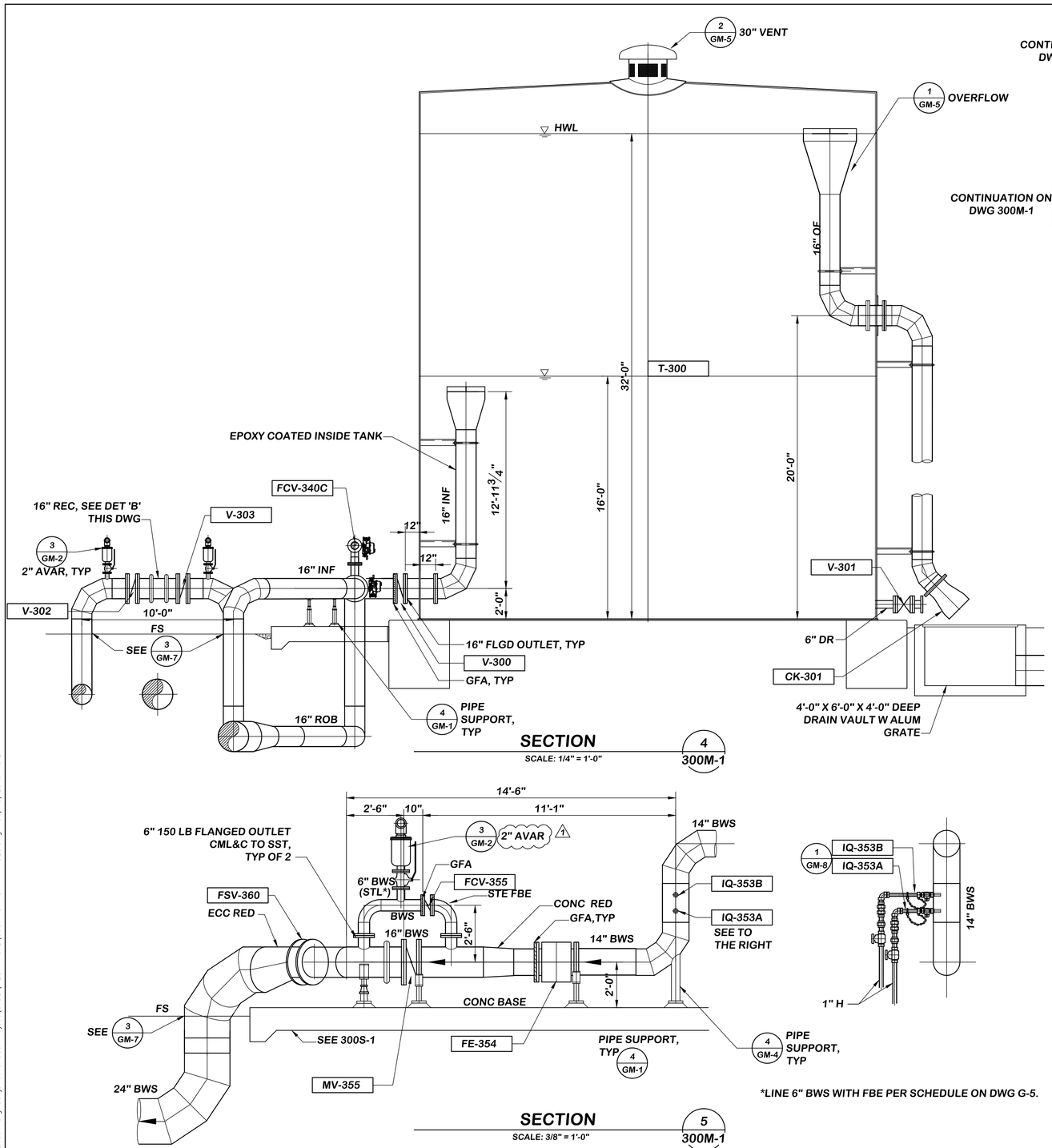


SECTION

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

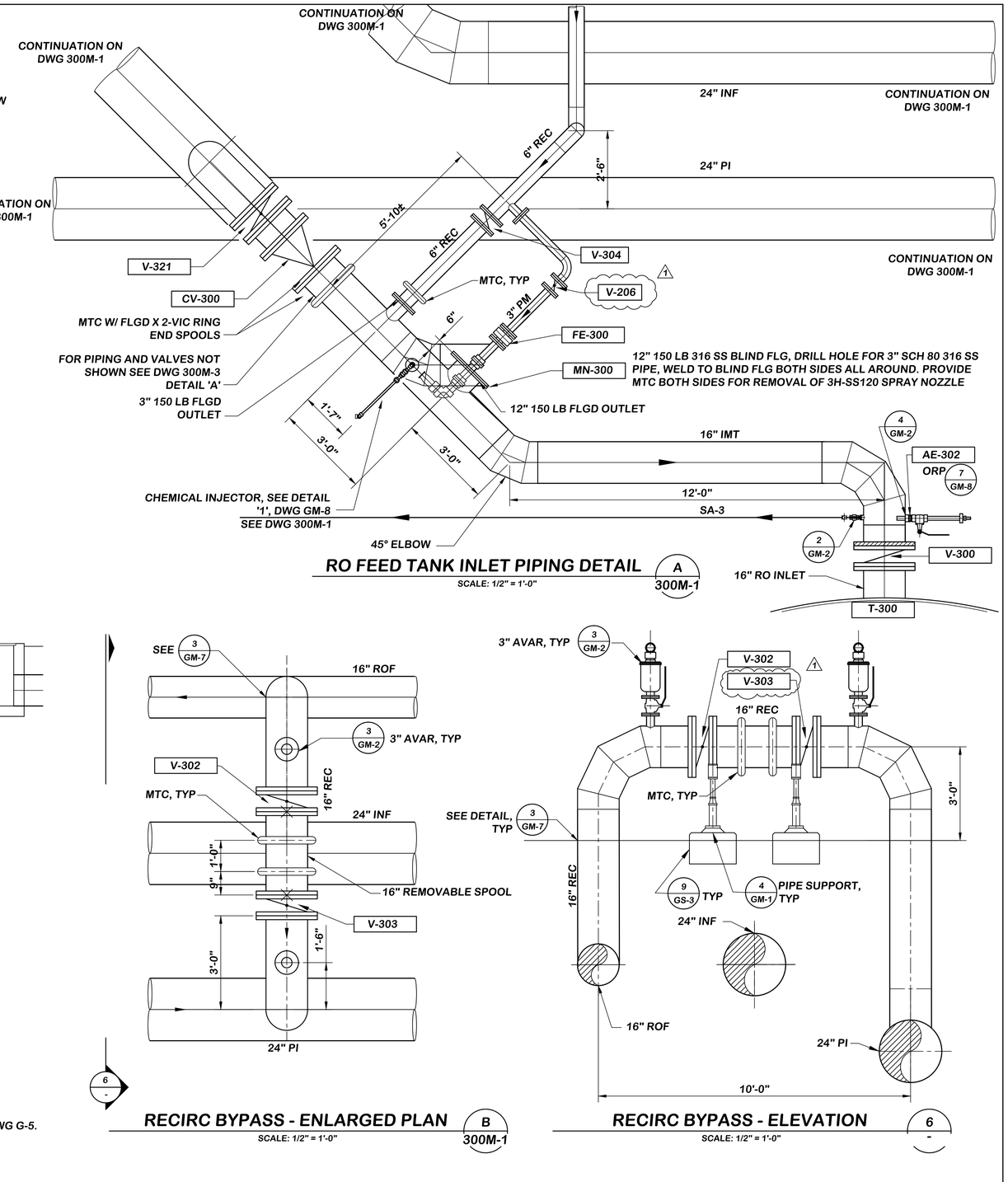
4 300M-1

SECTION

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

5 300M-1

*LINE 6" BWS WITH FBE PER SCHEDULE ON DWG G-5.



RO FEED TANK INLET PIPING DETAIL

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

A 300M-1

RECIRC BYPASS - ENLARGED PLAN

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

B 300M-1

RECIRC BYPASS - ELEVATION

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

6 -

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED CALLOUTS	06/18/19	IEC

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RLG
DRAWN BY RLG
CHECKED BY RK

Infrastructure ENGINEERING CORPORATION
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REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA

06/16/2017
DATE

FPUD Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 300 - RO FEED TANK AND BOOSTER PS - SECTIONS

DRAWING NO. 300M-3
SHEET NO. 128 OF 387
CLIENT JOB NO. 2744

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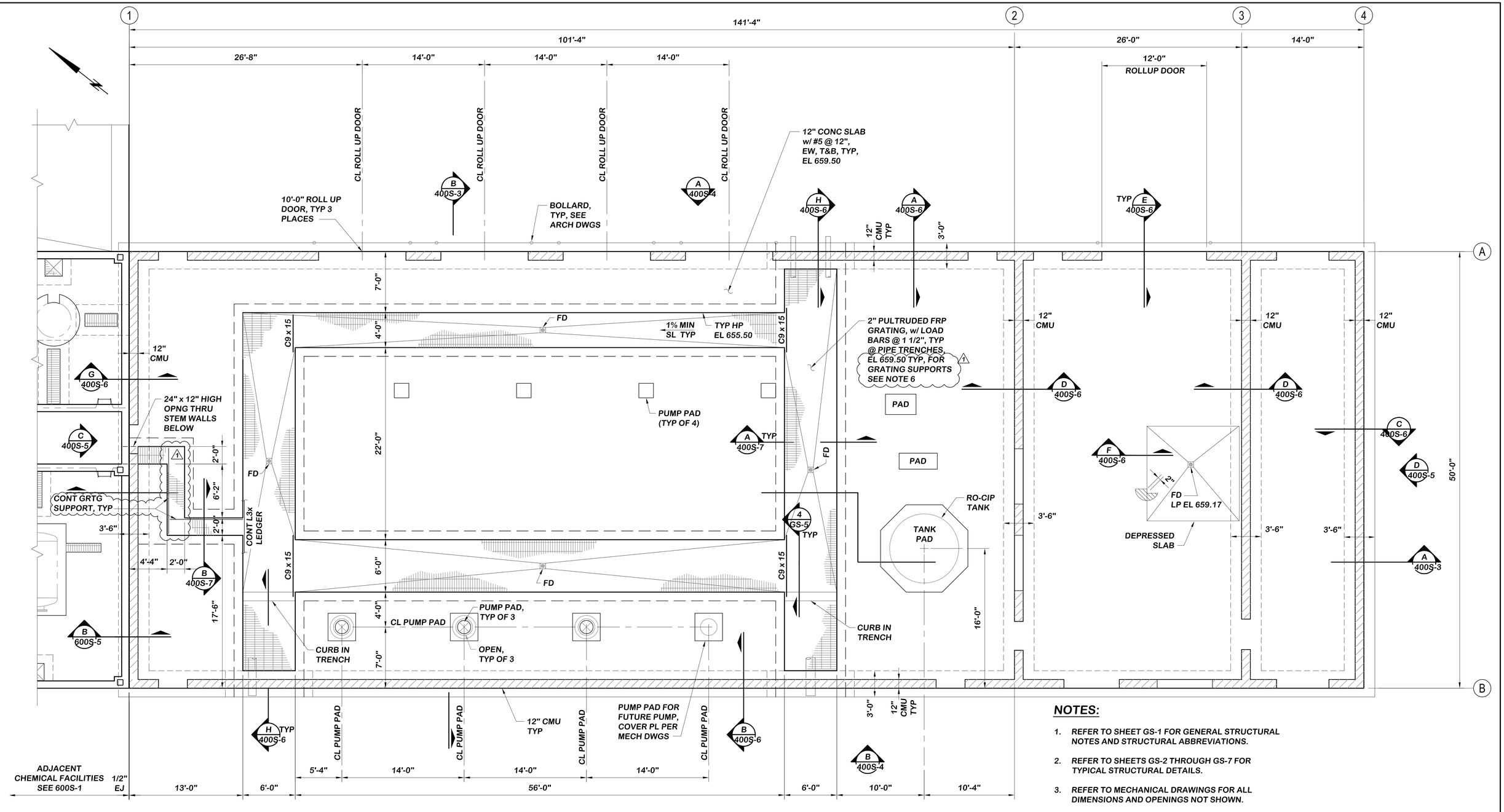

FOUNDATION PLAN

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

NOTES:

1. REFER TO SHEET GS-1 FOR GENERAL STRUCTURAL NOTES AND STRUCTURAL ABBREVIATIONS.
2. REFER TO SHEETS GS-2 THROUGH GS-7 FOR TYPICAL STRUCTURAL DETAILS.
3. REFER TO MECHANICAL DRAWINGS FOR ALL DIMENSIONS AND OPENINGS NOT SHOWN.
4. REFER TO MECHANICAL DRAWINGS FOR LOCATIONS OF PIPE PENETRATIONS AND RELATED OPENINGS.
5. FLOOR LIVE LOAD = 100PSF.
6. (1) FRP GRATING SUPPORT CHANNELS AND ANGLES SHALL BE 316 STAINLESS STEEL.

Beyaz & Patel
10920 Via Frontera, Ste 210
San Diego, California 92127
(858) 451-0374

ROBERT GERALD PROFESSIONAL ENGINEER — No. 4233 Exp. 6-30-17 — STRUCTURAL — STATE OF CALIFORNIA
06-19-17

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED GRATING SUPPORTS	06/25/19	B&P

SCALE	AS SHOWN
DATE	06/19/2017
PROJECT NO.	112.FPUD.0002
DESIGNED BY	HIW
DRAWN BY	JEN
CHECKED BY	SP

Infrastructure ENGINEERING CORPORATION
14271 Danielson Street
Poway, California 92064
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www.iecorporation.com

DATE

Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

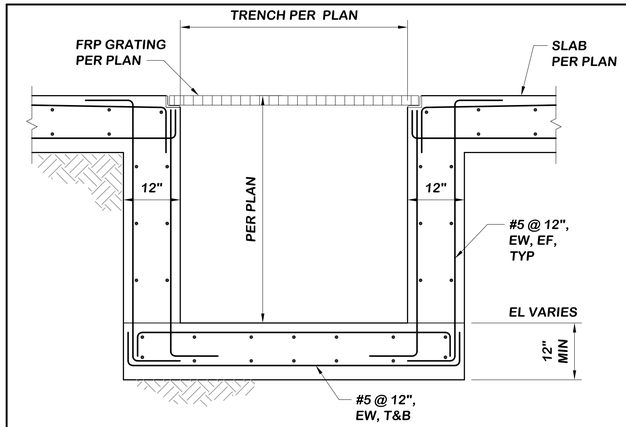
JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

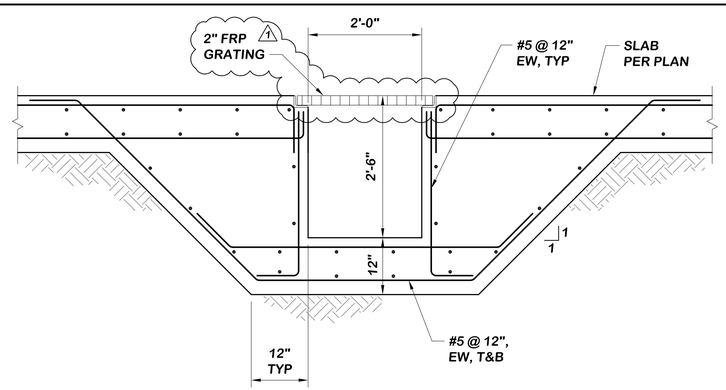
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 400 - RO BUILDING FOUNDATION PLAN

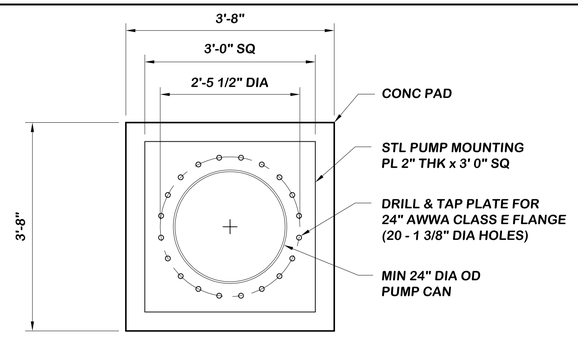
DRAWING NO. 400S-1
SHEET NO. 251 OF 387
CLIENT JOB NO. 2744



SECTION A — SCALE: 3/4" = 1'-0" — 400S-1



SECTION B — SCALE: 3/4" = 1'-0" — 400S-1

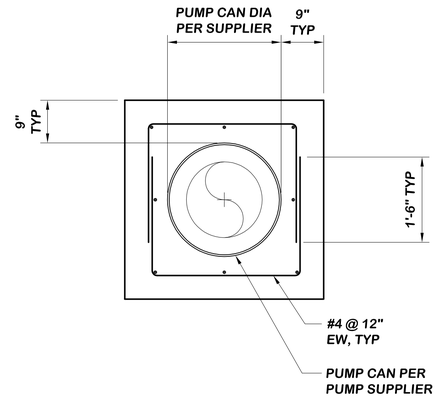


NOTES:

1. HOLES FOR BOLTS: DRILL & TAP TO STRADDLE CENTERLINE OF PLATE AS SHOWN.
2. STEEL PLATE SHALL BE CARBON STEEL CONFORMING TO ASTM A181, GRADE I.

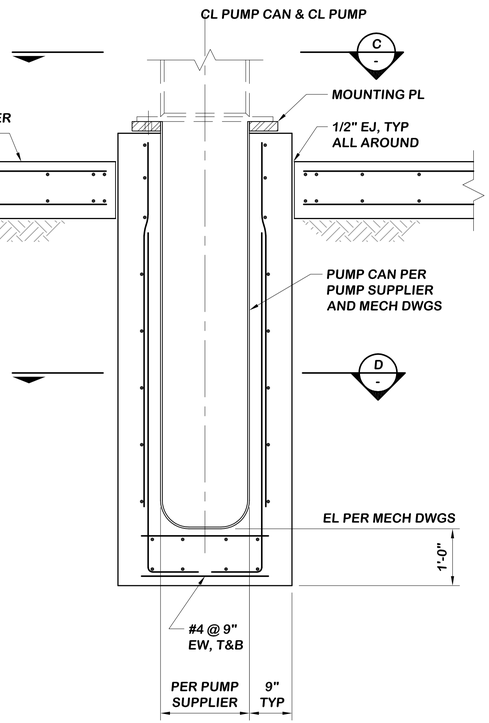
PUMP MOUNTING PLATE - PLAN VIEW

SECTION C — SCALE: 3/4" = 1'-0" — -



CONCRETE ENCASED PUMP CAN

SECTION D — SCALE: 3/4" = 1'-0" — -



PUMP MOUNTING & PUMP CAN SECTION

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

Beyaz & Patel
10920 Via Frontera, Ste 210
San Diego, California 92127
(858) 451-0374

REGISTERED PROFESSIONAL ENGINEER — ASHOKCHANDRA PATEL — No. 42133 Exp. 6-30-17 — STRUCTURAL — STATE OF CALIFORNIA

06-19-17

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED DETAIL	06/25/19	B&P

SCALE: AS SHOWN
DATE: 06/19/2017
PROJECT NO.: 112.FPUD.0002
DESIGNED BY: HIW
DRAWN BY: JEN
CHECKED BY: SP

Infrastructure ENGINEERING CORPORATION
14271 Danielson Street
Poway, California 92064
T 858.413.2400 F 858.413.2440
www.iecorporation.com

DATE

Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

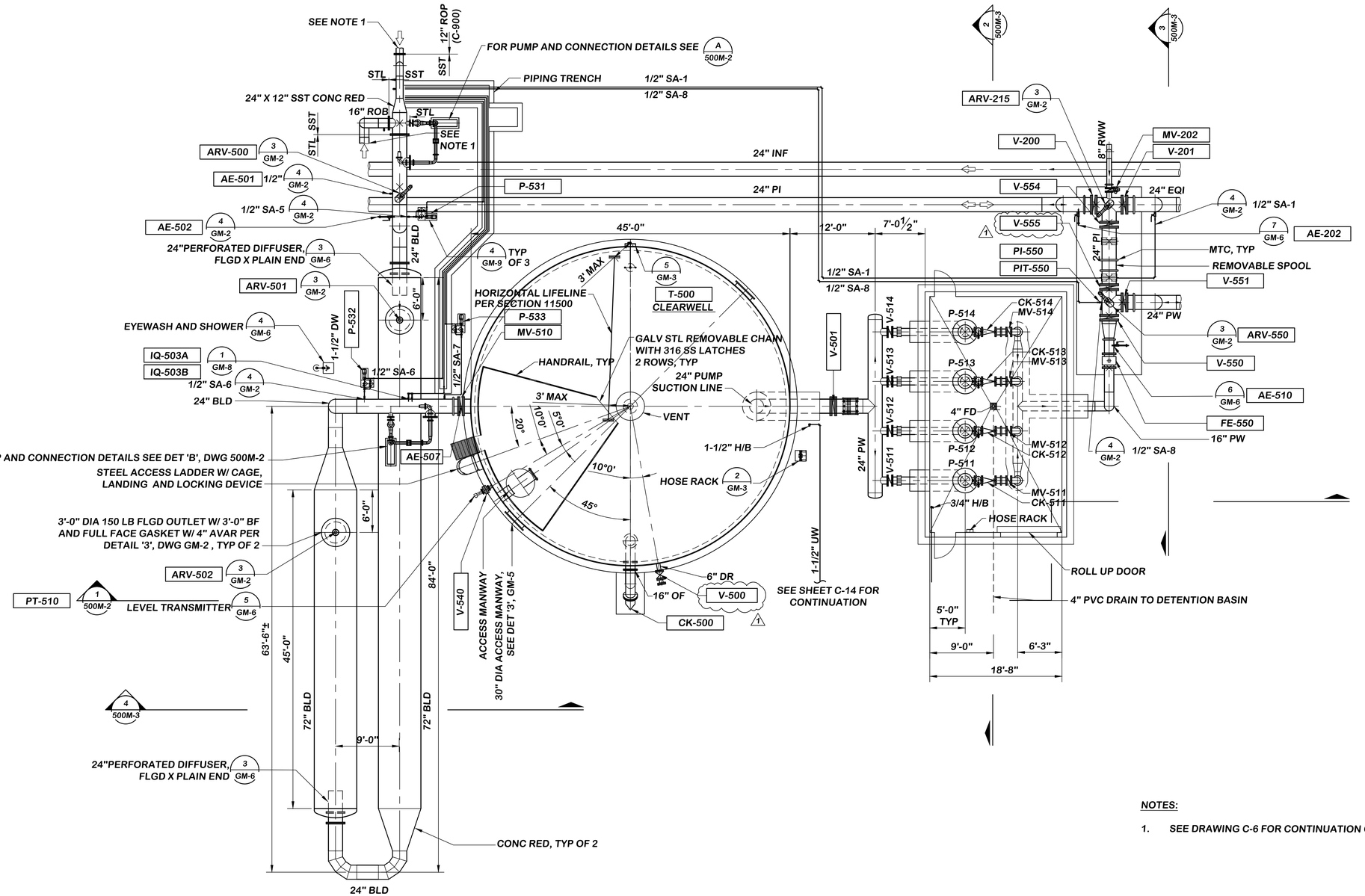
JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 400 - RO BUILDING SECTIONS AND DETAILS

DRAWING NO.: 400S-7
SHEET NO.: 257 OF 387
CLIENT JOB NO.: 2744



NOTES:

1. SEE DRAWING C-6 FOR CONTINUATION OF UNDERGROUND PIPING & FOR TRENCH PIPING.

CLEARWELL TANK AND PUMP STATION - PLAN

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

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED CALLOUTS	06/18/19	IEC

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RLG
DRAWN BY RLG
CHECKED BY RK

Infrastructure ENGINEERING CORPORATION
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www.iecorporation.com

REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA

06/16/2017
DATE

FPUD Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 500 - CLEARWELL TANK AND PS PLAN

DRAWING NO. 500M-1
SHEET NO. 180 OF 387
CLIENT JOB NO. 2744

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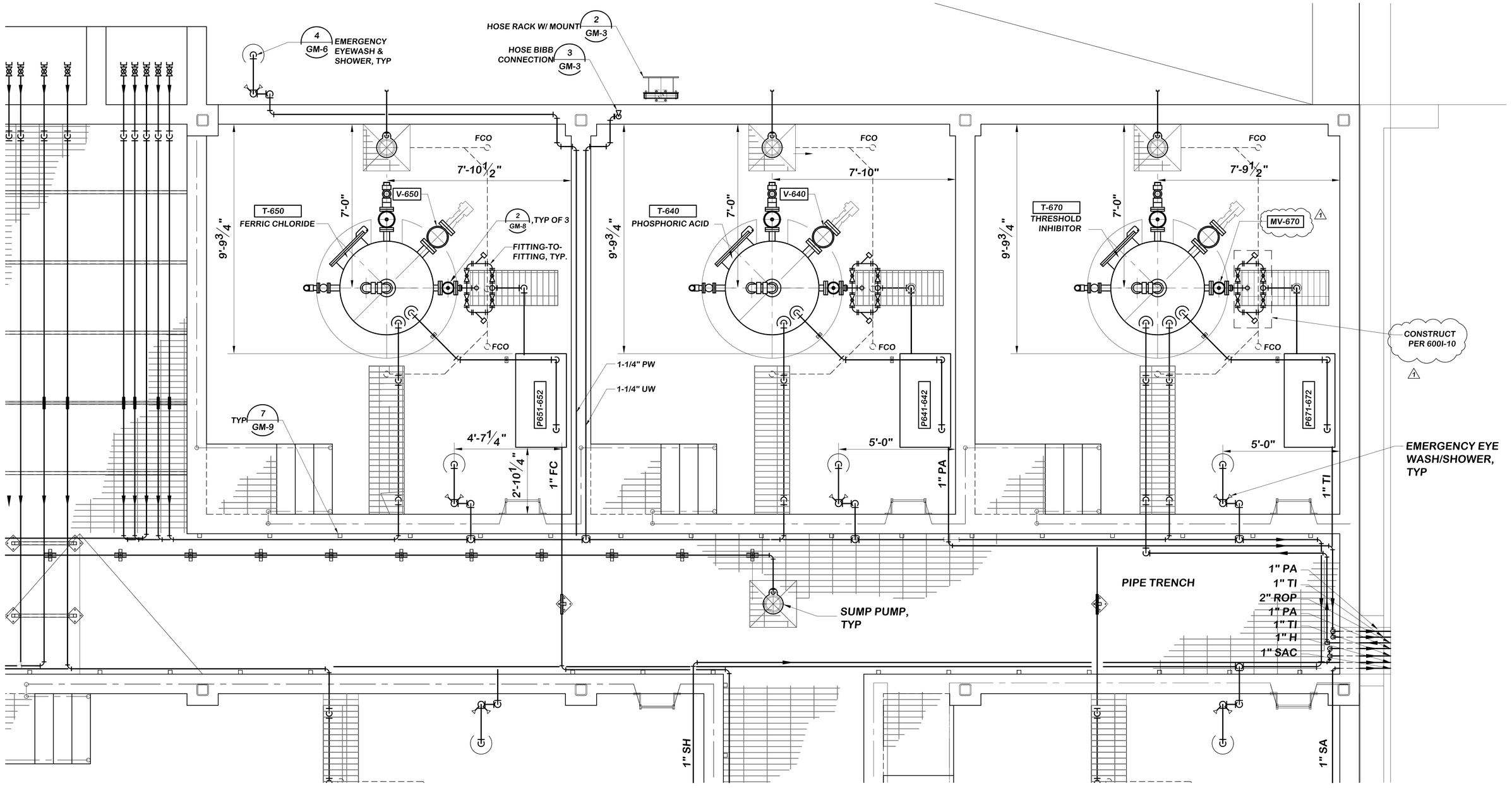

PARTIAL PLAN 2

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

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED CALLOUTS	06/18/19	IEC

SCALE 3/16" = 1'-0"
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RLG
DRAWN BY RLG
CHECKED BY RK

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REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA

06/16/2017
DATE

FRD Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

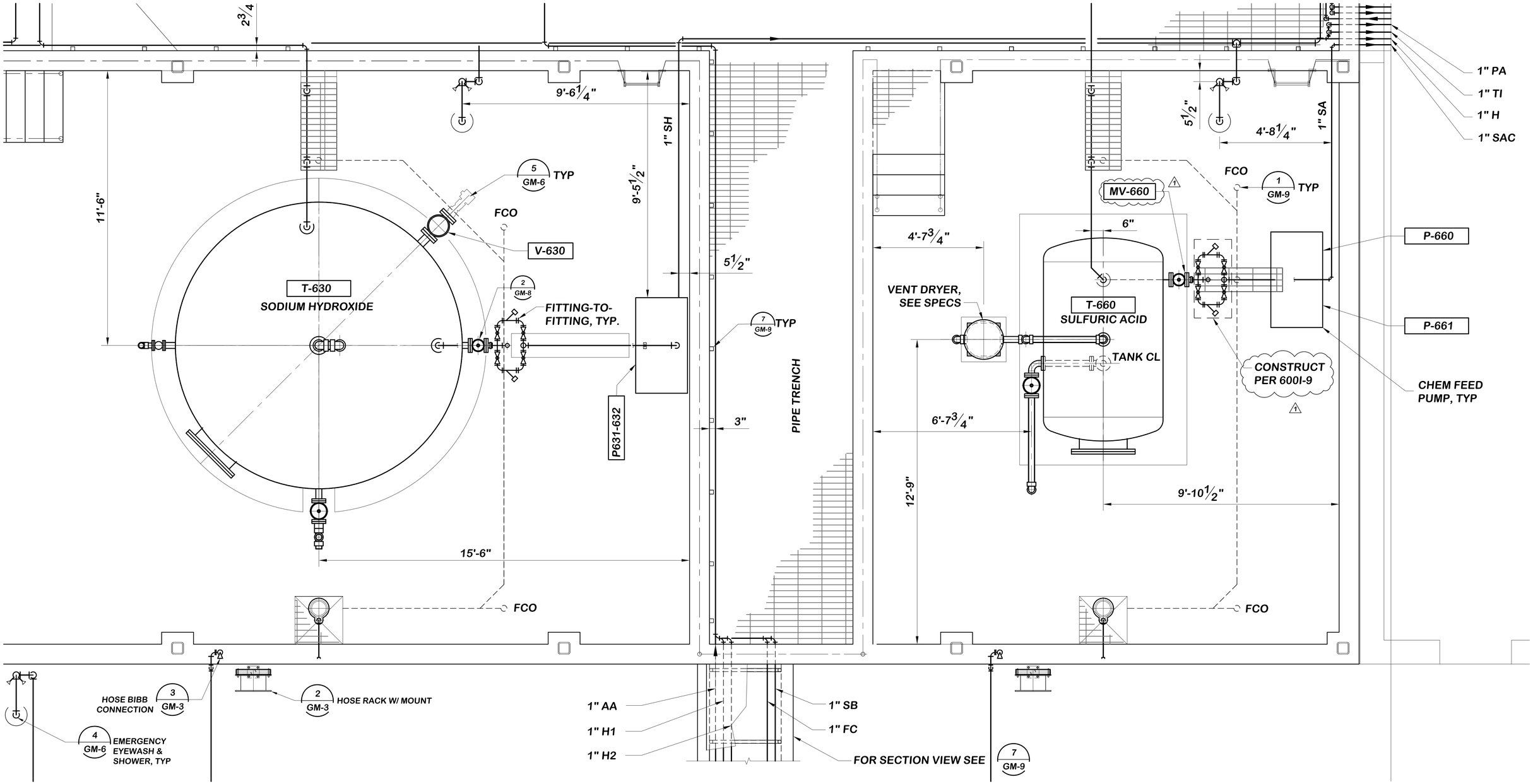
JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 600 - CHEMICAL FACILITIES PARTIAL PLANS

DRAWING NO. 600M-5
SHEET NO. 188 OF 387
CLIENT JOB NO. 2744



PARTIAL PLAN -4

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

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED CALLOUTS	06/18/19	IEC

SCALE 3/16" = 1'-0"
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RLG
DRAWN BY RLG
CHECKED BY RK

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REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 STATE OF CALIFORNIA CIVIL

06/16/2017
DATE

FPUD Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 600 - CHEMICAL FACILITIES PARTIAL PLANS

DRAWING NO. 600M-7
SHEET NO. 190 OF 387
CLIENT JOB NO. 2744

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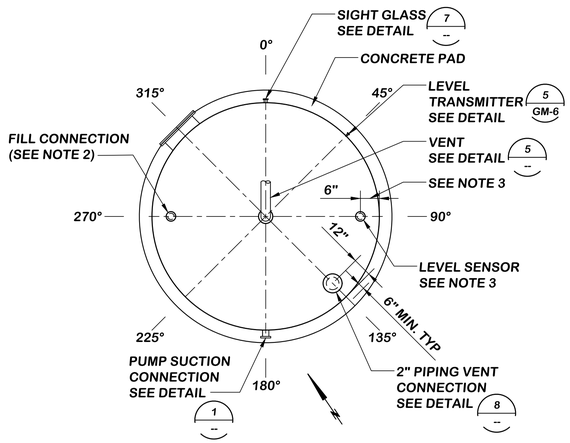


ELEVATION I

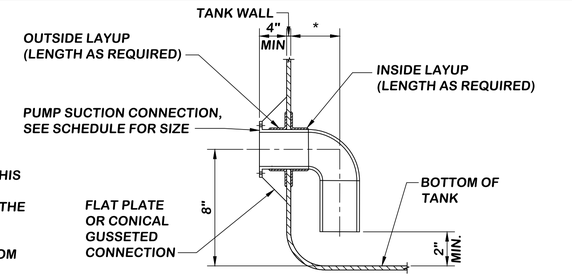
CHEMICAL STORAGE TANK ORIENTATION PLAN

NOTES:

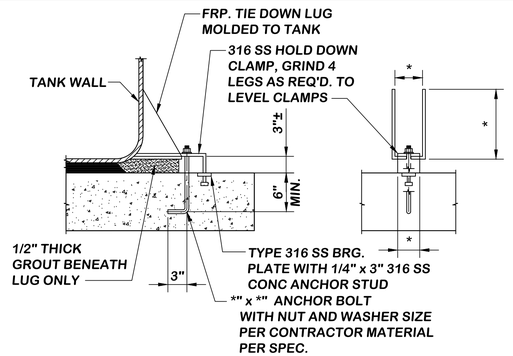
1. ELEVATION OF FULL DRAIN PIPE CL TO BE AT SAME ELEVATION AS TANK BOTTOM, SEE DETAIL THIS SHEET. DRAIN VALVE SHALL BE SIZED TO MATCH CONNECTION.
2. PROVIDE 4 - 1/2" DIA. OPENINGS IN THE SIDE OF THE FILL LINE INSIDE THE TANK AND 4" BELOW THE TOP OF THE TANK AT APPROXIMATELY 18O DEGREES APART. ORIENT OPENINGS AWAY FROM OVERFLOW CONNECTION.
3. AA LEVEL SENSOR TO BE ULTRASONIC TYPE AND MUST MAINTAIN A MIN OF 21" CLEARANCE FROM SIDE WALL OF TANK.
4. TANKS SHALL BE PLACARDED WITH HAZARD IDENTIFICATION SIGNS AS SPECIFIED IN UFC STANDARD 79-3 FOR THE SPECIFIC MATERIAL CONTAINED. [CFC/ UFC SS 8003.13]

Chemical Storage Tanks Schedule

Storge Tank Description	Capacity (gal)	Diameter (ft)	Shell Height (ft)	Material	Appurtenance Description, Position in Degrees and Reference Detail																												Remarks
					Vent Detail 5		Manway Detail 6		Discharge Detail 1		Sight Glass Detail 7		Overflow & Drain Elev 1		Fill Nozzle Elev 1		Vent Back to Tank Detail 8		Pressure Level Detail 5 on GM-6		Vapor Recovery		Ultrasonic Level		Pressure Relief Valve		Vacuum Relief Valve		Pressure Switch		Temp. Indication		
					Location Deg.	Size (in)	Location Deg.	Size (in)	Location Deg.	Size (in)	Location Deg.	Size (in)	Location Deg.	Size (in)	Location Deg.	Size (in)	Location Deg.	Size (in)	Location Deg.	Size (in)	Location Deg.	Size (in)	Location Deg.	Size (in)	Location Deg.	Size (in)	Location Deg.	Size (in)	Location Deg.	Size (in)	Location Deg.	Size (in)		
T-600 Sodium Hypochlorite	7,500	12	10	FRP	Center	4	225	24	90	2	315	2	180	3	0	2	90	2	45	4	N/A		N/A		N/A		N/A		N/A		N/A			
T-601 Sodium Hypochlorite	7,500	12	10	FRP	Center	4	225	24	90	2	315	2	180	3	0	2	90	2	45	4	N/A		N/A		N/A		N/A		N/A		N/A			
T-610 Sodium Bisulfite	1,000	6	6	FRP	Center	4	315	24	270	2	90	2	0	3	180	2	225	2	45	4	N/A		N/A		N/A		N/A		N/A		N/A			
T-620 Aqua Ammonia	500	3.5	9	SS	N/A		315	20	90	2	180	1-1/2	22	2	112	2	135	2	N/A		67	2	Centerd	3	225	3	270	4	45	1-1/4	45	1-1/4	No Overflow PRV discharge to 4" PVC run down the side of the tank to 8" above floor. VRV inlet has not additional piping. SG similar to Detail 8.
T-630 Sodium Hydroxide	9,000	12	14	FRP	Center	4	225	24	90	2	270	2	180	3	0	2	90	2	45	4	N/A		N/A		N/A		N/A		N/A		N/A			
T-640 Phosphoric Acid	500	4	6	FRP	Center	4	315	24	90	2	270	2	0	3	180	2	NA		45	4	N/A		N/A		N/A		N/A		N/A		N/A			
T-650 Ferric Chloride	400	4	6	FRP	Center	4	315	24	90	2	270	2	0	3	180	2	135	2	45	4	N/A		N/A		N/A		N/A		N/A		N/A			Top vent to be run down the side of the tank to 2'-0" above the floor.
T-660 Sulfuric Acid	1,200	5	6.5	Steel	Center	4	180	20	90	2	270	2	Bottom	2	Top	2	NA																	Horizontal bullet tank design
T-670 Threshold Inhibitor	565	4	6	FRP	Center	4	315	24	90	2	270	2	0	3	180	2	NA		45		N/A		N/A		N/A		N/A		N/A		N/A			Add'l nozzles - see FRP tank spec
T-680 Hydrofluorosilicic Acid	500	4	6	FRP	Center	4	315	24	270	2	90	2	0	3	135	2	180	2	45	4	N/A		N/A		N/A		N/A		N/A		N/A			



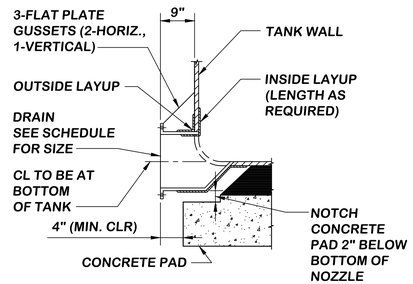
DISCHARGE CONNECTION DETAIL 1



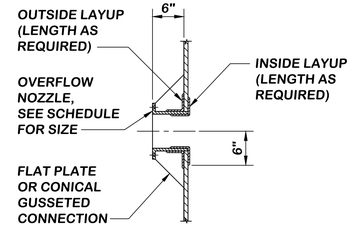
NOTE:

1. LOCATION OF TIE DOWN LUGS TO BE DETERMINED BY MANUFACTURER.

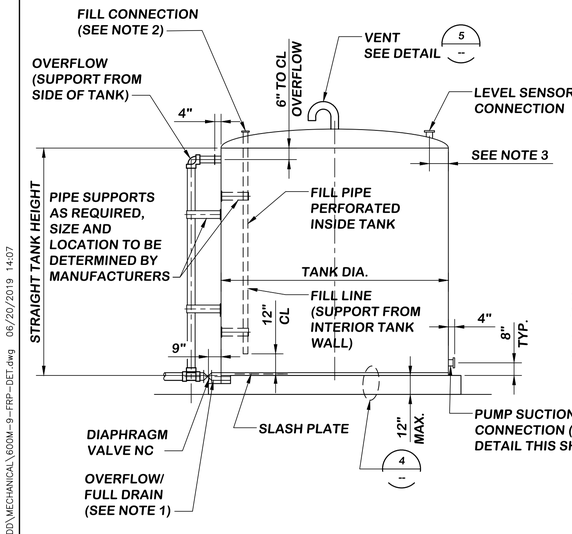
FIBERGLASS TANK TIE DOWN LUG AND CLIP DETAIL 4



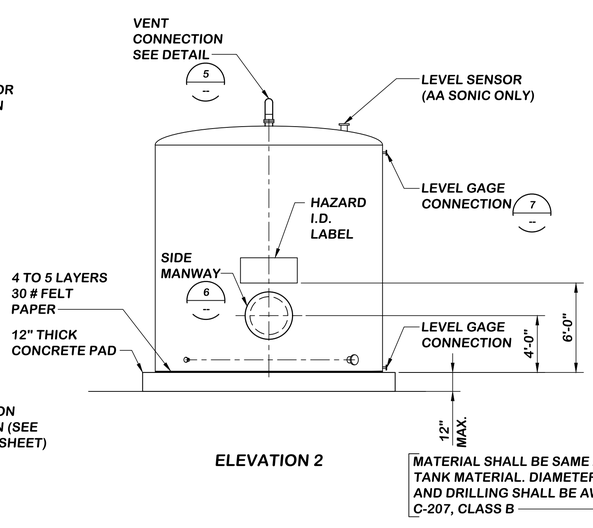
DRAIN CONNECTION DETAIL 2



TYPICAL NOZZLE DETAIL 3



ELEVATION 1

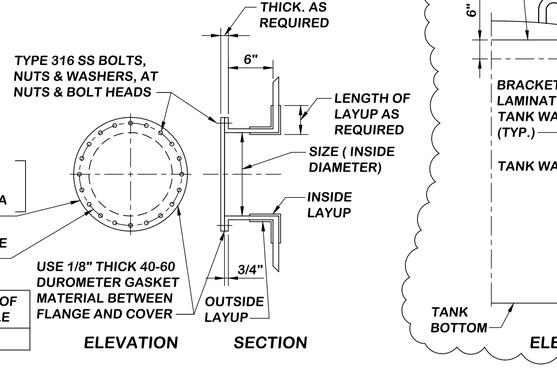


ELEVATION 2

GENERAL NOTES:

A. BOLTS FOR FRP/ PVC/ CPVC PIPE FLANGES SHALL BE 3016 SS.
B. SEE SCHEDULE ABOVE FOR CORRECT ORIENTATION.

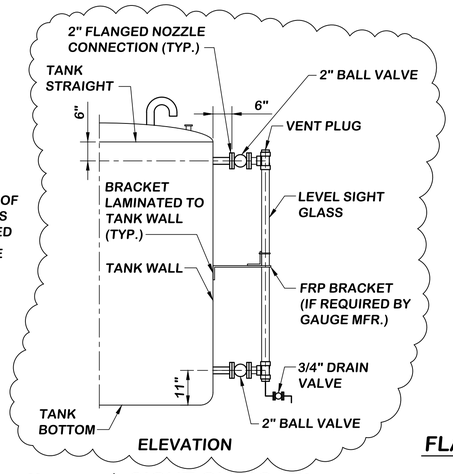
TYPICAL TANK ARRANGEMENT ELEVATIONS



ELEVATION SECTION

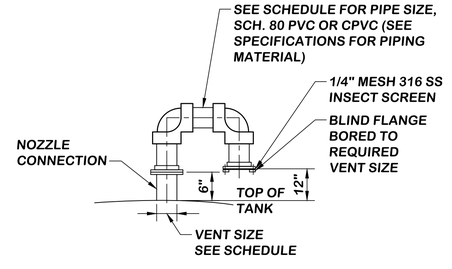
SIZE	DIAMETER OF FLANGE	DIAMETER OF BOLT CIRCLE	DIAMETER OF BOLTS	DIAMETER OF BOLT HOLE
24"	32"	29 1/2"	7/8"	1"

FIBERGLASS TANK MANWAY DETAIL 6

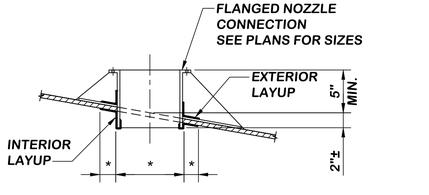


ELEVATION

⚠1 SIGHT GLASS DETAIL 7



TANK VENT DETAIL 5



FLANGED CONNECTION TANK DETAIL 8

NO.	DESCRIPTION	DATE	APPROVED
⚠1	REVISED SIGHT GLASS DETAIL	06/18/19	IEC

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RLG
DRAWN BY RLG
CHECKED BY RK

Infrastructure ENGINEERING CORPORATION
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REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA

06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 600 - CHEMICAL TANK AND FRP TANK DETAILS APPURTENANCE LOCATIONS

DRAWING NO. 600M-9
SHEET NO. 192 OF 387
CLIENT JOB NO. 2744

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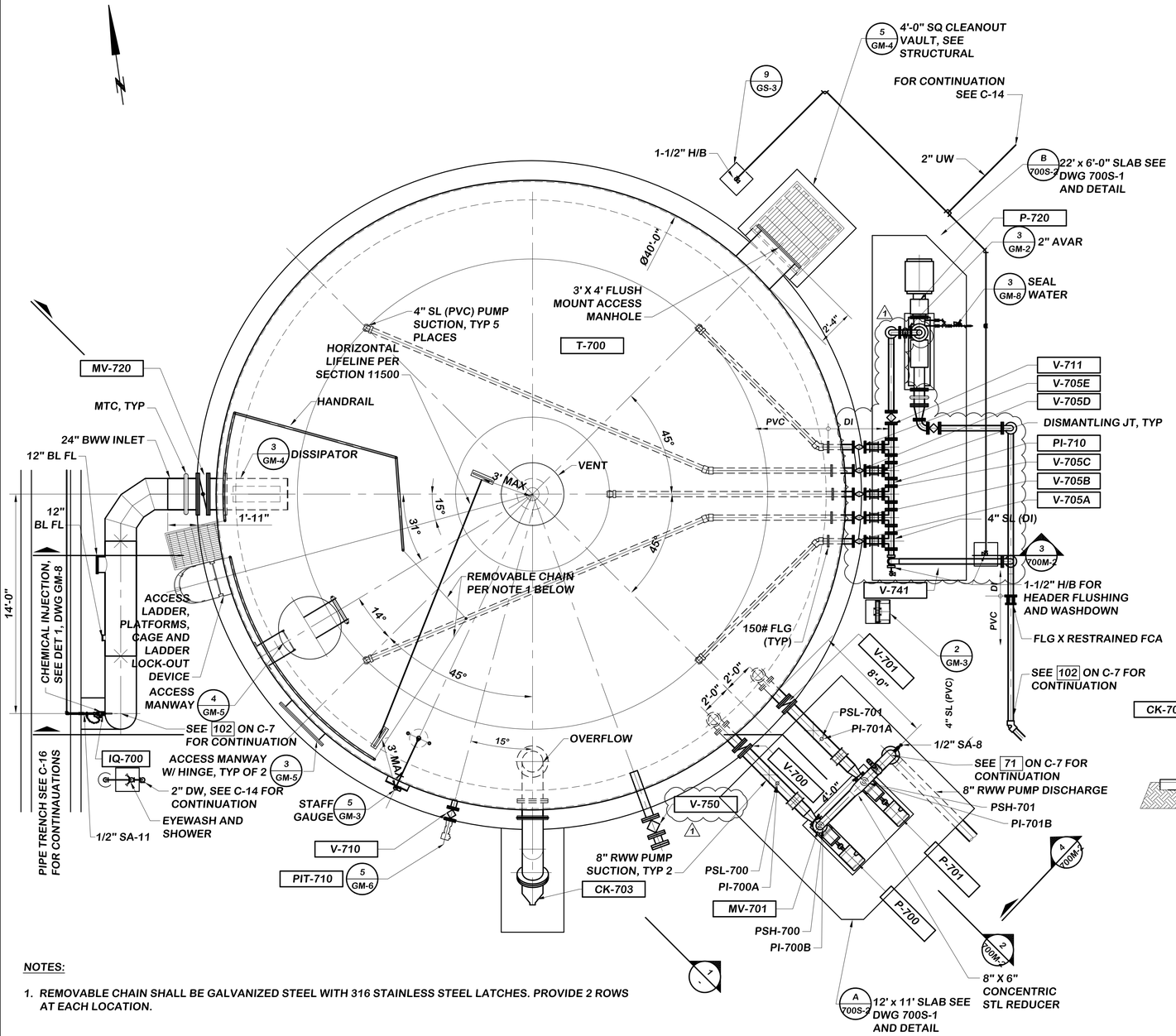

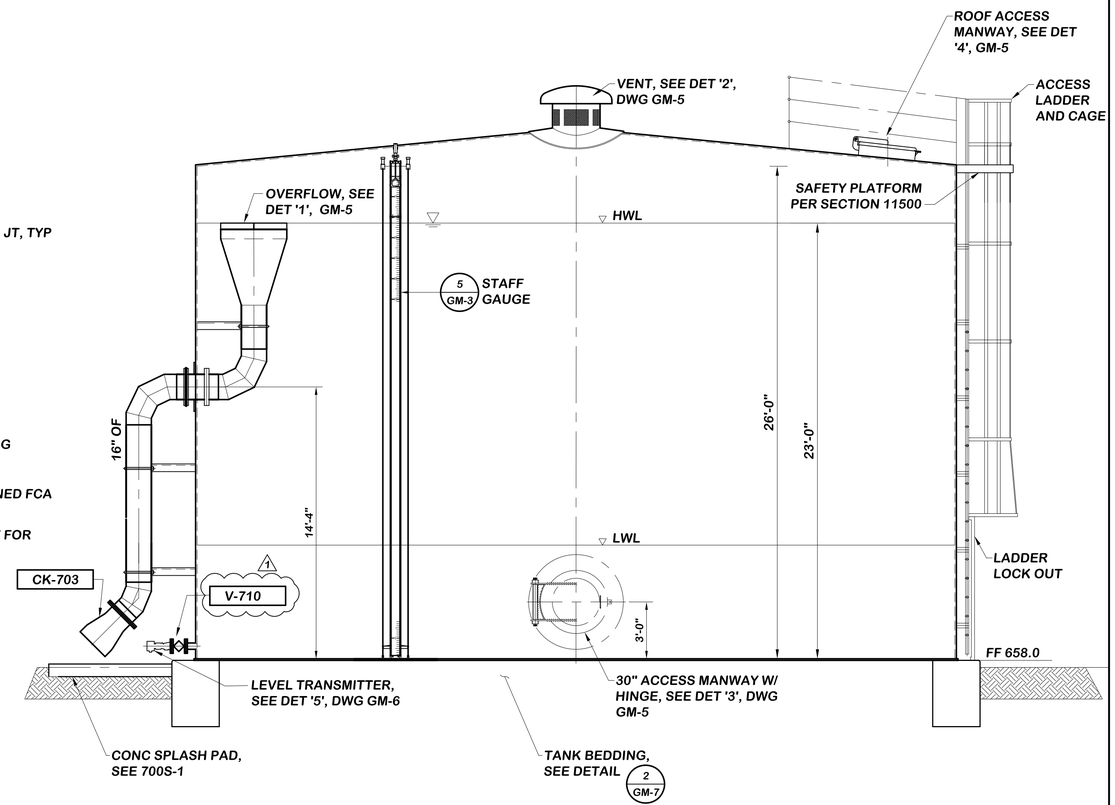

NOTES:

1. REMOVABLE CHAIN SHALL BE GALVANIZED STEEL WITH 316 STAINLESS STEEL LATCHES. PROVIDE 2 ROWS AT EACH LOCATION.

160,000 GAL WWW RECOVERY TANK - PLAN

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

SECTION 1 -

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

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED SL PIPING AND VALVE TAGS	06/18/19	IEC

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RM
DRAWN BY RLG
CHECKED BY RK

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06/16/2017
DATE

FPUD Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 700 - WASTE WASHWATER STORAGE PLAN AND SECTION

DRAWING NO. 700M-1
SHEET NO. 194 OF 387
CLIENT JOB NO. 2744

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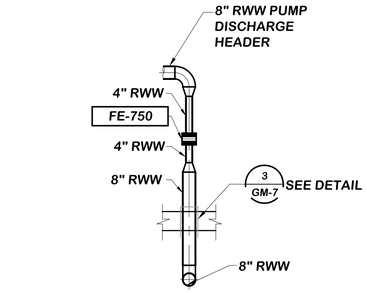
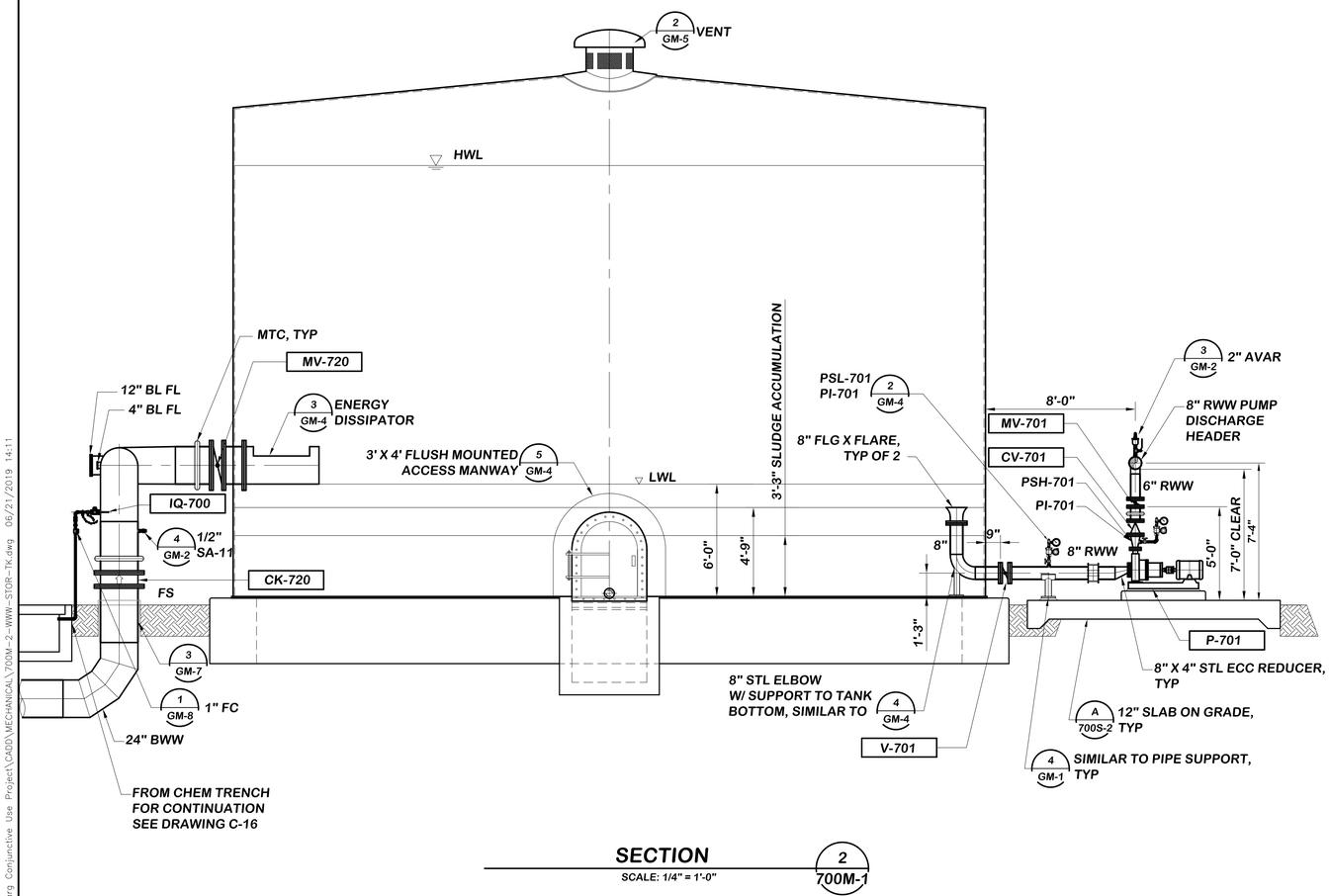
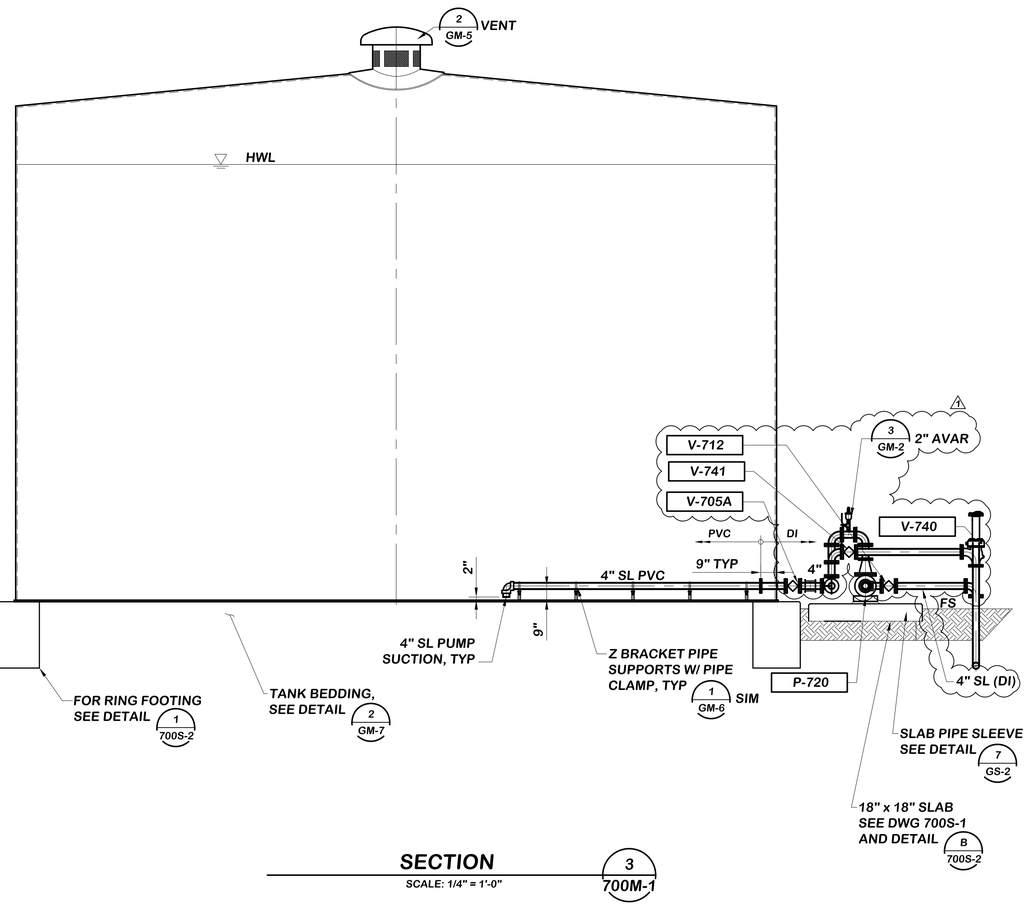


SECTION 4 / 700M-1
SCALE: 1/4" = 1'-0"



SECTION 2 / 700M-1
SCALE: 1/4" = 1'-0"



SECTION 3 / 700M-1
SCALE: 1/4" = 1'-0"

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED SL PIPING	06/18/19	IEC

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RM
DRAWN BY RLG
CHECKED BY RK

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REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C62681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA

06/16/2017
DATE

Fallbrook Public Utility District

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

990 E. MISSION RD
FALLBROOK, CA 92028

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 700 - WASTE WASHWATER STORAGE PLAN AND SECTION

DRAWING NO. 700M-2
SHEET NO. 195 OF 387
CLIENT JOB NO. 2744

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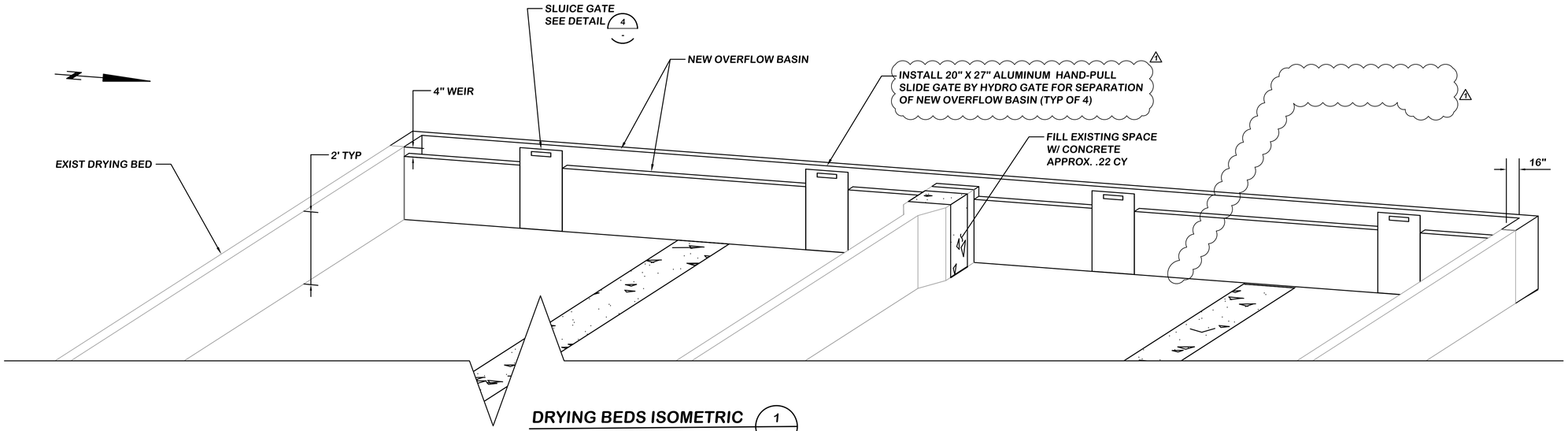
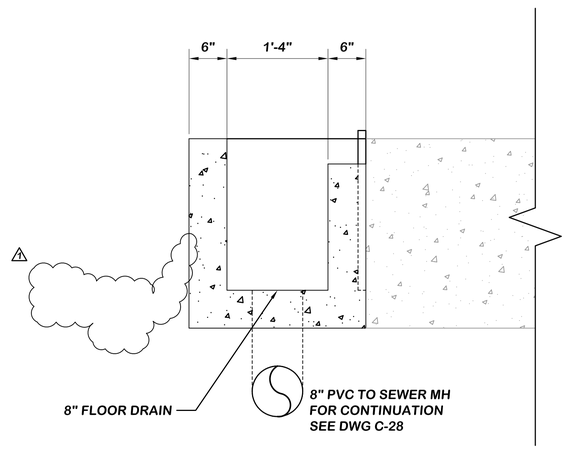


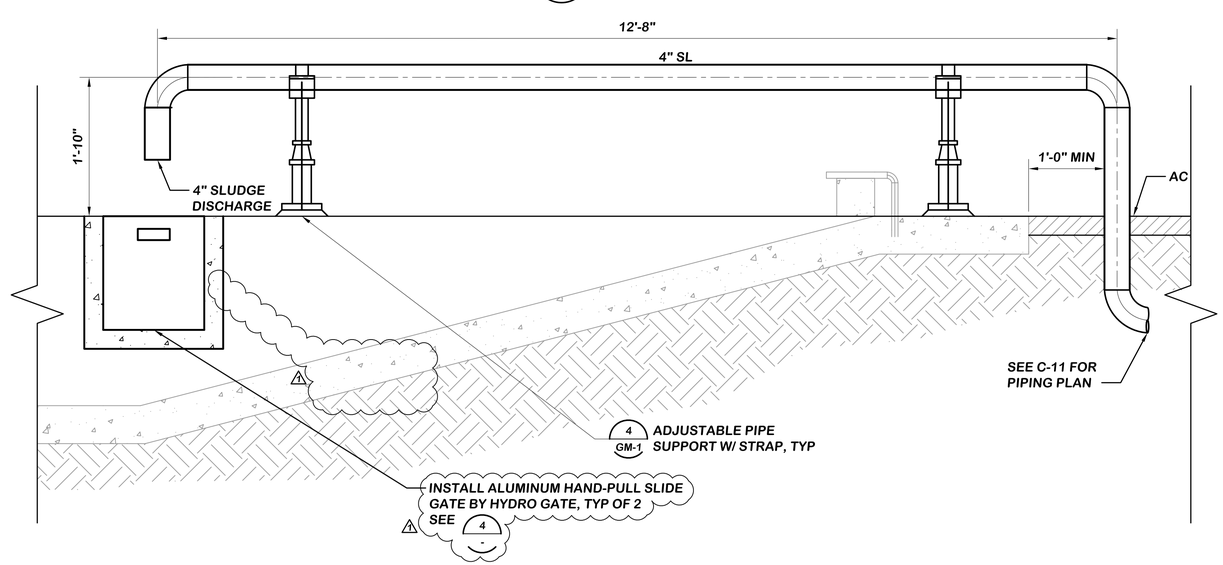
DRYING BEDS ISOMETRIC 1

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



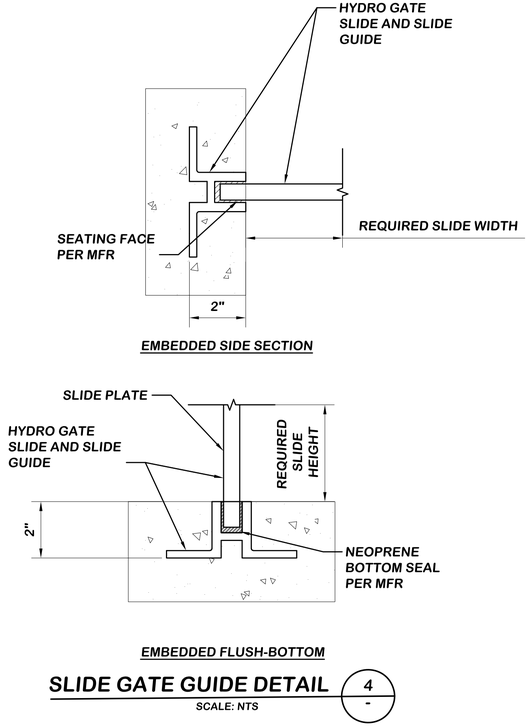
OVERFLOW AND DRAIN 2

SCALE: 1" = 1'-0"



SLUDGE DISCHARGE 3

SCALE: 1" = 1'-0"



SLIDE GATE GUIDE DETAIL 4

SCALE: NTS

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED CALLOUTS	06/11/19	IEC

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RM
DRAWN BY RM
CHECKED BY RK

Infrastructure ENGINEERING CORPORATION
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REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA

06/16/2017
DATE

FRD Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 700 -DRYING BED MODIFICATIONS ISOMETRIC AND SECTIONS

DRAWING NO. 700M-4
SHEET NO. 197 OF 387
CLIENT JOB NO. 2744

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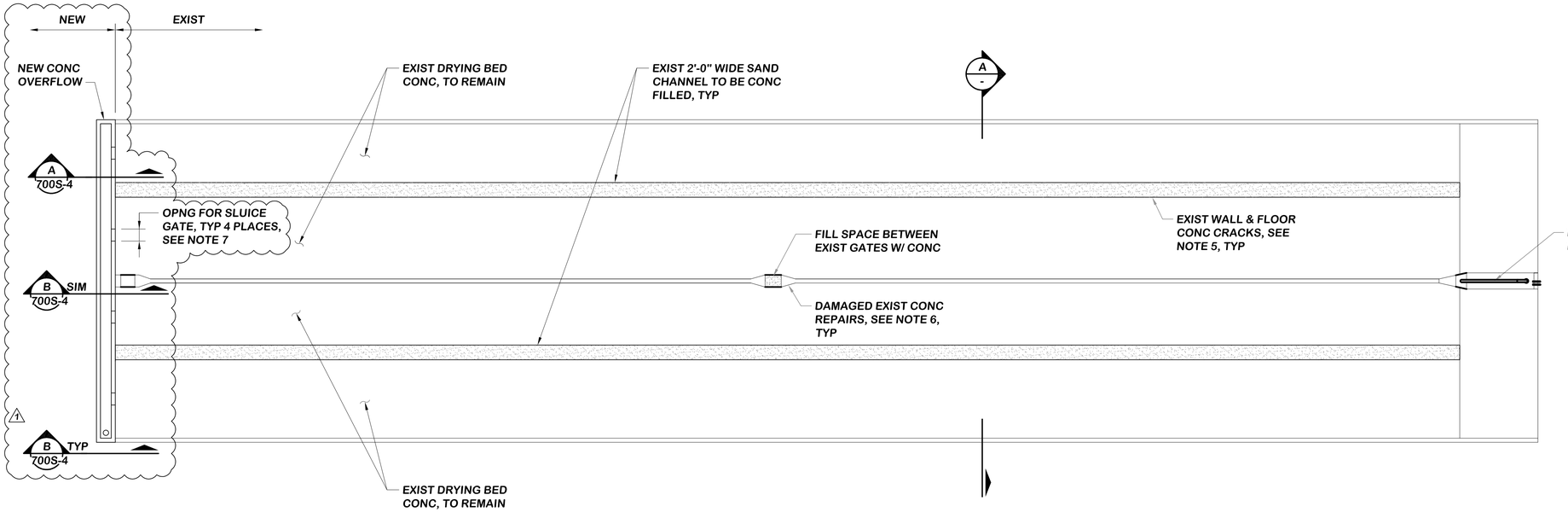
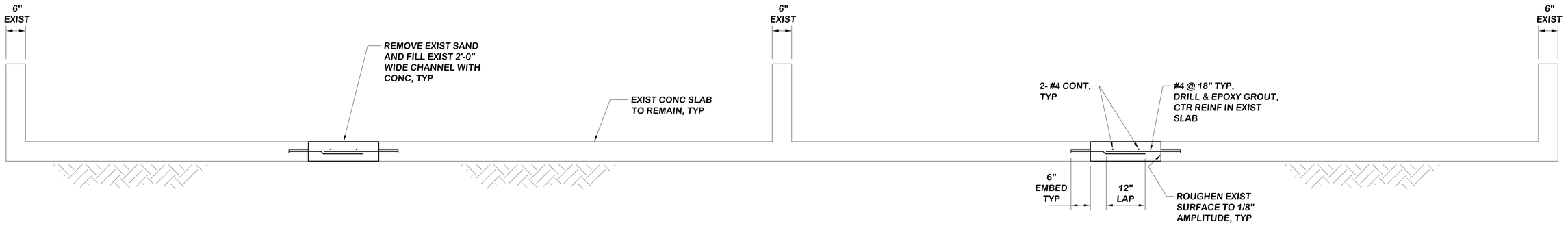


DRYING BEDS - PLAN

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

NOTES:

1. REFER TO SHEET GS-1 FOR GENERAL STRUCTURAL NOTES AND STRUCTURAL ABBREVIATIONS.
2. REFER TO SHEETS GS-2 THROUGH GS-7 FOR TYPICAL STRUCTURAL DETAILS.
3. REFER TO MECHANICAL DRAWINGS FOR ALL DIMENSIONS AND OPENINGS NOT SHOWN.
4. REFER TO MECHANICAL DRAWINGS FOR LOCATIONS OF PIPE PENETRATIONS AND RELATED OPENINGS.
5. REPAIR CRACKS AS SHOWN ON 700M-5 AND PER 1 / 700S-4
6. REPAIR EXISTING CONCRETE WALLS AT LOCATIONS SHOWN ON A/ 700M-5 AND G/ 700M-5. SEE CONCRETE REPAIR NOTES ON 2 / 700S-4
7. SLUICE GATE OPENINGS AT 4 PLACES PER 700M-4.



SECTION

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

A -

Beyaz & Patel
10920 Via Frontera, Ste 210
San Diego, California 92127
(858) 451-0374

REGISTERED PROFESSIONAL ENGINEER — BHASKARCHANDRA PATEL — No. 42333 — Exp. 6-30-17 — STRUCTURAL — STATE OF CALIFORNIA

06-19-17

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED OVERFLOW PLAN	06/25/19	B&P

SCALE: AS SHOWN
DATE: 06/19/2017
PROJECT NO.: 112.FPUD.0002
DESIGNED BY: HIW
DRAWN BY: JEN
CHECKED BY: SP

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DATE

Fallbrook Public Utility District

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FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 700 - DRYING BED MODIFICATIONS PLAN AND SECTION

DRAWING NO. 700S-3
SHEET NO. 283 OF 387
CLIENT JOB NO. 2744

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CRACK REPAIR TABLE:		
CRACK	REPAIR:	
WIDE	TYPE A*	
FINE TO MED	TYPE B*	
MED TO WIDE	TYPE B*	
MED TO WIDE	TYPE B*	
FINE TO MED	TYPE B*	

* SEE CRACK REPAIRS BELOW FOR PRODUCT AND APPLICATION.

CRACK TYPES:

1. HAIRLINE CRACKS WIDTH LESS THAN 0.004" (NO REPAIRS NECESSARY)
2. FINE CRACKS: WIDTH 0.004" TO 0.04"
3. MEDIUM CRACKS: WIDTH 0.04" TO 0.08"
4. WIDE CRACKS: WIDTH GREATER THAN 0.08"

CRACK REPAIRS:

TYPE A: SIKAFLEX-2c NS EZ CRACK FILLER BY SIKA CORPORATION OR EQUAL

1. CHASE CRACK WITH A "V" SHAPED BLADE FOR A GROOVE 1/2" x 1/2" DEEP ALONG THE LENGTH OF THE EXISTING WIDE CRACK. PREPARE SUBSTRATE PER MANUFACTURER'S INSTRUCTIONS.
2. APPLY BOND BREAKER TAPE IN BOTTOM 1/4" OF "V" GROOVE.
3. FILL GROOVE WITH SIKAFLEX-2c NS EZ PER MANUFACTURER'S INSTRUCTIONS.

TYPE B: SIKADUR 35 HI-MOD LV BY SIKA CORPORATION OR EQUAL

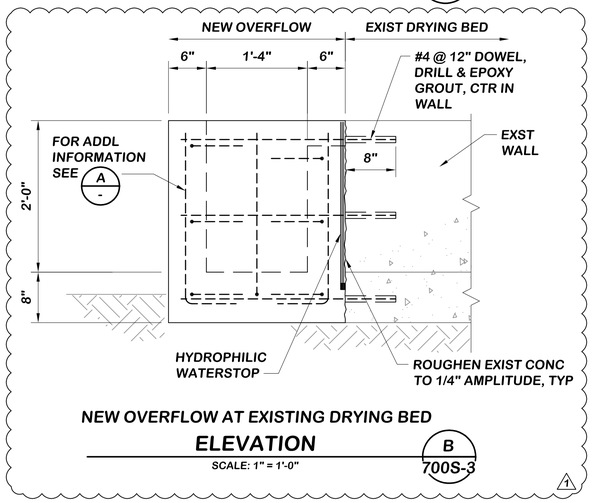
1. CLEAN AND PREPARE SURFACES PER MANUFACTURER'S INSTRUCTIONS.
2. PRESSURE INJECT CRACKS PER MANUFACTURER'S INSTRUCTIONS.

CONCRETE CRACK REPAIRS
DETAIL 1 / 700S-3
NTS

SEQUENCE OF REPAIR FOR DAMAGED CONCRETE:

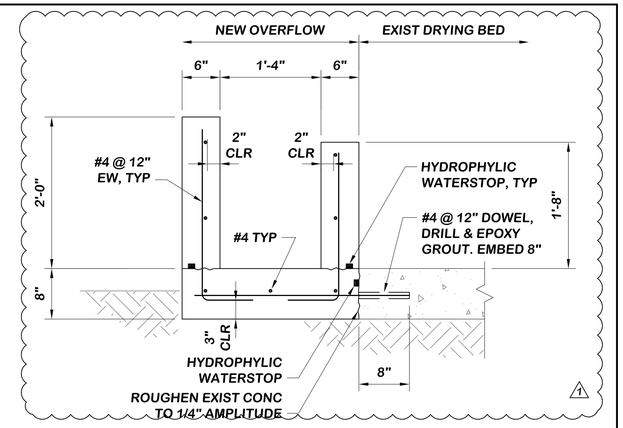
1. REMOVE LOOSE CONCRETE.
2. SAWCUT PERIMETER 1/2" MAXIMUM.
3. SANDBLAST ANY CORRODED REBAR.
4. CHIP CONCRETE SUBSTRATE TO 1/8" AMPLITUDE.
5. APPLY EPOXY BONDING AGENT.
6. REPAIR WITH "SIKATOP III".

DAMAGED CONCRETE REPAIR
DETAIL 2 / 700S-3
NTS



NEW OVERFLOW AT EXISTING DRYING BED
ELEVATION B / 700S-3
SCALE: 1" = 1'-0"

NOT USED
DETAIL 3 / 700S-3
NTS



NEW OVERFLOW AT EXISTING DRYING BED
SECTION A / 700S-3
SCALE: 1" = 1'-0"

Beyaz & Patel
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(858) 451-0374

REGISTERED PROFESSIONAL ENGINEER — RAMASHCHANDRA PATEL — No. 42333 — Exp. 6-30-17 — STRUCTURAL — STATE OF CALIFORNIA

06-19-17

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED DETAIL	06/25/19	B&P

SCALE AS SHOWN
DATE 06/19/2017
PROJECT NO. 112.FPUD.0002
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CHECKED BY SP

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DATE

Fallbrook Public Utility District
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APPROVED BY:

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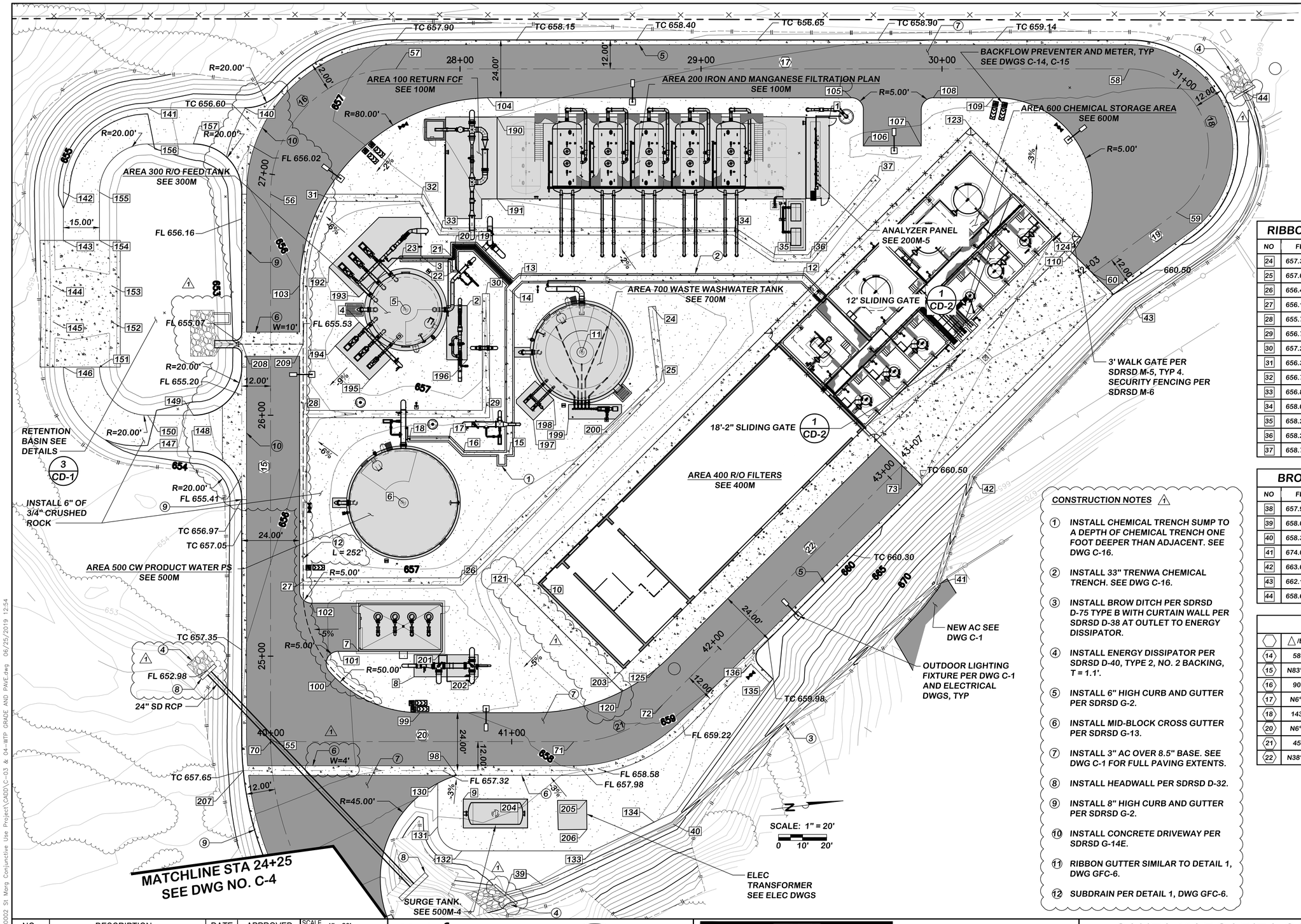
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 700 - DRYING BED MODIFICATIONS SECTIONS AND DETAILS

DRAWING NO. 700S-4
SHEET NO. 284 OF 387
CLIENT JOB NO. 2744



STRUCTURES TABLE

NO	FG	NORTHING	EASTING	DESCRIPTION
1	658.830	2077104.37	6252861.98	CORNER SAMPLE PANEL PAD
2	657.667	2076945.76	6252921.98	CORNER RO BYPASS PAD
3	657.670	2076929.15	6252899.22	CORNER RO PAD
4	657.670	2076900.47	6252923.43	CORNER RO PAD
5	657.670	2076920.21	6252920.62	CENTER RO TANK
6	657.670	2076909.82	6253000.12	CENTER CW TANK
7	657.500	2076884.17	6253059.13	CORNER CW PS PAD
8	657.499	2076905.71	6253072.35	CORNER CW PS PAD
9	659.000	2076920.02	6253125.15	CORNER SURGE TANK PAD
10	659.500	2076961.44	6253040.02	CORNER BUILDING PAD
11	657.670	2076990.67	6252946.83	CENTER STORAGE TANK

RIBBON GUTTER TABLE

NO	FL	NORTHING	EASTING
24	657.375	2077021.84	6252931.42
25	657.046	2077021.84	6252962.50
26	656.461	2076929.43	6253035.23
27	656.123	2076864.69	6253027.62
28	655.704	2076872.89	6252958.63
29	656.752	2076947.78	6252967.38
30	657.200	2076954.10	6252917.95
31	656.330	2076893.50	6252870.69
32	656.751	2076932.22	6252875.29
33	656.848	2076938.59	6252890.14
34	658.067	2077059.41	6252904.46
35	658.208	2077074.45	6252917.22
36	658.283	2077089.46	6252918.93
37	658.700	2077121.18	6252889.11

CHEMICAL TRENCH TABLE

NO	FG	NORTHING	EASTING
12	659.091	2077085.22	6252927.21
13	657.504	2076969.02	6252913.51
14	657.489	2076963.95	6252917.44
15	657.287	2076955.75	6252984.93
16	657.463	2076937.05	6252982.78
17	657.533	2076931.72	6252976.12
18	657.663	2076915.50	6252974.20
19	657.558	2076951.69	6252898.16
20	657.590	2076943.43	6252897.14
21	657.602	2076942.79	6252902.25
22	657.618	2076942.21	6252906.83
23	657.668	2076921.07	6252899.52

NOTE: FG ELEVATION AT TOP OF CHEMICAL TRENCH

BROW DITCH TABLE

NO	FL	NORTHING	EASTING
38	657.930	2076932.44	6253166.86
39	658.030	2076948.58	6253164.48
40	658.380	2077005.27	6253145.74
41	674.070	2077125.51	6253059.97
42	663.000	2077145.46	6253016.89
43	662.150	2077220.75	6252954.93
44	658.670	2077275.93	6252871.77

ACCESS ROAD DATA TABLE

	△/BEARING	R	L	T	DESCRIPTION	BEGIN STA
14	58° 39' 45"	124.00'	126.96'	69.67'	ACCESS RD	23+38.60
15	N83° 13' 26"W		226.20'		ACCESS RD	24+65.55
16	90° 00' 00"	52.00'	81.68'	52.00'	ACCESS RD	26+91.76
17	N6° 46' 34"E		304.19'		ACCESS RD	27+73.44
18	143° 39' 56"	33.00'	82.75'	100.56'	ACCESS RD	30+77.63
20	N6° 46' 34"E		125.74'		ACCESS RD	40+00.00
21	45° 01' 12"	52.00'	40.86'	21.55'	ACCESS RD	41+25.74
22	N38° 14' 38"W		140.55'		ACCESS RD	41+66.60

CONSTRUCTION NOTES △1

1. INSTALL CHEMICAL TRENCH SUMP TO A DEPTH OF CHEMICAL TRENCH ONE FOOT DEEPER THAN ADJACENT. SEE DWG C-16.
2. INSTALL 33" TRENWA CHEMICAL TRENCH. SEE DWG C-16.
3. INSTALL BROW DITCH PER SDRSD D-75 TYPE B WITH CURTAIN WALL PER SDRSD D-38 AT OUTLET TO ENERGY DISSIPATOR.
4. INSTALL ENERGY DISSIPATOR PER SDRSD D-40, TYPE 2, NO. 2 BACKING, T = 1.1'.
5. INSTALL 6" HIGH CURB AND GUTTER PER SDRSD G-2.
6. INSTALL MID-BLOCK CROSS GUTTER PER SDRSD G-13.
7. INSTALL 3" AC OVER 8.5" BASE. SEE DWG C-1 FOR FULL PAVING EXTENTS.
8. INSTALL HEADWALL PER SDRSD D-32.
9. INSTALL 8" HIGH CURB AND GUTTER PER SDRSD G-2.
10. INSTALL CONCRETE DRIVEWAY PER SDRSD G-14E.
11. RIBBON GUTTER SIMILAR TO DETAIL 1, DWG GFC-6.
12. SUBDRAIN PER DETAIL 1, DWG GFC-6.

NOTES

1 SEE DWG CD-4 FOR ADDITIONAL COORDINATE TABLES.

NO.	DESCRIPTION	DATE	APPROVED
△1	REVISED CURB & GUTTER, DRIVEWAY	05/24/19	IEC

SCALE 1" = 20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RM
DRAWN BY AS
CHECKED BY RK

Infrastructure ENGINEERING CORPORATION
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REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA

06/16/2017
DATE

Fallbrook Public Utility District

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FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

WTP PAVING AND GRADING - ENLARGED PLAN 1

DRAWING NO. C-3
SHEET NO. 18 OF 387
CLIENT JOB NO. 2744

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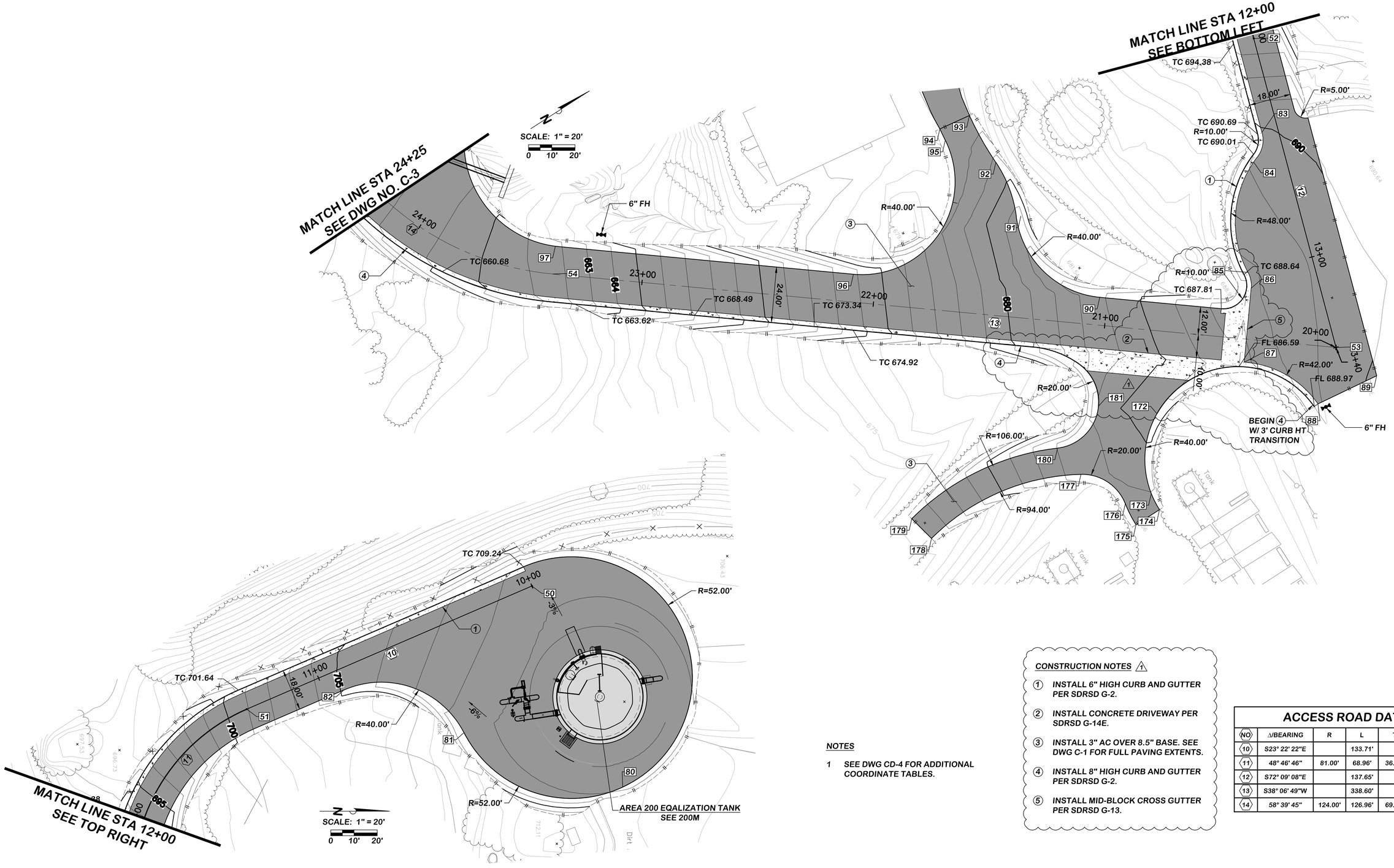

CONSTRUCTION NOTES

1. INSTALL 6" HIGH CURB AND GUTTER PER SDRSD G-2.
2. INSTALL CONCRETE DRIVEWAY PER SDRSD G-14E.
3. INSTALL 3" AC OVER 8.5" BASE. SEE DWG C-1 FOR FULL PAVING EXTENTS.
4. INSTALL 8" HIGH CURB AND GUTTER PER SDRSD G-2.
5. INSTALL MID-BLOCK CROSS GUTTER PER SDRSD G-13.

NOTES

1 SEE DWG CD-4 FOR ADDITIONAL COORDINATE TABLES.

ACCESS ROAD DATA TABLE

NO	Δ/BEARING	R	L	T	DESCRIPTION	BEGIN STA
10	S23° 22' 22"E		133.71'		ACCESS RD	10+00.00
11	48° 46' 46"	81.00'	68.96'	36.73'	ACCESS RD	11+33.71
12	S72° 09' 08"E		137.65'		ACCESS RD	12+02.67
13	S38° 06' 49"W		338.60'		ACCESS RD	20+00.00
14	58° 39' 45"	124.00'	126.96'	69.67'	ACCESS RD	23+38.60

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED CURB & GUTTER, DRIVEWAY	05/24/19	IEC

SCALE 1" = 20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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06/16/2017
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JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

WTP PAVING AND GRADING - ENLARGED PLAN 2

DRAWING NO. C-4
SHEET NO. 19 OF 387
CLIENT JOB NO. 2744

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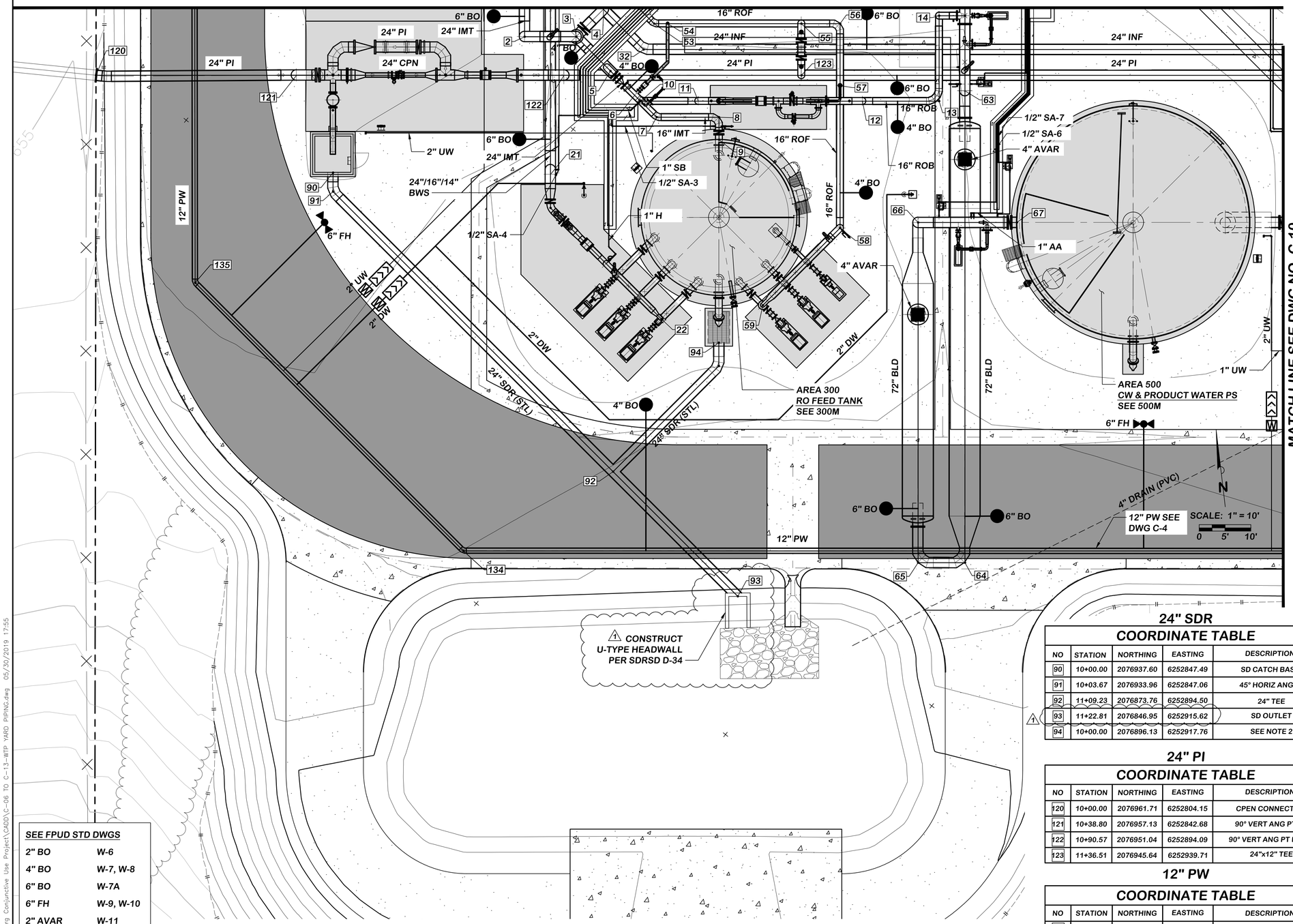

SEE FPUD STD DWGS

2" BO	W-6
4" BO	W-7, W-8
6" BO	W-7A
6" FH	W-9, W-10
2" AVAR	W-11
4" AVAR	W-12

NOTES:

1. REFER TO PIPE SCHEDULE ON DWG G-5 FOR PIPE MATERIAL, LINING AND COATING, THICKNESS/CLASS, ETC.

   FOR PROFILES, SEE DWG:

C-22	PI	C-25	ROF RWW ROP ROB
C-23	INF		
C-24	BWW IMT BWS SDR	C-27	PW

2. CATCH BASIN IE=652.8'

24" IMT

COORDINATE TABLE

NO	STATION	NORTHING	EASTING	DESCRIPTION
2	11+03.96	2076959.34	6252887.40	90° HORIZ/VERT ANG PT
3	11+13.96	2076958.17	6252897.33	24"x24" WYE
4	11+21.43	2076962.79	6252903.20	24"x24" TEE
5	11+23.30	2076950.81	6252903.10	24"x16" TEE
6	11+29.97	2076945.58	6252907.23	16"x6" TEE
7	11+35.97	2076940.87	6252910.94	45° HORIZ ANG PT
8	11+48.04	2076939.45	6252922.93	90° HORIZ ANG PT
9	11+52.37	2076935.14	6252922.42	RO TANK INLET

16" ROB

COORDINATE TABLE

NO	STATION	NORTHING	EASTING	DESCRIPTION
10	10+08.24	2076944.34	6252908.20	90° HORIZ ANG PT
11	10+19.45	2076943.02	6252919.33	90° VERT ANG PT UP
12	10+51.21	2076939.28	6252950.87	90° VERT ANG PT DOWN
13	10+66.03	2076937.54	6252965.59	90° HORIZ ANG PT
14	10+82.56	2076953.95	6252967.53	90° HORIZ/VERT ANG PT

24"/16"/14" BWS

COORDINATE TABLE

NO	STATION	NORTHING	EASTING	DESCRIPTION
21	11+30.60	2076932.30	6252889.23	90° VERT ANG PT DOWN
22	11+67.47	2076901.99	6252907.28	END PIPELINE

24" INF

COORDINATE TABLE

NO	STATION	NORTHING	EASTING	DESCRIPTION
32	11+11.81	2076954.20	6252909.98	45° HORIZ ANG PT

16" ROF

COORDINATE TABLE

NO	STATION	NORTHING	EASTING	DESCRIPTION
53	11+26.27	2076958.92	6252912.58	45° HORIZ ANG PT
54	11+28.91	2076958.61	6252915.20	16"x6" TEE
55	11+54.78	2076955.57	6252940.89	16"x24" TEE
56	11+62.28	2076954.69	6252948.33	90° HORIZ ANG PT
57	11+74.28	2076942.77	6252946.92	16"x4" TEE
58	12+01.84	2076915.40	6252943.68	45° HORIZ ANG PT
59	12+22.98	2076902.31	6252927.08	END PIPELINE

16" ROP

COORDINATE TABLE

NO	STATION	NORTHING	EASTING	DESCRIPTION
63	10+83.25	2076938.94	6252970.79	90° VERT ANG PT DOWN
64	11+74.56	2076848.26	6252960.05	90° HORIZ ANG PT
65	11+83.62	2076849.33	6252951.05	90° HORIZ ANG PT
66	12+49.44	2076914.69	6252958.80	90° HORIZ/VERT ANG PT
67	12+68.54	2076912.44	6252977.77	CW TANK INLET

24" SDR

COORDINATE TABLE

NO	STATION	NORTHING	EASTING	DESCRIPTION
90	10+00.00	2076937.60	6252847.49	SD CATCH BASIN
91	10+03.67	2076933.96	6252847.06	45° HORIZ ANG PT
92	11+09.23	2076873.76	6252894.50	24" TEE
93	11+22.81	2076846.95	6252915.62	SD OUTLET
94	10+00.00	2076896.13	6252917.76	SEE NOTE 2

24" PI

COORDINATE TABLE

NO	STATION	NORTHING	EASTING	DESCRIPTION
120	10+00.00	2076961.71	6252804.15	CPEN CONNECTION
121	10+38.80	2076957.13	6252842.68	90° VERT ANG PT UP
122	10+90.57	2076951.04	6252894.09	90° VERT ANG PT DOWN
123	11+36.51	2076945.64	6252939.71	24"x12" TEE

12" PW

COORDINATE TABLE

NO	STATION	NORTHING	EASTING	DESCRIPTION
134	12+70.31	2076861.93	6252863.93	45° HORIZ ANG PT
135	13+43.73	2076919.59	6252818.48	45° HORIZ ANG PT

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED 24" SDR	05/24/19	IEC

SCALE 1" = 10'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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FPUD Fallbrook Public Utility District

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APPROVED BY:

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ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

WTP YARD PIPING - ENLARGED PLAN 1

DRAWING NO. C-6
SHEET NO. 21 OF 387
CLIENT JOB NO. 2744

P:\Projects\FPUD (0112)\0002 St Marg Conjunctive Use Project\CADD\C-06 TO C-13-WTP YARD PIPING.dwg 05/30/2019 17:55

MATCHLINE SEE DWG NO. C-12

MATCHLINE SEE DWGS C-7 & C-8

MATCH LINE SEE DWG NO. C-10

N

SCALE: 1" = 10'

0 5' 10'

4" SL

COORDINATE TABLE

NO	STATION	NORTHING	EASTING	DESCRIPTION
105	12+38.72	2077039.20	6253096.17	12.99° HORIZ ANG PT
106	13+23.98	2077119.45	6253124.97	45° HORIZ ANG PT
107	13+40.31	2077126.42	6253139.73	90° HORIZ ANG PT
108	13+51.13	2077136.23	6253135.17	SEE NOTE 3

4" SL (TO DRY BEDS)

COORDINATE TABLE

NO	NORTHING	EASTING	DESCRIPTION
110	2077113.73	6253086.84	90° HORIZ ANG PT*
111	2077136.43	6253076.27	90° VERT ANG PT UP*
112	2077157.39	6253180.60	90° HORIZ ANG PT*

* SEE NOTE 2

12" PW

COORDINATE TABLE

NO	STATION	NORTHING	EASTING	DESCRIPTION
139	19+81.21	2077003.36	6253104.92	45° HORIZ ANG PT

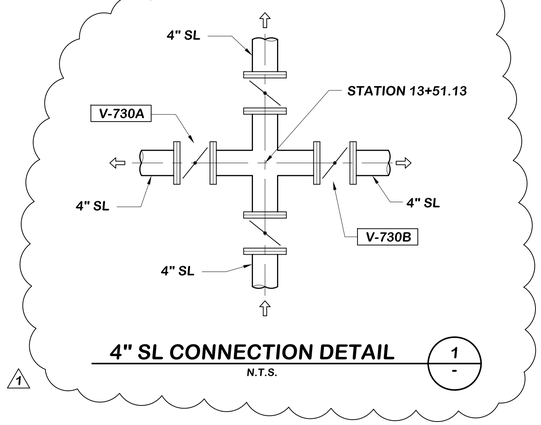
NOTES:

1. REFER TO PIPE SCHEDULE ON DWG G-5 FOR PIPE MATERIAL, LINING AND COATING, THICKNESS/CLASS, ETC.

   FOR PROFILES, SEE DWG:

C-26	SL
C-27	PW

2. 4" SL SHALL MAINTAIN A MIN COVER OF 3' PRIOR TO ABOVE GRADE PORTION. FOR ABOVE GRADE PORTION SEE 700M-3, 700M-4, & 700M-5.
3. INSTALL CROSS AND VALVES PER 1/-



4" SL CONNECTION DETAIL 1/- N.T.S.

SEE FPUD STD DWGS

2" BO	W-6
4" BO	W-7, W-8
6" BO	W-7A
6" FH	W-9, W-10
2" AVAR	W-11
4" AVAR	W-12

NO.	DESCRIPTION	DATE	APPROVED
1	ADDED DETAIL 1	06/19/19	IEC
1	REVISED NOTES AND COORDINATE TABLE	06/19/19	IEC

SCALE 1" = 10'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RM
DRAWN BY AS
CHECKED BY RK

Infrastructure ENGINEERING CORPORATION
14271 Danielson Street
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REGISTERED PROFESSIONAL ENGINEER ROSS N. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA

06/16/2017
DATE

FPUD Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

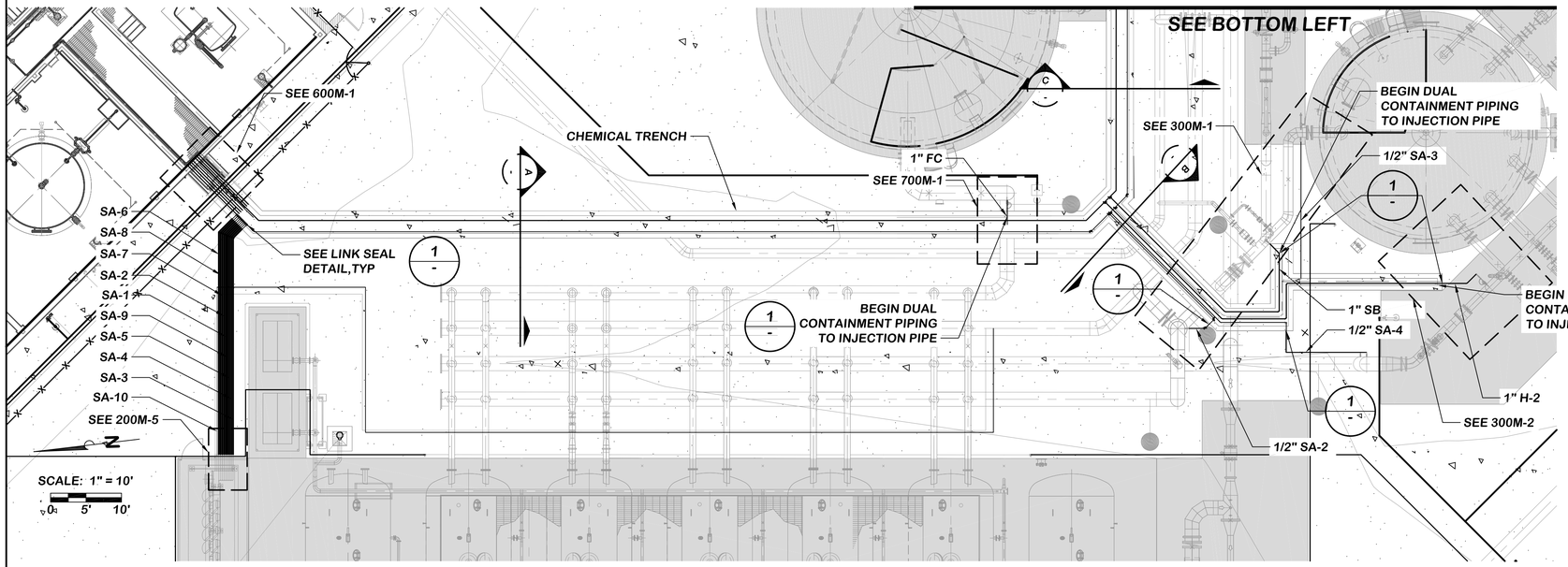
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

WTP YARD PIPING - ENLARGED PLAN 6

DRAWING NO. C-11
SHEET NO. 26 OF 387
CLIENT JOB NO. 2744

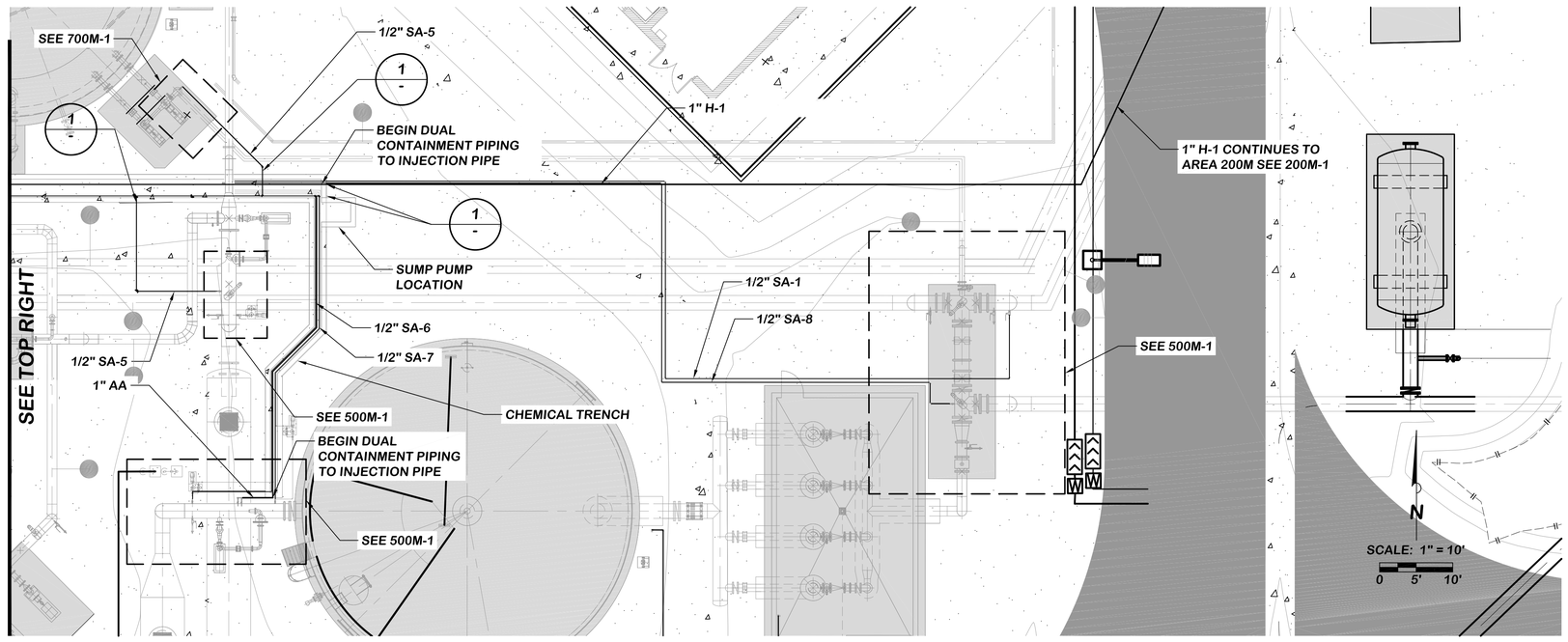
MATCH LINE

SEE BOTTOM LEFT



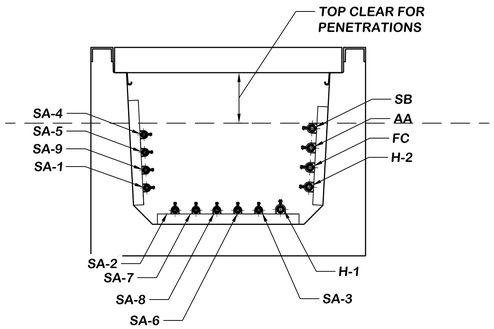
MATCH LINE

SEE TOP RIGHT



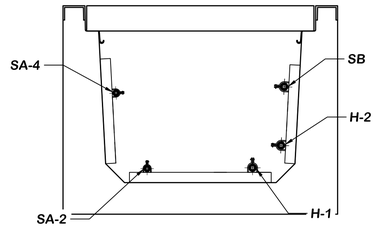
NOTES

1. ALL YARD CHEMICAL PIPES SHALL BE DUAL CONTAINMENT PIPING OUTSIDE CHEMICAL TRENCH. DOUBLE CONTAINMENT PIPE TO BE SLOPED 0.5% DOWN TO TRENCH.



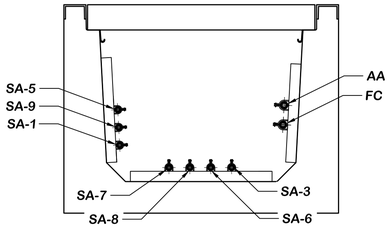
TYPICAL TRENCH DETAIL — A

SCALE: 1" = 1'-0"



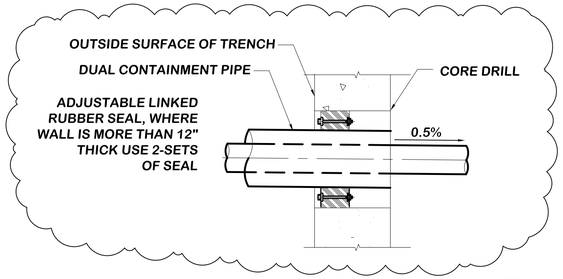
TYPICAL TRENCH DETAIL — B

SCALE: 1" = 1'-0"



TYPICAL TRENCH DETAIL — C

SCALE: 1" = 1'-0"



1 SLEEVED PIPE OPENING — 1

SCALE: NTS

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED SLEEVED PIPE OPENING DETAIL	06/19/19	IEC

SCALE 1" = 40'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RM
DRAWN BY RM
CHECKED BY RK

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REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA

06/16/2017
DATE

FPUD Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

WTP YARD CHEMICAL PIPING AND SAMPLE PIPING

DRAWING NO. C-16
SHEET NO. 31 OF 387
CLIENT JOB NO. 2744

CONSTRUCT 18" SS
SEE DWGS C-31 & C-32 FOR PROFILE

SCALE: 1" = 20'
0 10' 20'

CONSTRUCT 6" ROC
SEE DWGS C-29 & C-30 FOR PROFILE

CONSTRUCT 10" SS
SEE DWG C-33 FOR PROFILE

COMMUNICATION LINE

START OF COMMON TRENCH FOR ROC & COMMUNICATION LINE AT STA 100+20.65

MATCH LINE
SEE DWG NO. C-18

COORDINATE TABLE				
NO	STATION	NORTHING	EASTING	DESCRIPTION
1	140+00.00	2077111.17	6252862.61	MH 1
2	140+13.04	2077112.67	6252849.66	MH 2
3	141+91.20	2077290.26	6252863.85	MH 3
60	160+00.00	2077013.32	6253081.78	MH 6
61	161+10.00	2077099.76	6253013.76	SEE NOTE 1

DATA TABLE					
	/BEARING	R	L	T	DESCRIPTION
1	N83° 22' 23"W		13.04'		18" PVC
2	N4° 34' 08"E		178.16'		18" PVC
3	N5° 14' 28"E		362.72'		18" PVC
60	N38° 12' 01"W		110.00'		8" PVC
61	N38° 12' 01"W		242.41'		10" PVC

COORDINATE TABLE				
NO	STATION	NORTHING	EASTING	DESCRIPTION
20	100+00.00	2077044.03	6253038.62	RO BUILDING
21	100+20.65	2077056.80	6253054.84	90° HORIZ ANG PT
22	103+51.90	2077316.96	6252849.80	45° HORIZ ANG PT

DATA TABLE					
	/BEARING	R	L	T	DESCRIPTION
20	N51° 46' 34"E		20.65'		6" PVC
21	N38° 14' 38"W		331.25'		6" PVC
22	N6° 50' 31"E		357.75'		6" PVC

NOTES:

1. CONSTRUCT BACKWATER STRUCTURE PER DETAIL 1/PL-01

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED SEWER	06/25/19	IEC

SCALE 1"=20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RI/DP
DRAWN BY RI
CHECKED BY RK

Infrastructure ENGINEERING CORPORATION
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REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA

06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

COMMUNICATION, ROC & SEWER PIPELINE TO WRP

DRAWING NO. C-17
SHEET NO. 32 OF 387
CLIENT JOB NO. 2744

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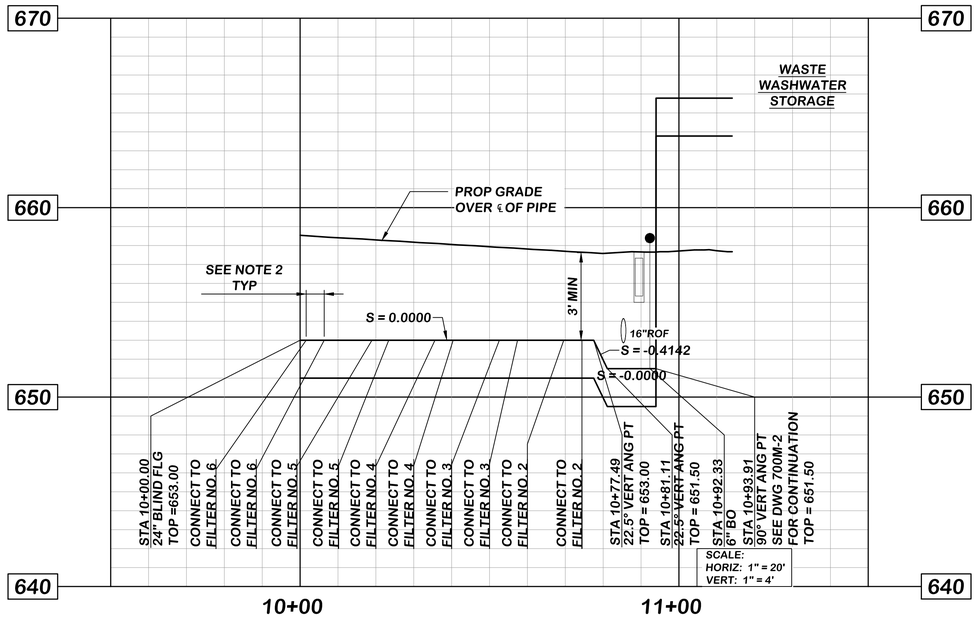
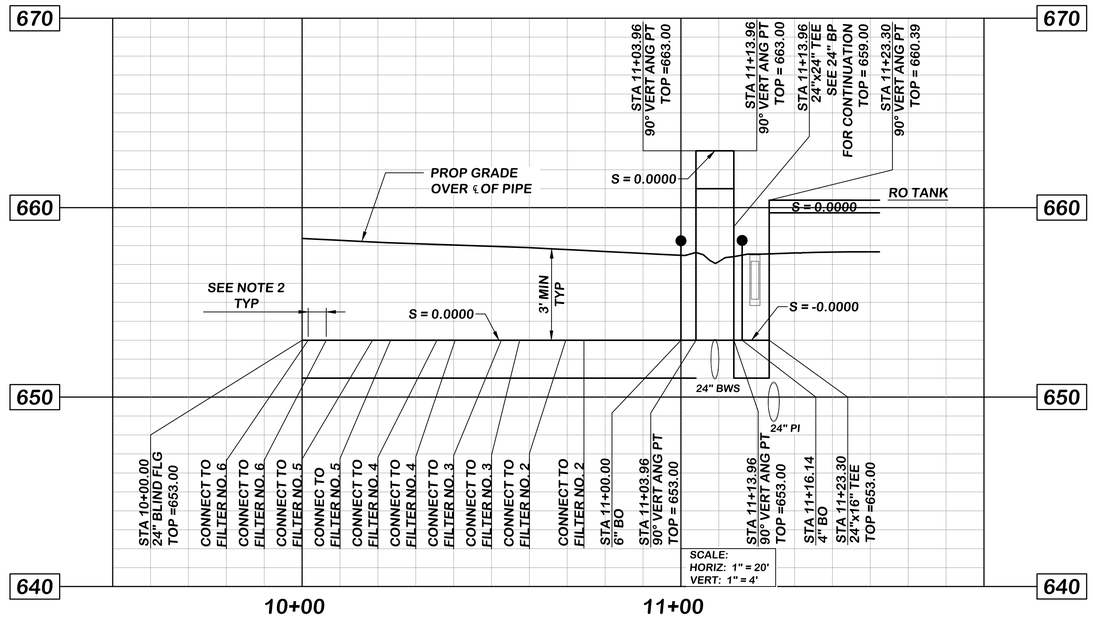
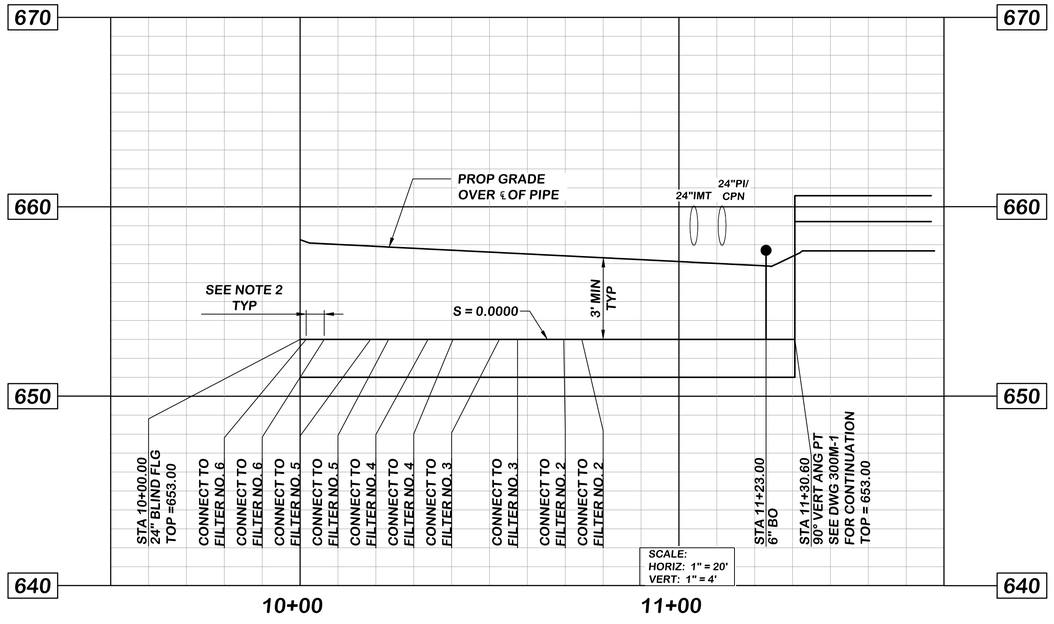


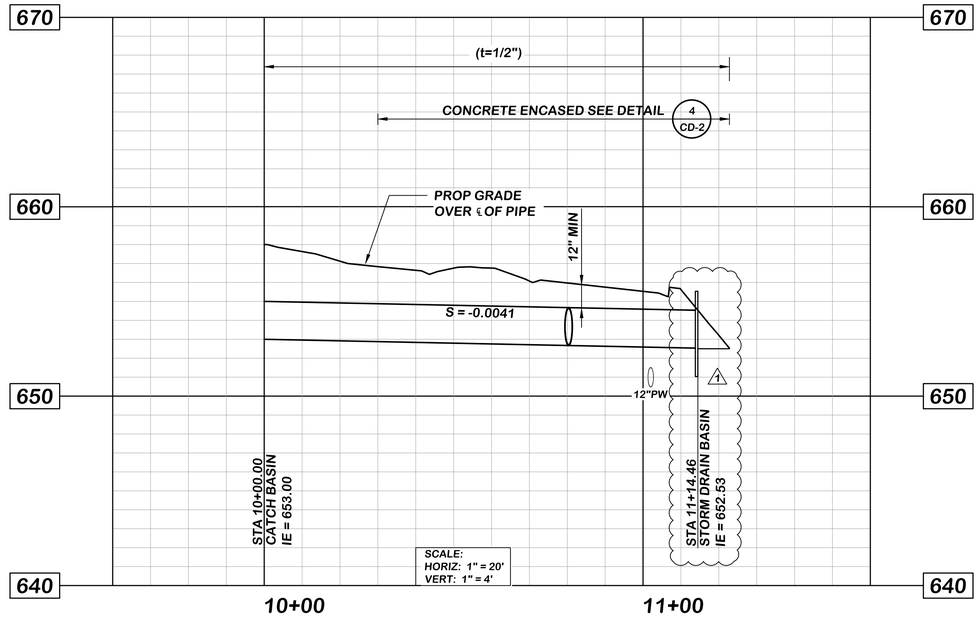
24" BWW



16"/24" IMT



24" BWS



24" SDR

NOTES:

1. REFER TO PIPE SCHEDULE ON DWG G-5 FOR PIPE MATERIAL, LINING AND COATING, THICKNESS/CLASS, ETC.
2. DISTANCE BETWEEN IM VESSEL NOZZLES SHALL BE PER MANUFACTURER'S RECOMMENDATION.

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED PROFILE	05/24/19	IEC

SCALE 1" = 20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RI
DRAWN BY RI
CHECKED BY DP

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REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA
06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

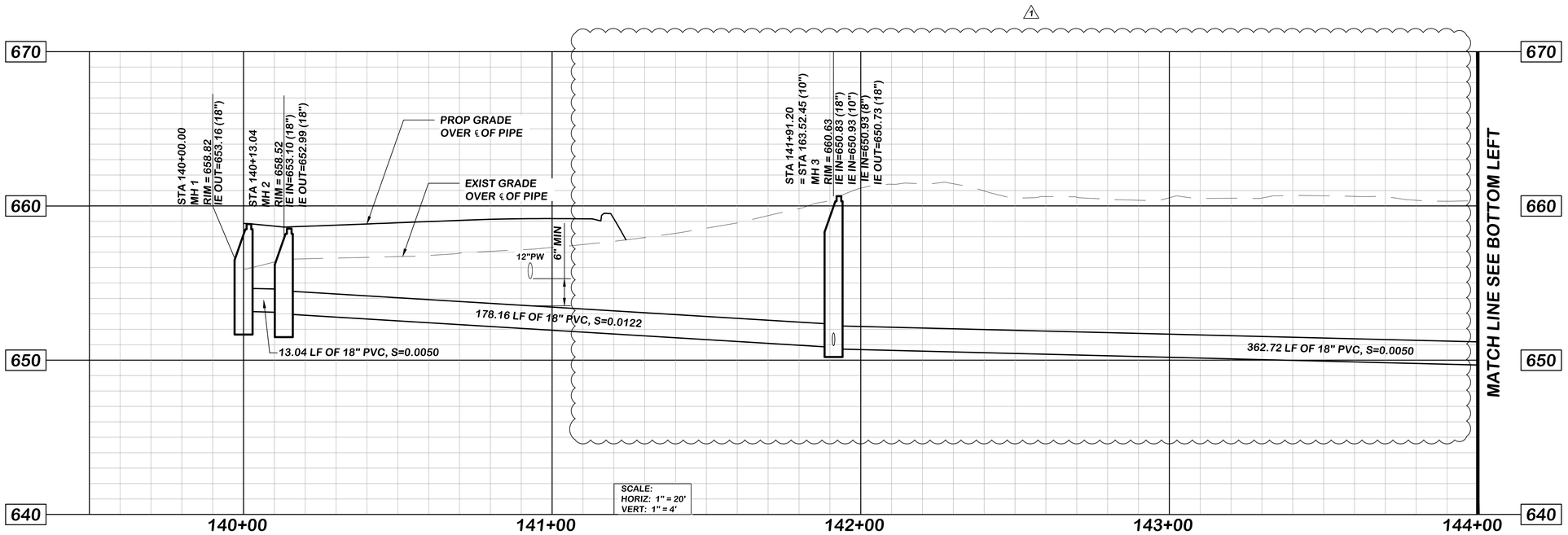
JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

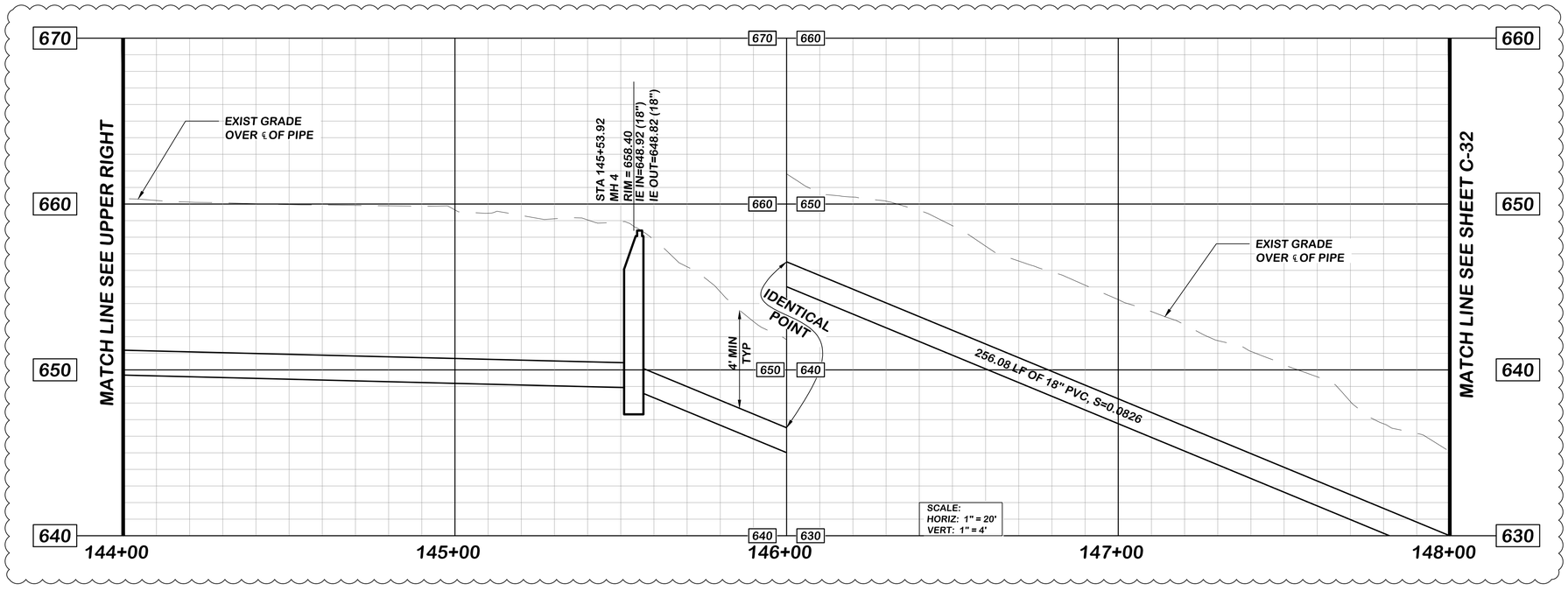
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

WTP YARD PIPING PROFILES

DRAWING NO. C-24
SHEET NO. 40 OF 387
CLIENT JOB NO. 2744

P:\Projects\FPUD (0112)\0002 St Marg Conjunctive Use Project\CAD\C-22 – C-27 – WTP YARD PIPING PROFILE.dwg 05/30/2019 17:24





NOTES:

1. FROM STA 140+00 TO STA 148+10, PIPE, FITTINGS, AND APPURTENANCES SHALL BE TESTED AS A GRAVITY SEWER SYSTEM PER SPEC SECTION 15043. MANHOLES SHALL BE TESTED PER SPEC SECTION 02601.
2. DOWNSTREAM OF STA 148+10, PIPE, FITTINGS, AND APPURTENANCES SHALL BE TESTED AS A PRESSURE PIPE SYSTEM PER SPEC SECTION 15071.

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED PROFILE	06/25/19	IEC

SCALE 1" = 20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RI
DRAWN BY RI
CHECKED BY DP

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REGISTERED PROFESSIONAL ENGINEER
ROSS W. MAXWELL
No. C82681
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA
06/16/2017
DATE

Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

WTP SS PROFILES
STA 140+00.00 TO STA 148+00.00

DRAWING NO. C-31
SHEET NO. 47 OF 387
CLIENT JOB NO. 2744

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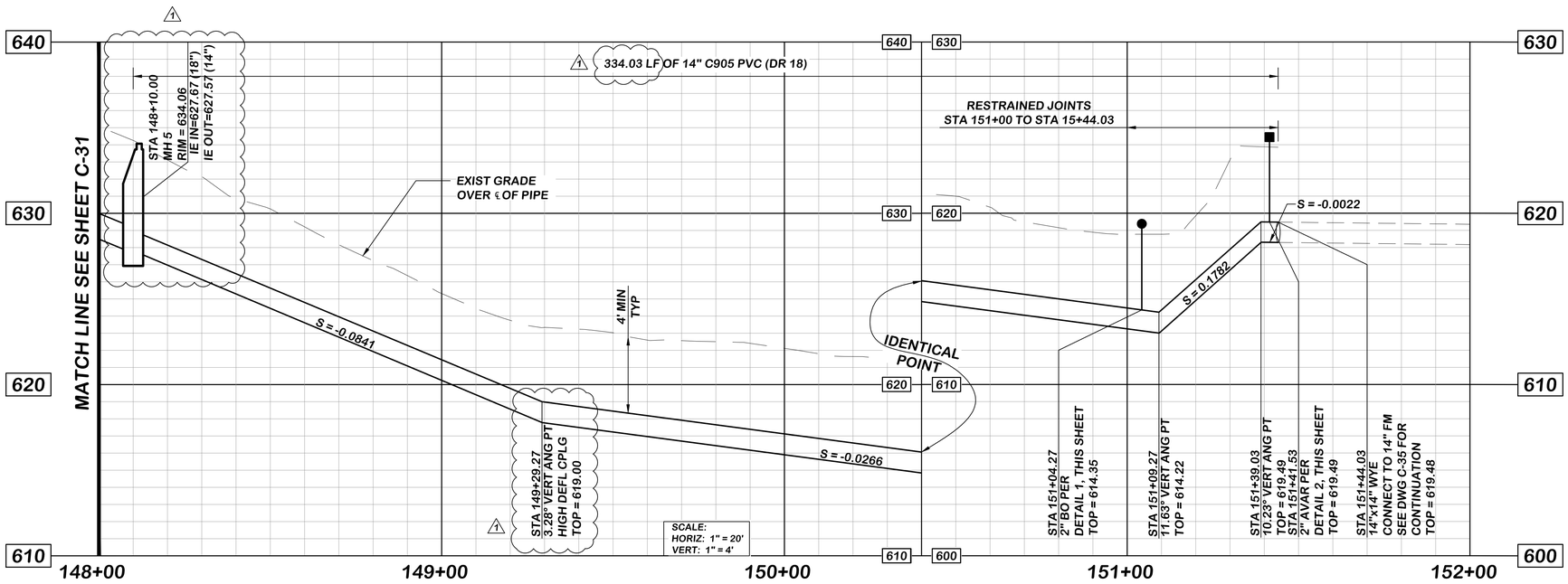
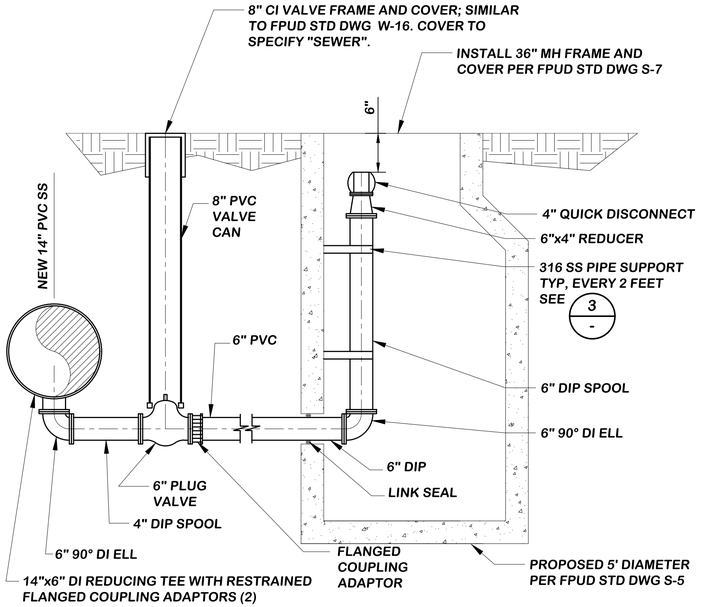
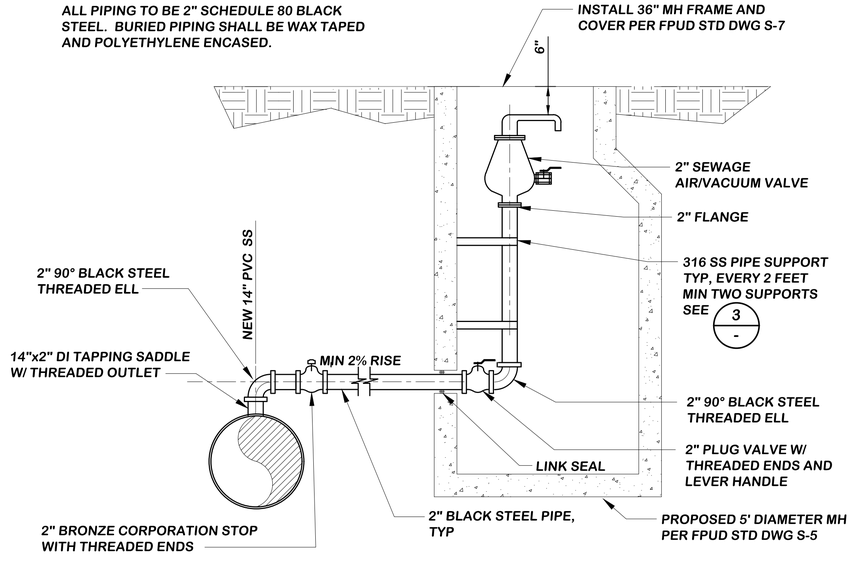




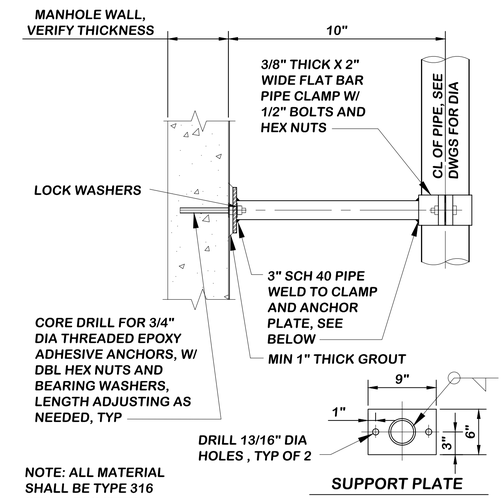
BLOWOFF IN MANHOLE — SCALE: NTS — 1 / C-20

NOTE:

ALL PIPING TO BE 2" SCHEDULE 80 BLACK STEEL. BURIED PIPING SHALL BE WAX TAPED AND POLYETHYLENE ENCASED.



AIR VALVE IN MANHOLE — SCALE: NTS — 2 / C-20



PIPE SUPPORT — SCALE: NTS — 3 / -

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED PROFILE	06/25/19	IEC

SCALE 1" = 20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RI
DRAWN BY RI
CHECKED BY DP

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REGISTERED PROFESSIONAL ENGINEER — ROSS W. MAXWELL — No. C82681 Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

WTP SS PROFILE
STA 148+00.00 TO STA 151+44.03

DRAWING NO. C-32
SHEET NO. 48 OF 387
CLIENT JOB NO. 2744

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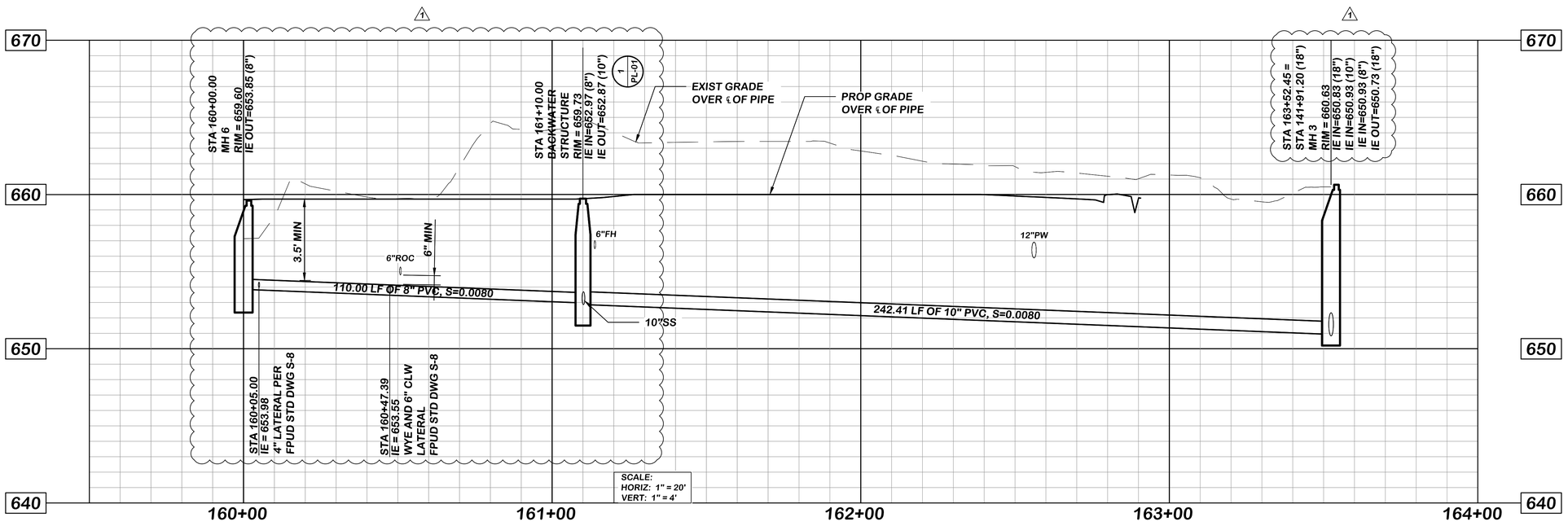

NOTES:

1. *PIPE, FITTINGS, AND APPURTENANCES SHALL BE TESTED AS A GRAVITY SEWER SYSTEM PER SPEC SECTION 15043. MANHOLES SHALL BE TESTED PER SPEC SECTION 02601.*

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED PROFILE	06/25/19	IEC

SCALE 1" = 20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RI
DRAWN BY RI
CHECKED BY DP

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REGISTERED PROFESSIONAL ENGINEER
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No. C82681
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA
06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

WTP SS PROFILES
STA 160+00.00 TO STA 163+52.45

DRAWING NO. C-33
SHEET NO. 49 OF 387
CLIENT JOB NO. 2744

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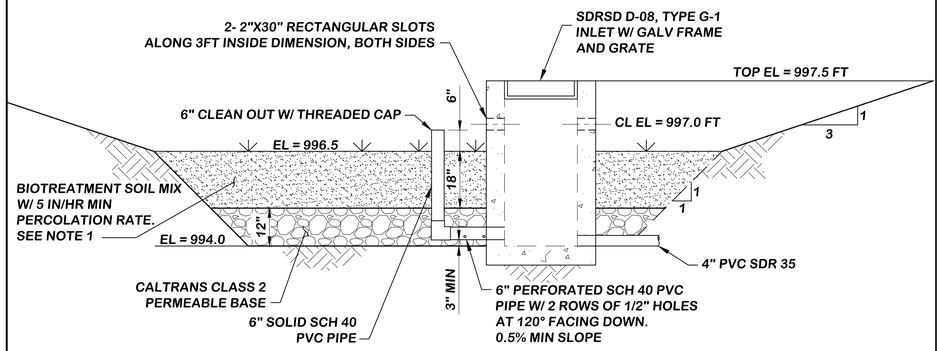
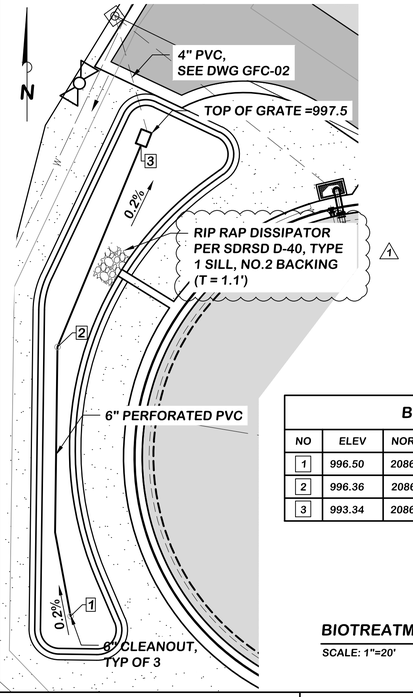


NOTES:

1. BIOTREATMENT SOIL MIX SHALL MEET EITHER THE CITY OF SAN DIEGO LOW IMPACT DEVELOPMENT DESIGN MANUAL (PG B-18), MOST RECENT EDITION OR COUNTY OF SAN DIEGO LOW IMPACT DEVELOPMENT HANDBOOK: APPENDIX G - BIORETENTION SOIL SPECIFICATION, MOST RECENT EDITION.
2. PLANTS SHALL BE SELECTED FROM THE PLANT LIST PROVIDED IN APPENDIX E-20, SECTION D OR THE COUNTY OF SAN DIEGO MODEL BMP DESIGN MANUAL, LATEST EDITION.

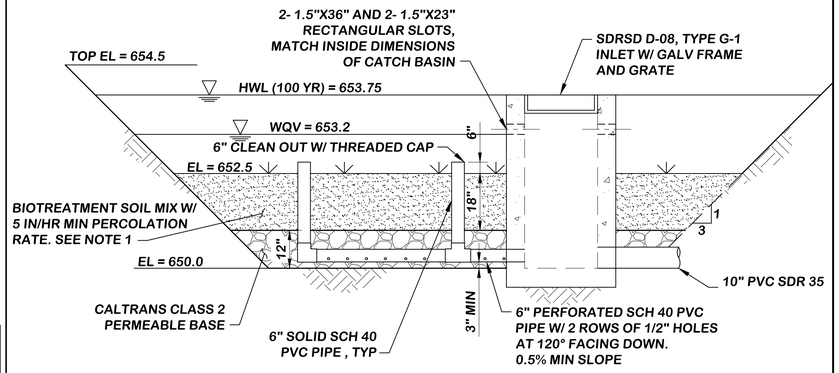
BIOTREATMENT BASIN DETAIL - GHEEN (1 / -)
SCALE: NTS



BIOTREATMENT BASIN

NO	ELEV	NORTHING	EASTING	DESCRIPTION
1	996.50	2086718.17	6266107.12	FG @ CLEANOUT
2	996.36	2086789.21	6266103.64	FG @ CLEANOUT
3	993.34	2086842.47	6266125.70	6" IE

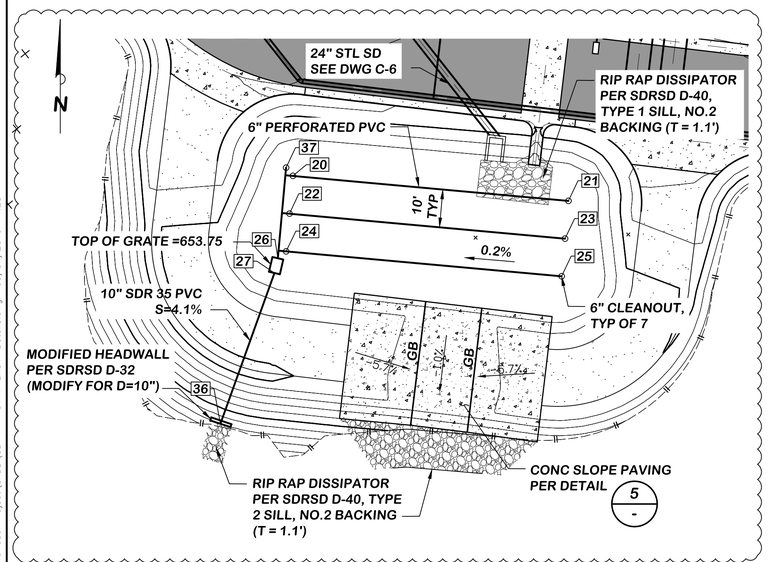
BIOTREATMENT BASIN PLAN - GHEEN (2 / -)
SCALE: 1"=20'



NOTES:

1. BIOTREATMENT SOIL MIX SHALL MEET EITHER THE CITY OF SAN DIEGO LOW IMPACT DEVELOPMENT DESIGN MANUAL (PG B-18), MOST RECENT EDITION OR COUNTY OF SAN DIEGO LOW IMPACT DEVELOPMENT HANDBOOK: APPENDIX G - BIORETENTION SOIL SPECIFICATION, MOST RECENT EDITION.
2. PLANTS SHALL BE SELECTED FROM THE PLANT LIST PROVIDED IN APPENDIX E-20, SECTION D OR THE COUNTY OF SAN DIEGO MODEL BMP DESIGN MANUAL, LATEST EDITION.

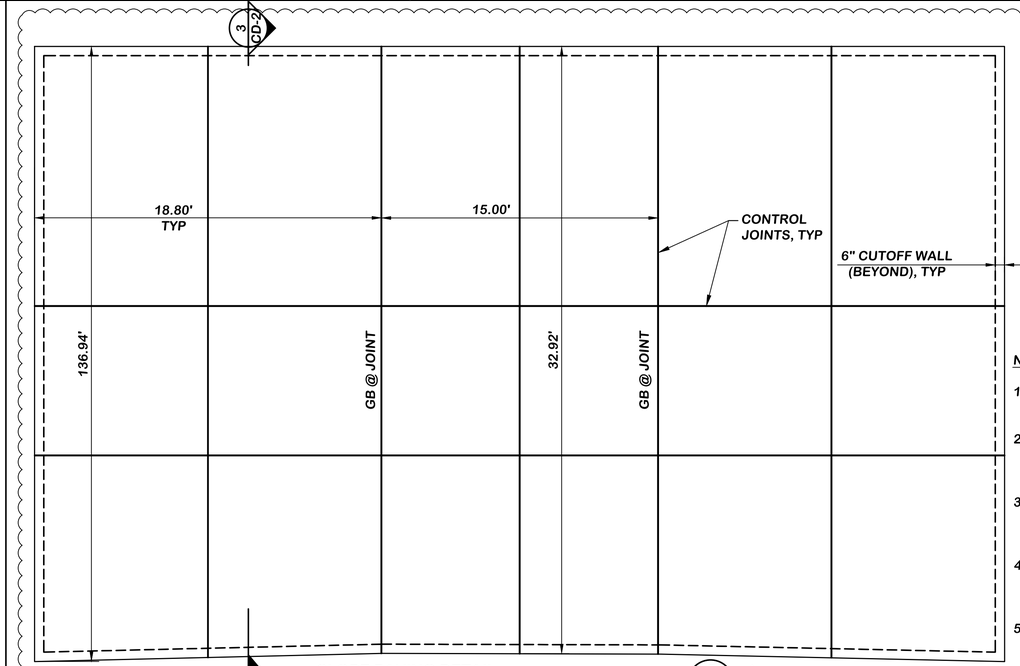
BIOTREATMENT BASIN DETAIL - WTP (3 / -)
SCALE: NTS



BIOTREATMENT BASIN

NO	ELEV	NORTHING	EASTING	DESCRIPTION
20	652.33	2076836.96	6252861.90	FG @ CLEANOUT
21	652.48	2076830.38	6252934.60	FG @ CLEANOUT
22	652.33	2076827.00	6252861.00	FG @ CLEANOUT
23	652.48	2076820.42	6252933.70	FG @ CLEANOUT
24	652.33	2076817.04	6252860.10	FG @ CLEANOUT
25	652.48	2076810.46	6252932.80	FG @ CLEANOUT
26	649.96	2076815.23	6252857.92	6" IE
27	649.71	2076811.34	6252857.02	10" IE
36	648.00	2076771.55	6252842.75	10" IE
37	652.33	2076839.14	6252860.09	FG @ CLEANOUT

BIOTREATMENT BASIN PLAN - WTP (4 / -) 1
SCALE: 1"=20'



NOTES:

1. CONCRETE SHALL BE 520-C-2500
2. ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED (3/4")
3. SAWN JOINTS SHALL BE CUT WITHIN 24 HOURS OF CONCRETE PLACEMENT.
4. PROVIDE HEAVY BROOM FINISH ON ALL EXPOSED SURFACES.
5. SEE DRAWING C-3 FOR COORDINATES.

SLOPE PAVING DETAIL (5 / -) 1
SCALE: NTS

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED DETAIL	05/24/19	IEC

SCALE NTS
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RK
DRAWN BY RI
CHECKED BY DP

Infrastructure ENGINEERING CORPORATION
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www.iecorporation.com

REGISTERED PROFESSIONAL ENGINEER — ROSS W. MAXWELL — No. C82681 Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA
06/16/2017
DATE

FRD Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

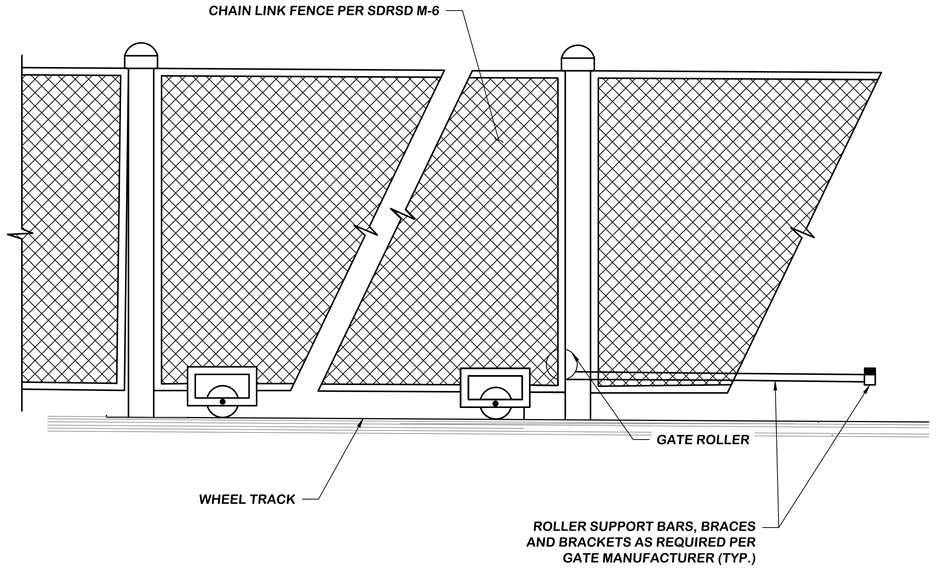
JACK R. BEBEE, P.E. — DATE
ASSISTANT GENERAL MANAGER

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

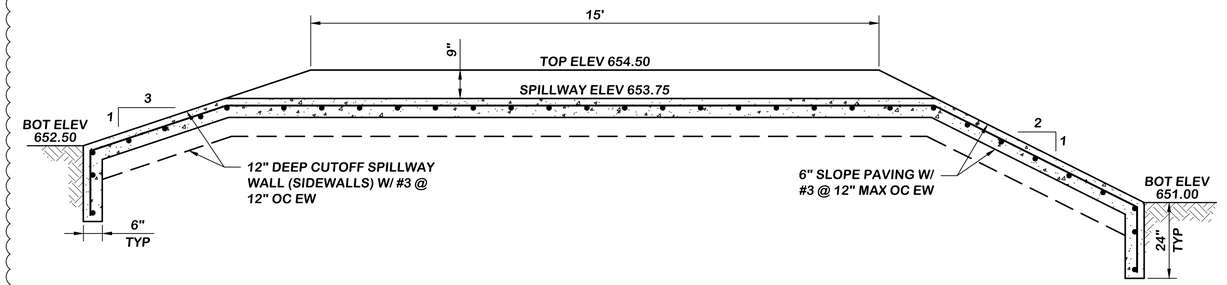
BIOTREATMENT BASIN DETAILS

DRAWING NO. CD-1
SHEET NO. 60 OF 387
CLIENT JOB NO. 2744

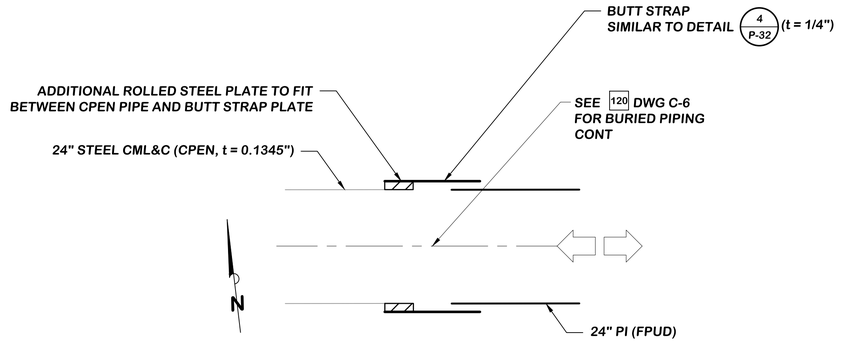
P:\Projects\FPUD (0112)\0002 St Marg Conjunctive Use Project\CADD\CD-1 - STRM BASIN Details.dwg 05/31/2019 11:28



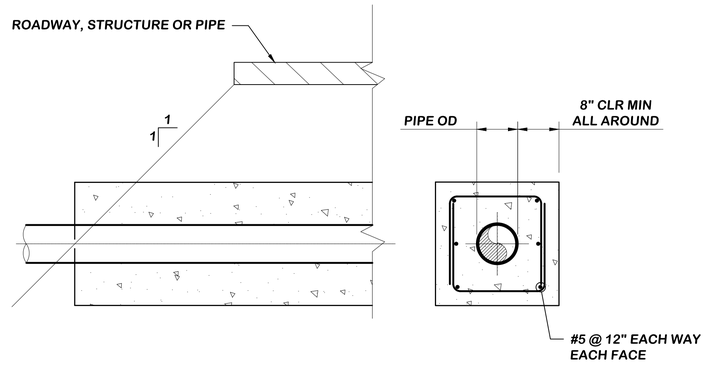
SLIDING GATE — 1 / -
SCALE: NTS



SLOPE PAVING SECTION — 3 / CD-1 (1)
SCALE: NTS



CPEN CONNECTION — 2 / -
SCALE: NTS



TYP PIPE ENCASEMENT — 4 / -
SCALE: NTS

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED DETAIL	05/24/19	IEC

SCALE NTS
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY IEC
DRAWN BY IEC
CHECKED BY IEC

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REGISTERED PROFESSIONAL ENGINEER — ROSS W. MAXWELL — No. C82681 Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA
06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

CIVIL DETAILS

DRAWING NO. CD-2
SHEET NO. 61 OF 387
CLIENT JOB NO. 2744

P:\Projects\FPUD (0112)\0002 St Marg Conjunctive Use Project\CADD\CD-2.dwg 05/29/2019 14:14

ACCESS ROAD CENTERLINE

NO	FG	NORTHING	EASTING	DESCRIPTION
50	708.603	2077366.45	6253178.62	BEGIN ROAD
51	700.946	2077243.72	6253231.66	BC
52	693.686	2077198.75	6253281.19	EC
53	689.000	2077156.59	6253412.24	HORIZ ANG PT
54	661.507	2076890.16	6253203.23	BC
55	653.000	2076843.56	6253091.04	EC
56	656.168	2076870.25	6252866.42	BC
57	657.285	2076928.02	6252820.92	EC
58	658.000	2077230.09	6252856.81	BC
59	662.000	2077242.48	6252918.28	EC
60	660.000	2077205.15	6252939.45	END ROAD

ACCESS ROAD CENTERLINE

NO	ELEVATION	NORTHING	EASTING	DESCRIPTION
70	653.000	2076843.44	6253092.05	INTERSECTION
71	658.334	2076968.30	6253106.91	BC
72	659.840	2077006.63	6253096.10	EC
73	660.000	2077116.99	6253009.10	END ROAD

ACCESS ROAD EOP - IRREGULAR AREAS

NO	FG	NORTHING	EASTING	DESCRIPTION
80	708.988	2077405.52	6253265.22	BC
81	708.702	2077337.22	6253241.79	EC / BC
82	704.972	2077285.67	6253223.29	EC
83	689.380	2077179.89	6253317.07	BC
84	689.094	2077169.94	6253325.91	EC / BC
85	687.710	2077142.19	6253364.55	BC
86	687.508	2077139.66	6253371.00	EC
87	686.811	2077119.91	6253396.18	BC
88	688.916	2077136.85	6253428.46	EC
89	690.174	2077164.68	6253431.94	-
90	683.817	2077082.72	6253339.06	BC
91	681.346	2077073.10	6253291.25	EC / BC
92	679.187	2077076.52	6253266.01	EC / BC
93	677.230	2077077.93	6253242.85	EC
94	677.105	2077064.07	6253240.85	-
95	677.458	2077063.39	6253246.20	BC
96	673.832	2076998.94	6253273.32	EC
97	661.727	2076897.58	6253193.77	BC
98	657.524	2076918.45	6253115.07	EC
99	657.848	2076906.42	6253087.45	BC
100	656.884	2076873.21	6253068.95	EC / BC
101	657.209	2076875.72	6253058.17	EC
102	656.635	2076867.10	6253037.00	BC
103	655.806	2076877.68	6252905.49	BC
104	657.564	2076964.34	6252837.38	EC
105	658.014	2077114.21	6252855.14	BC
106	659.109	2077116.83	6252875.57	-
107	659.175	2077140.66	6252878.41	-
108	658.177	2077147.98	6252859.13	EC
109	658.857	2077172.81	6252862.08	BC
110	660.000	2077197.61	6252929.89	EC

CONCRETE EOP NEAR RO BLDG

NO	FG	NORTHING	EASTING	DESCRIPTION
120	687.843	2076990.72	6253088.51	-
121	687.843	2076951.61	6253038.85	-
123	659.360	2077161.89	6252873.24	-
124	659.908	2077202.13	6252924.31	-
125	659.817	2077005.82	6253080.96	-

GRAVEL NEAR SURGE TANK, XFMR

NO	FG	NORTHING	EASTING	DESCRIPTION
130	657.722	2076910.24	6253117.39	-
131	658.083	2076908.11	6253135.31	BC
132	658.166	2076916.86	6253146.42	EC
133	658.841	2076970.64	6253152.81	-
134	659.000	2076997.54	6253144.05	-
135	659.296	2077051.81	6253092.04	-
136	659.081	2077045.14	6253083.57	-

BASIN PERIMETER ROAD

NO	FG	NORTHING	EASTING	DESCRIPTION
140	656.662	2076863.77	6252829.59	EC
141	655.000	2076823.84	6252824.85	BC
142	655.030	2076784.97	6252855.46	EC
143	654.860	2076782.61	6252875.34	-
144	653.507	2076776.10	6252893.47	-
145	653.507	2076774.33	6252908.37	-
146	654.860	2076776.38	6252927.49	BC
147	655.050	2076807.01	6252966.42	EC
148	656.545	2076825.88	6252968.66	BC
149	656.245	2076827.65	6252953.77	EC
150	654.750	2076808.78	6252951.53	BC
151	654.750	2076791.28	6252929.31	EC
152	653.750	2076798.46	6252911.24	-
153	653.750	2076800.23	6252896.34	-
154	654.750	2076797.48	6252877.09	-
155	654.750	2076799.84	6252857.23	BC
156	654.750	2076822.06	6252839.73	EC
157	656.661	2076840.94	6252841.89	BC

ACCESS ROAD BRANCH EOP △1

NO	FG	NORTHING	EASTING	DESCRIPTION
172	685.627	2077076.31	6253394.49	BC
173	683.965	2077055.65	6253422.10	EC
174	683.601	2077054.88	6253429.86	-
175	683.474	2077042.88	6253429.84	-
176	683.725	2077043.88	6253419.76	BC
177	683.725	2077034.69	6253398.78	EC / BC
178	676.104	2076965.66	6253387.17	EC
179	676.100	2076963.10	6253375.44	BC
180	683.038	2077032.32	6253383.80	EC / BC
181	684.390	2077056.85	6253378.19	EC

MISC HORIZ CONTROL POINTS

NO	NORTHING	EASTING	DESCRIPTION
190	2076967.37	6252845.70	PAD CORNER
191	2076963.26	6252879.47	PAD CORNER
192	2076890.76	6252899.39	PAD CORNER
193	2076901.59	6252913.14	PAD CORNER
194	2076889.47	6252932.10	PAD CORNER
195	2076901.84	6252947.81	PAD CORNER
196	2076943.11	6252944.32	PAD CORNER
197	2076967.42	6252972.46	PAD CORNER
198	2076976.85	6252965.03	PAD CORNER
199	2076981.94	6252973.66	PAD CORNER
200	2077001.25	6252975.95	PAD CORNER
201	2076918.60	6253063.22	BLDG CORNER
202	2076932.08	6253075.48	PAD CORNER
203	2076992.39	6253079.30	BLDG CORNER
204	2076946.49	6253128.28	PAD CORNER
205	2076970.76	6253131.71	PAD CORNER
206	2076969.48	6253143.69	PAD CORNER
207	2076830.90	6253102.65	FLOW LINE
208	2076851.16	6252926.85	FLOW LINE
209	2076876.31	6252929.84	FLOW LINE

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED TABLE	05/24/19	IEC

SCALE NTS
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY ARW
DRAWN BY ARW
CHECKED BY RWM

Infrastructure ENGINEERING CORPORATION
14271 Danielson Street
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www.iecorporation.com

REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA
06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

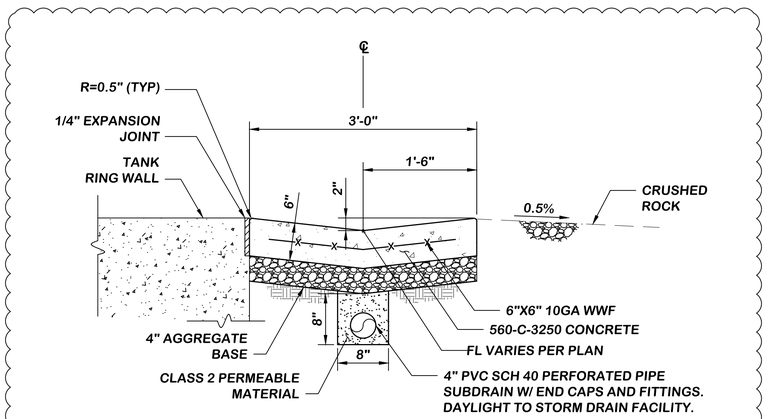
JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

GRADING COORDINATE TABLES

DRAWING NO. CD-4
SHEET NO. 63 OF 387
CLIENT JOB NO. 2744

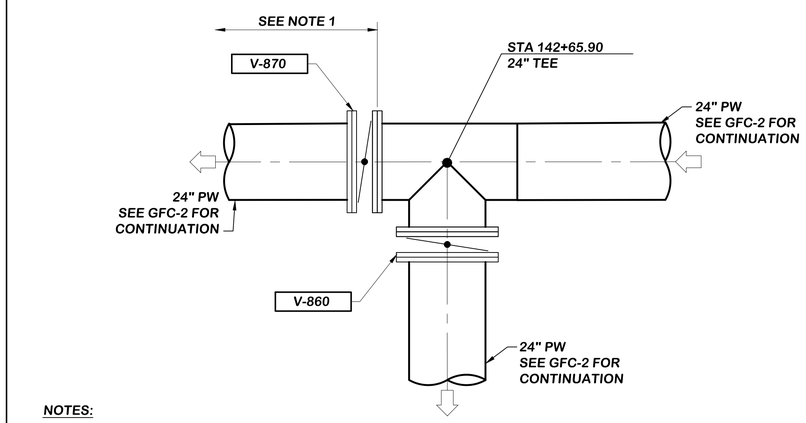
P:\Projects\FPUD (0112)\0002 St Marg Conjunctive Use Project\CADD\CD-4 – GRADING COORDINATES.dwg 06/25/2019 12:58



NOTE:

1. WEAKENED PLANE JOINT PER SDRSD G-9 AND G-10.
2. INSTALL SUBDRAIN ONLY WHERE NOTED ON PLANS.

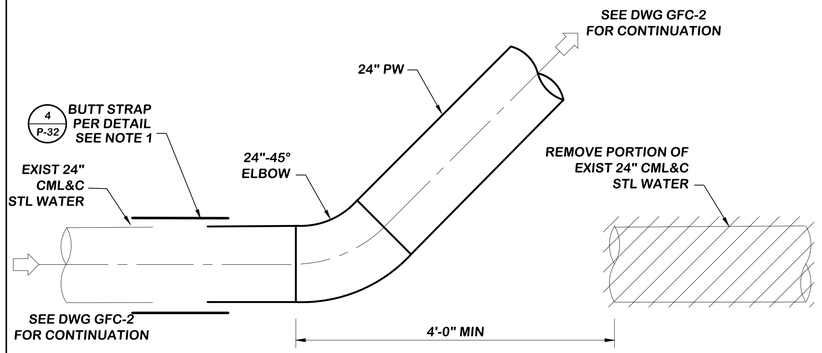
RIBBON GUTTER — 1 GFC-1 — 1
SCALE: NTS



NOTES:

1. BID ALTERNATE PIPING AND BUTTERFLY VALVE. IF BID ALTERNATE PIPING IS NOT CONSTRUCTED, INSTALL A 24" BLIND FLANGE.

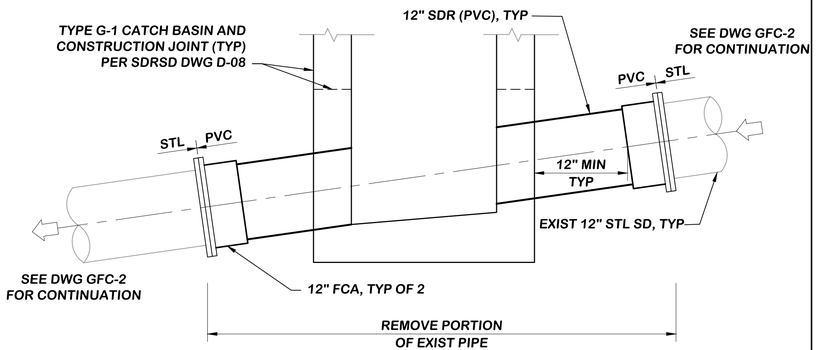
CONNECTION DETAIL DISCH TO RED MOUNTAIN — 2 GFC-2
SCALE: NTS



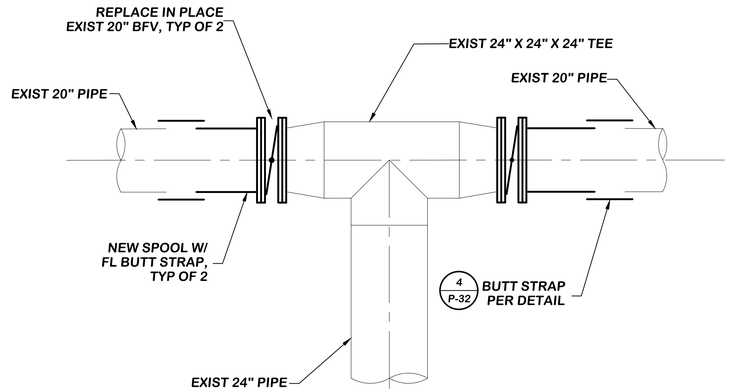
NOTES:

1. CONTRACTOR TO FIELD VERIFY LOCATION AND DEPTH OF CONNECTION TO EXISTING PIPE.

CONNECTION DETAIL FROM GHEEN SYSTEM — 3 GFC-2
SCALE: NTS



CATCH BASIN DETAIL SECTION LOOKING NORTHEAST — 4 GFC-2
SCALE: NTS



VALVE REPLACEMENT EXIST TEE — 5 GFC-2
SCALE: NTS

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED DETAIL	05/24/19	IEC

SCALE NTS
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY IEC
DRAWN BY IEC
CHECKED BY DP

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REGISTERED PROFESSIONAL ENGINEER — DAVID PADILLA — No. C59744 Exp. 12-31-18 — STATE OF CALIFORNIA — CIVIL
06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

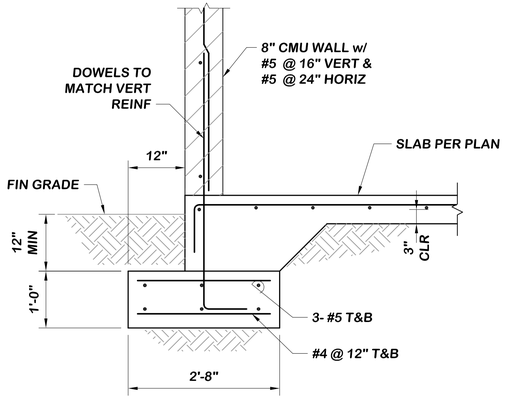
JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

GHEEN FACILITY DETAILS

DRAWING NO. GFC-6
SHEET NO. 58 OF 387
CLIENT JOB NO. 2744

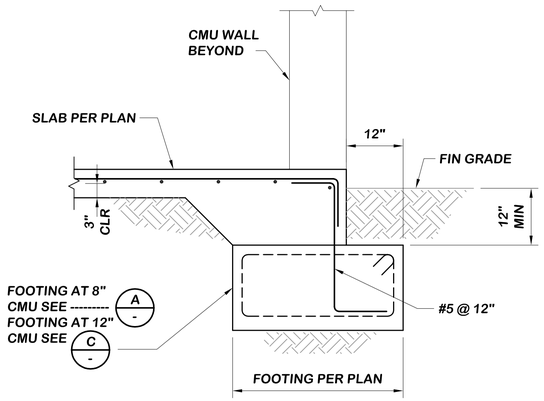
P:\Projects\FPUD (0112)\0002 St Marg Conjunctive Use Project\CAD\GFC-06 -Gheen Details.dwg 05/30/2019 13:50



FOOTING AT 8" CMU WALL

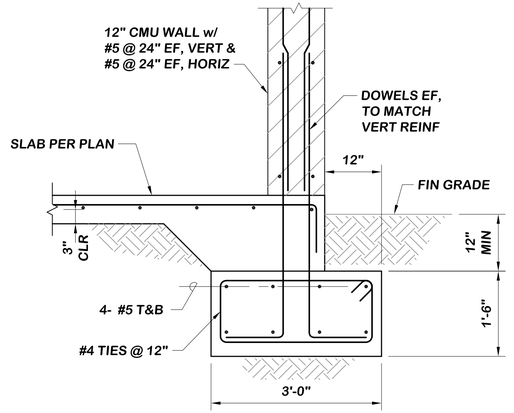
SECTION A / GFS-2

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



SECTION B / GFS-2

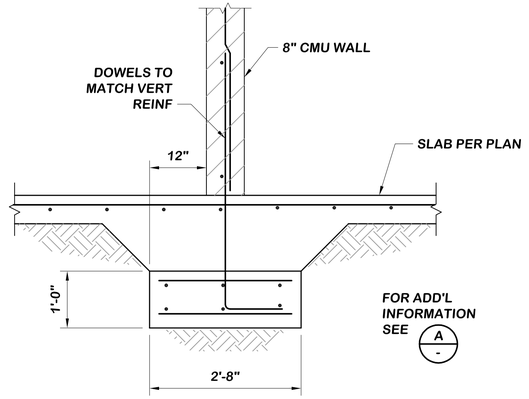
SCALE: 3/4" = 1'-0"



FOOTING AT 12" CMU WALL

SECTION C / GFS-2

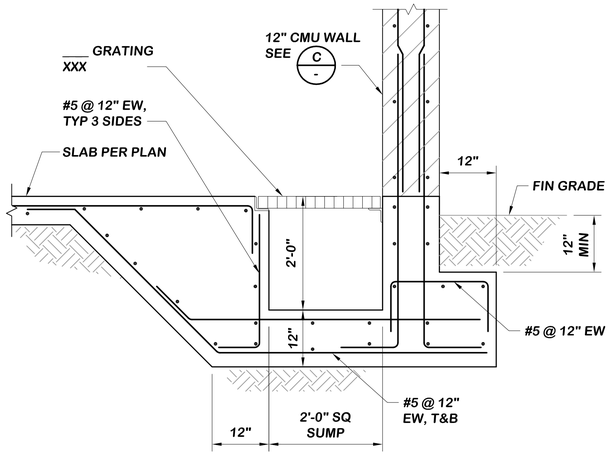
SCALE: 3/4" = 1'-0"



FOOTING AT 8" CMU WALL

SECTION D / GFS-2

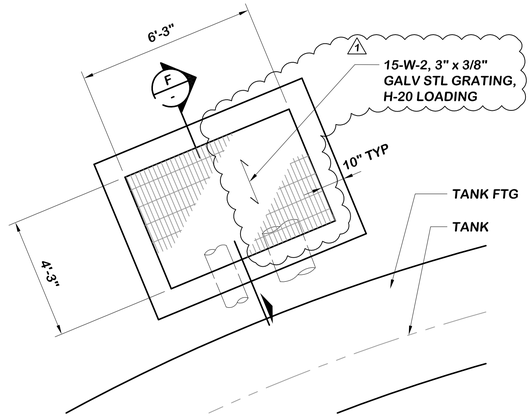
SCALE: 3/4" = 1'-0"



SECTION AT SUMP

SECTION E / GFS-2

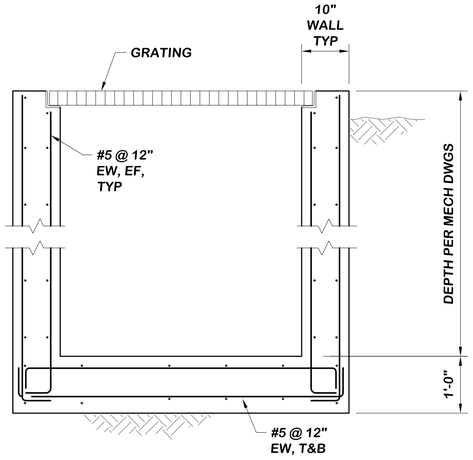
SCALE: 3/4" = 1'-0"



OVERFLOW / DRAIN STRUCTURE

DETAIL 1 / GFS-1

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



OVERFLOW DRAIN STRUCTURE

SECTION F / -

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

TOP SLAB AT 8" CMU GABLE WALL

SECTION G / GFS-3

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

Beyaz & Patel
10920 Via Frontera, Ste 210
San Diego, California 92127
(858) 451-0374

REGISTERED PROFESSIONAL ENGINEER — Ghanashchandra A. Patel — No. 42333 — Exp. 6-30-17 — STRUCTURAL — STATE OF CALIFORNIA

06-19-17

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED DETAIL	06/25/19	B&P

SCALE AS SHOWN
DATE 06/19/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY HIW
DRAWN BY JEN
CHECKED BY SP

Infrastructure ENGINEERING CORPORATION
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DATE

Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

GHEEN FACILITY PUMP STATION SECTIONS AND DETAILS

DRAWING NO. GFS-8
SHEET NO. 292 OF 387
CLIENT JOB NO. 2744

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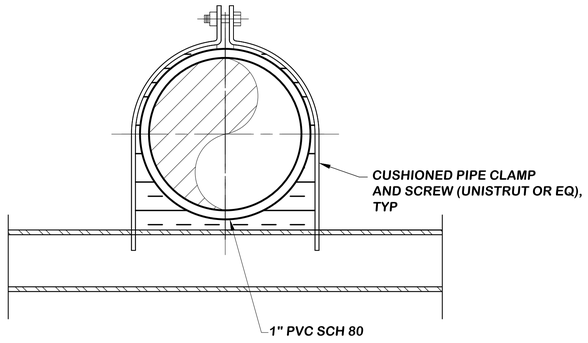
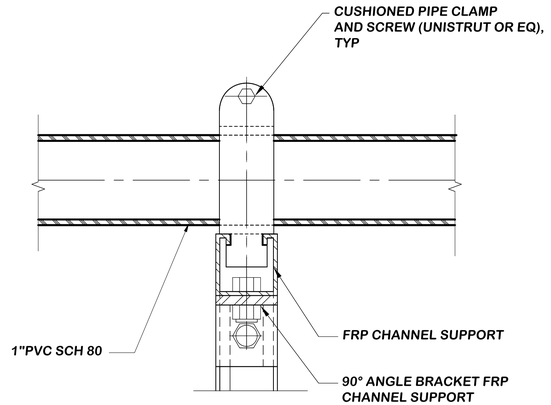
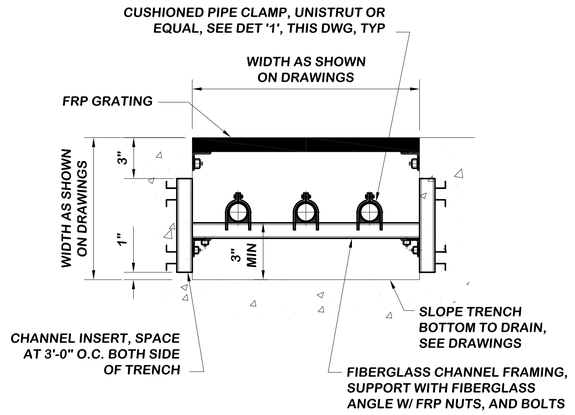


END VIEW
N.T.S.

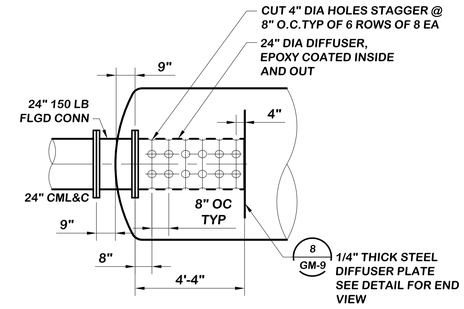


SIDE VIEW
N.T.S.

CUSHIONED PIPE SUPPORT (1)
N.T.S.



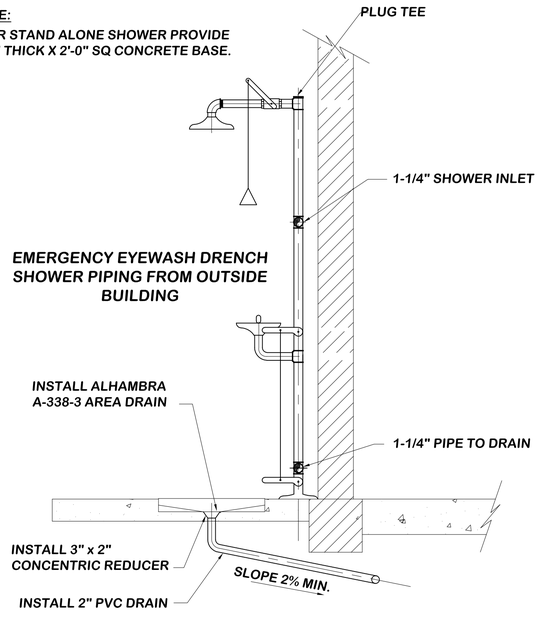
PIPE TRENCH (2)
N.T.S.



SIDE VIEW

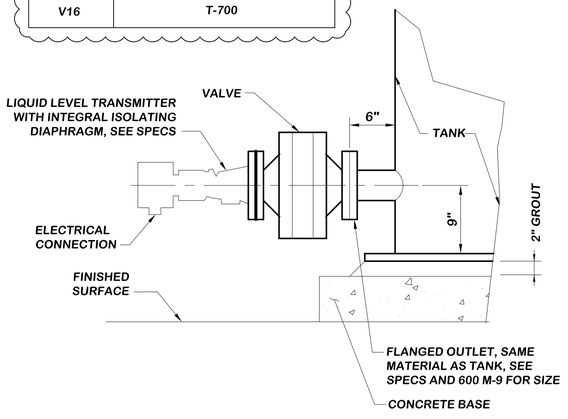
DIFFUSER DETAIL (3)
N.T.S.

NOTE:
FOR STAND ALONE SHOWER PROVIDE 12" THICK X 2'-0" SQ CONCRETE BASE.

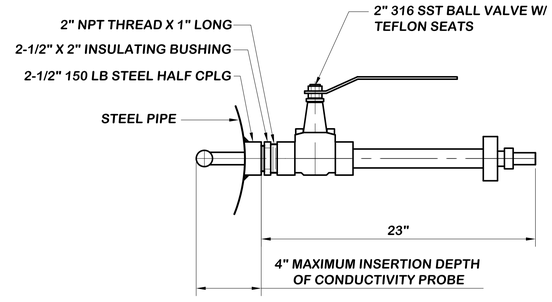


EYEWASH SHOWER (4)
N.T.S.

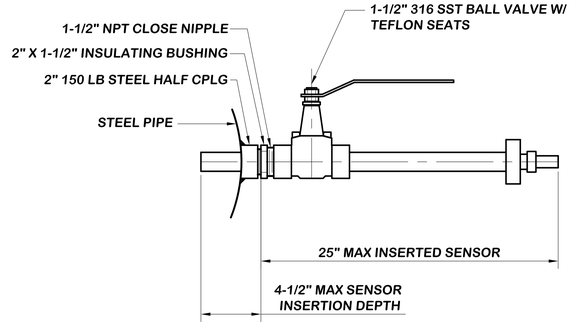
REFERENCE	
VALVE	APPLICATION
V345	T-600, T-601, T-610, T-630, T-640, T-650, T-680
V349	T-670
V6	T-200, T-300, T-500, T-700, T-800
V16	T-700



LEVEL TRANSMITTER (5)
N.T.S.



CONDUCTIVITY SENSOR (6)
N.T.S.



ORP AND pH SENSOR (7)
N.T.S.

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED DETAIL 5	06/18/19	IEC

SCALE NTS
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RLG
DRAWN BY RLG
CHECKED BY RK

Infrastructure ENGINEERING CORPORATION
14271 Danielson Street
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www.iecorporation.com

REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA
06/16/2017
DATE

FRD Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

MISCELLANEOUS MECHANICAL DETAILS

DRAWING NO. GM-6
SHEET NO. 212 OF 387
CLIENT JOB NO. 2744

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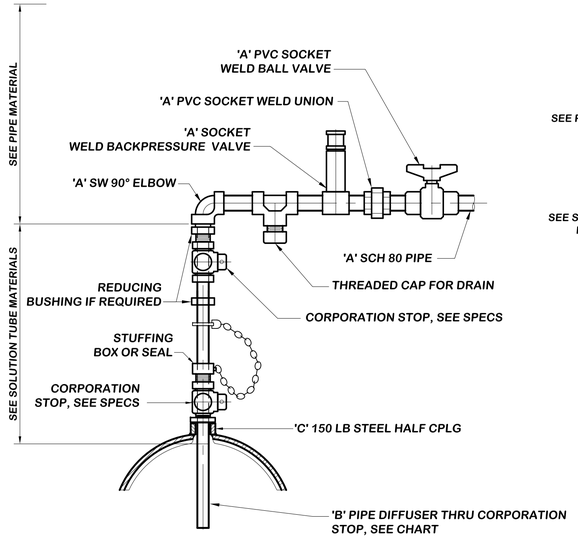
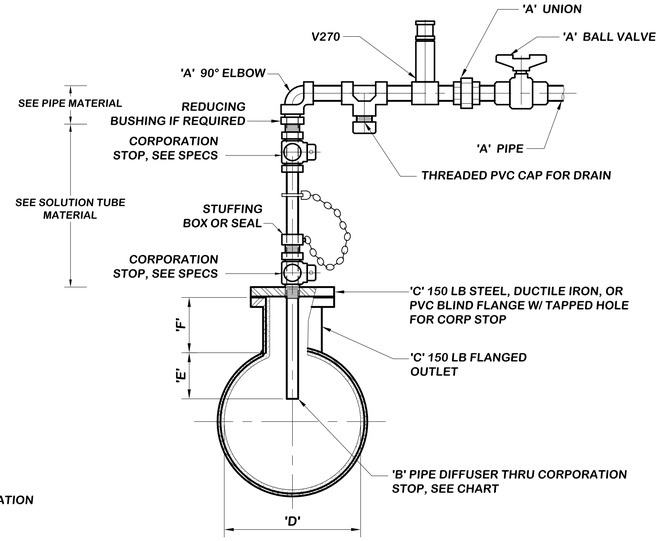


TYPE 'A'



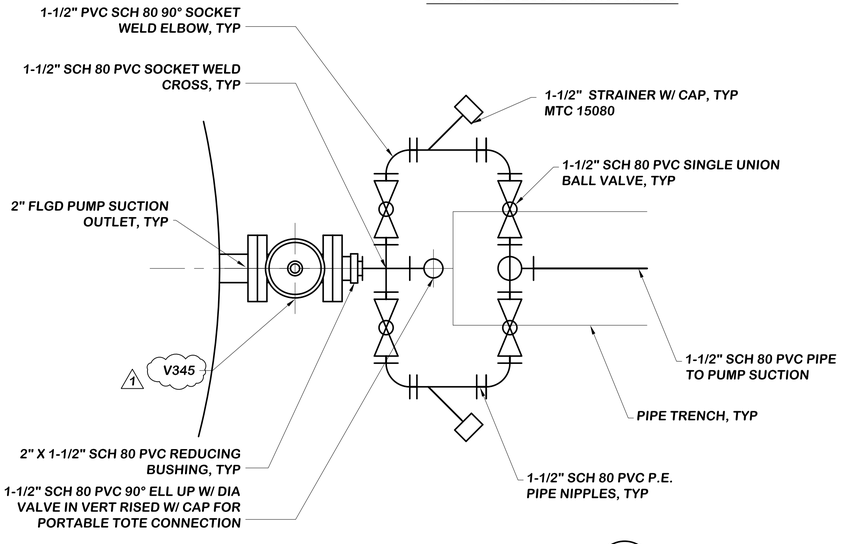
TYPE 'B'

DIMENSIONS IN INCHES											
TAG NO.	CHEMICAL	PIPE MATERIAL	SAF-T-FLO-MODEL	SOLUTON TUBE MATERIAL	CHECK VALVE SEAL TYPE	'A' (IN)	'B' (IN)	'C' (IN)	'D' (IN)	'E' (IN)	'F' (IN)
IQ-200A	H	PVC	EB-146-B-H-6-0-V	HASTELLOY C-276	VITON	1	1/2	N/A	24	12	N/A
IQ-200B	H	PVC	EB-146-B-H-6-0-V	HASTELLOY C-276	VITON	1	1/2	N/A	24	12	N/A
IQ-300	SB	PVC	EB-146-B-S-6-0-E	316SST	EPDM	1	1/2	N/A	16	8	N/A
IQ-353A	H	PVC	EB-146-B-H-6-0-V	HASTELLOY C-276	VITON	1	1/2	N/A	14	7	N/A
IQ-353B	H	PVC	EB-146-B-H-6-0-V	HASTELLOY C-276	VITON	1	1/2	N/A	14	7	N/A
IQ-400	SAC	C20	EB-146-B-H-6-0-V	HASTELLOY C-276	VITON	3/4	1/2	12	12	6	12
IQ-401	TI	PVDF	EB-146-B-S-6-0-E	316SST	EPDM	1/2	1/2	12	12	6	12
IQ-500	PA	PVC	EB-146-H-S-6-0-E	HASTELLOY C-276	VITON	1	1/2	12	12	6	12
IQ-501	CS	PVC	EB-146-B-S-6-0-E	316SST	EPDM	1	1/2	12	12	6	12
IQ-502	H	PVC	EB-146-B-H-6-0-V	HASTELLOY C-276	VITON	1	1/2	12	12	6	12
IQ-504	FL	PVDF	EB-146-B-H-6-0-V	HASTELLOY C-276	VITON	1	1/2	12	12	6	12
IQ-503A	AA	PVC	EB-146-B-S-6-0-E	316SST	EPDM	1	1/2	24	24	12	N/A
IQ-503B	AA	PVC	EB-146-B-S-6-0-E	316SST	EPDM	1	1/2	24	24	12	N/A
IQ-700	FC	PVC	EB-146-B-H-6-0-V	HASTELLOY C-276	VITON	1	1/2	24	24	12	N/A

CHEMICAL DIFFUSER
N.T.S.

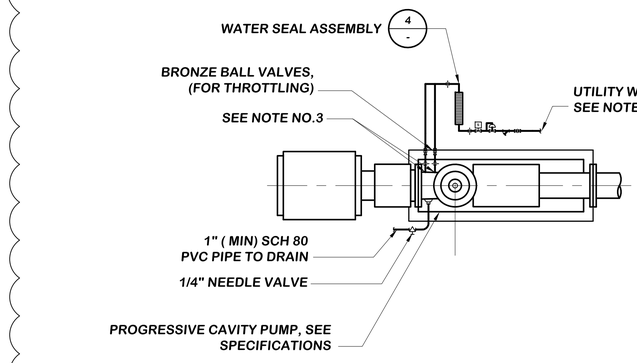
1 / X

NOTE: SEE SPECS FOR 15100 VALVES



PUMP SUCTION HEADER
N.T.S.

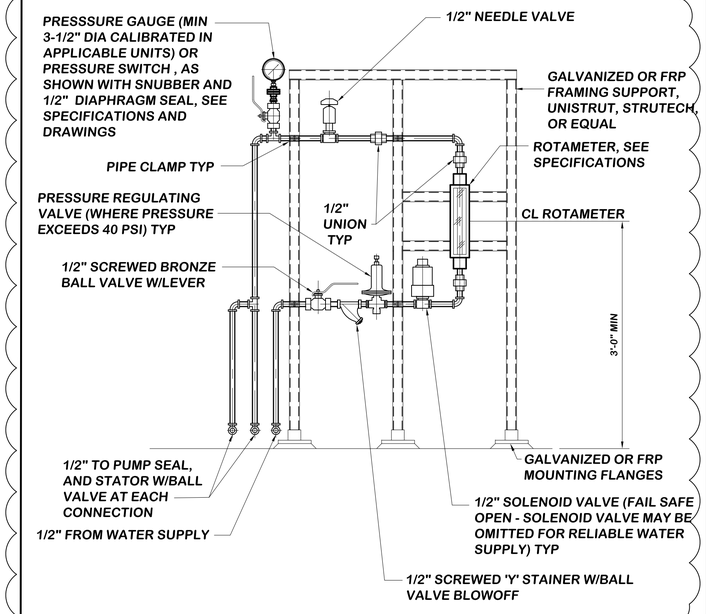
2 / -



NOTES:
1. ON POTABLE WATER SUPPLY SYSTEM PROVIDE REDUCED PRESSURE BACKFLOW PREVENTER IN SUPPLY LINE.
2. FOR PIPING MATERIALS SEE DRAWINGS AND SPECIFICATIONS.
3. USE TAP AT PUMP SUCTION OR PROVIDE NEW ½" TAP.
4. FOR TRUE ORIENTATION SEE DRAWING 700M-1.

1 PROGRESSIVE CAVITY PUMP SEAL HOOK-UP
N.T.S.

3 / -



1 WATER SEAL ASSEMBLY FOR CAVITY PUMP
N.T.S.

4 / -

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED DETAILS 2 & 3	06/11/19	IEC
2	ADDED DETAIL 4	06/11/19	IEC

SCALE NTS
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RLG
DRAWN BY RLG
CHECKED BY RK

Infrastructure ENGINEERING CORPORATION
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REGISTERED PROFESSIONAL ENGINEER ROSS W. MAXWELL No. C82681 Exp. 9-30-18 CIVIL STATE OF CALIFORNIA

06/16/2017
DATE

Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

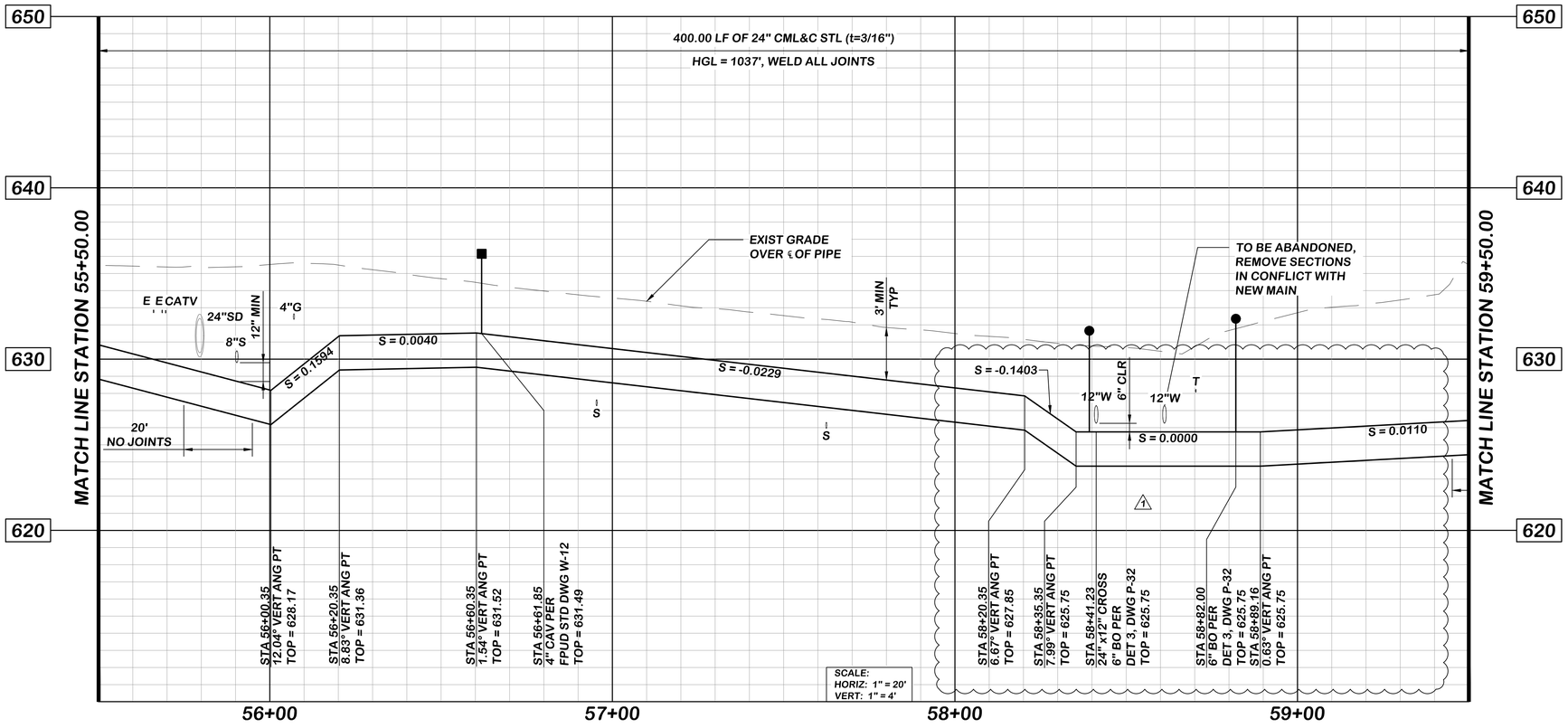
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

MISCELLANEOUS MECHANICAL DETAILS

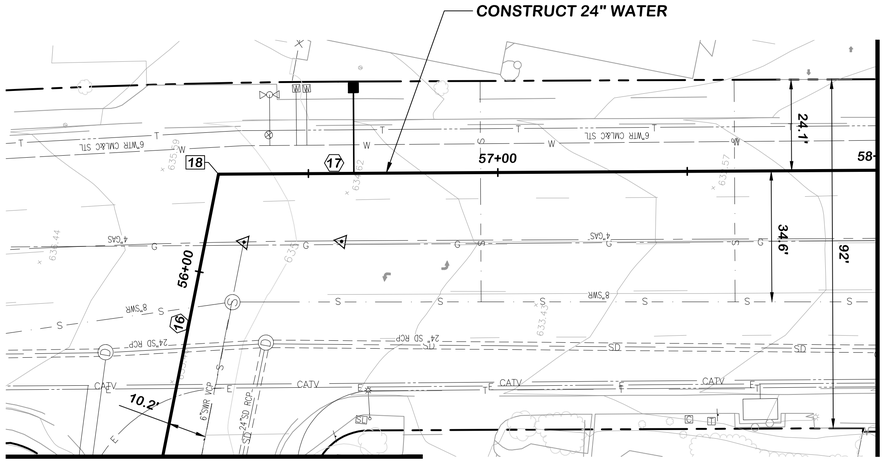
DRAWING NO. GM-8
SHEET NO. 214 OF 387
CLIENT JOB NO. 2744

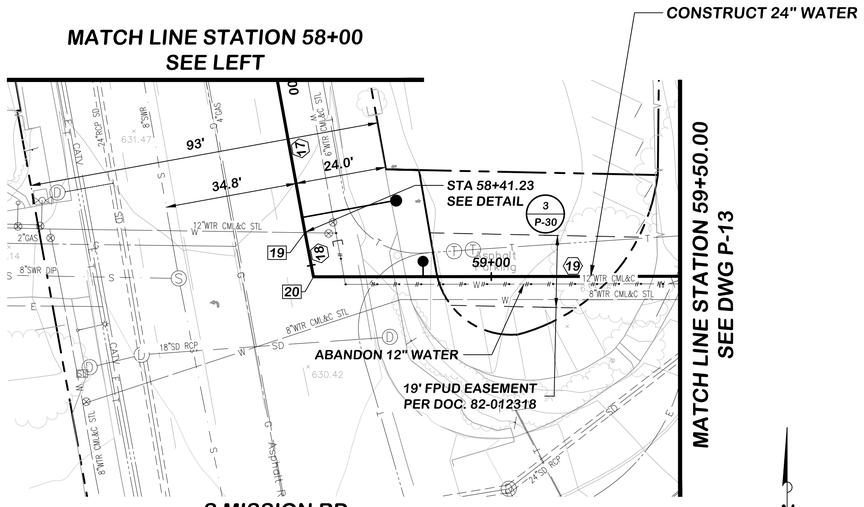
P:\Projects\FPUD (0112)\0002 Sta Marg Conjunctive Use Project\CADD\MECHANICAL\GM-8-DETAILS.dwg 06/24/2019 15:49



NOTES

1. CONTRACTOR SHALL INSTALL FULL-LANE WIDTH CHIP SEAL ALONG S MISSION ROAD.





COORDINATE TABLE				
NO	STATION	NORTHING	EASTING	DESCRIPTION
18	56+26.26	2078343.86	6256407.11	78.48° HORIZ ANG PT
19	58+41.23	2078132.38	6256445.66	CROSS
20	58+53.09	2078120.73	6256447.90	79.23° HORIZ ANG PT

DATA TABLE					
⬡	△/BEARING	R	L	T	DESCRIPTION
16	SEE DWG P-09				
17	S10° 19' 52"E		214.97'		24" CML&C STL
18	S10° 51' 18"E		11.86'		24" CML&C STL
19	N89° 54' 52"E		126.98'		24" CML&C STL

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED PROFILE	05/24/19	IEC

SCALE 1" = 20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RK
DRAWN BY RI
CHECKED BY DP

Infrastructure ENGINEERING CORPORATION
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www.iecorporation.com

REGISTERED PROFESSIONAL ENGINEER DAVID PADILLA No. C55574 Exp. 12-31-18 CIVIL STATE OF CALIFORNIA
06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PRODUCT WATER PLAN AND PROFILE STA 55+50.00 TO STA 59+50.00

DRAWING NO. P-12
SHEET NO. 96 OF 387
CLIENT JOB NO. 2744

450.00 LF OF 24" CML&C STL (t=3/16")
HGL = 1037', WELD ALL JOINTS

MATCH LINE STATION 59+50.00

MATCH LINE STATION 64+00.00

EXIST GRADE OVER ℄ OF PIPE

18"SD

6"W GET

8"S

24"SD

12" MIN

S = 0.1009

S = 0.0278

S = 0.0684

S = 0.4068

S = 0.1292

S = 0.1811

3' MIN TYP

IDENTICAL POINT

20' NO JOINTS

EXIST GRADE OVER ℄ OF PIPE

S = 0.1561

S = 0.0787

S = 0.0491

S = 0.0262

STA 60+32.4± 6" FH ASSY PER FPUD STD DWG W-9 TOP = 632.8±

STA 60+98.6± 1" WS PER FPUD STD DWG W-1 TOP = 641.6±

STA 61+96.9± 1" WS PER FPUD STD DWG W-1 TOP = 658.7±

STA 62+40.5± 1" WS PER FPUD STD DWG W-1 TOP = 664.8±

STA 62+71.7± 1" WS PER FPUD STD DWG W-1 TOP = 667.2±

STA 62+98.2± 6" FH ASSY PER FPUD STD DWG W-9 TOP = 668.5±

STA 63+39.0± 1" WS PER FPUD STD DWG W-1 TOP = 669.8±

STA 63+97.3± 1" WS PER FPUD STD DWG W-1 TOP = 671.4±

STA 59+69.16 21.51° VERT ANG PT TOP = 626.63

STA 59+77.36 20.54° VERT ANG PT TOP = 629.96

STA 59+80.07 24"x6" CROSS TOP = 630.02

STA 60+00.94 2.32° VERT ANG PT TOP = 630.61

STA 60+37.36 1.85° VERT ANG PT TOP = 633.10

STA 60+57.36 1.60° VERT ANG PT TOP = 635.12

STA 60+77.36 2.90° VERT ANG PT TOP = 637.71

STA 61+70.70 1.39° VERT ANG PT TOP = 654.61

STA 62+30.70 4.37° VERT ANG PT TOP = 663.98

STA 62+70.70 1.69° VERT ANG PT TOP = 667.13

STA 63+10.70 1.31° VERT ANG PT TOP = 669.09

SCALE:
HORIZ: 1" = 20'
VERT: 1" = 4'

60+00 61+00 62+00 63+00 64+00

STA 59+80.07
SEE DETAIL 4 P-30

OLD STAGE RD

CONSTRUCT 24" WATER

16.5' FPUD EASEMENT PER DOC NO. 2001-0653408

MATCH LINE STATION 59+50.00 SEE DWG P-12

MATCH LINE STATION 64+00.00 SEE DWG P-14

Asphalt Rd

6.3'

11.0'

7.2'

1.4'

ABANDON 12" WATER

16.5' FPUD EASEMENT PER DOC. 2001-0653408

CAUTION!
EXISTING OH UTILITY

OLD STAGE RD

PALOMINO RD

COORDINATE TABLE

NO	STATION	NORTHING	EASTING	DESCRIPTION
21	59+80.07	2078120.92	6256574.87	TEE
22	59+91.95	2078120.94	6256586.76	22.50° HORIZ ANG PT
23	60+00.94	2078124.39	6256595.06	23.82° HORIZ ANG PT
24	61+20.13	2078121.84	6256714.22	22.24° HORIZ ANG PT
25	61+30.70	2078125.63	6256724.09	22.19° HORIZ ANG PT

DATA TABLE

⬡	△/BEARING	R	L	T	DESCRIPTION
19	SEE DWG P-12				
20	N89° 54' 46"E		11.88'		24" CML&C STL
21	N67° 24' 52"E		8.99'		24" CML&C STL
22	S88° 46' 14"E		119.19'		24" CML&C STL
23	N68° 59' 42"E		10.57'		24" CML&C STL
24	S88° 48' 58"E		640.69'		24" CML&C STL

N

SCALE: 1" = 20'
0 10' 20'

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED PROFILE	05/24/19	IEC

SCALE 1" = 20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RK
DRAWN BY RI
CHECKED BY DP

Infrastructure ENGINEERING CORPORATION
14271 Danielson Street
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www.iecorporation.com

REGISTERED PROFESSIONAL ENGINEER DAVID PADILLA No. C55974 Exp. 12-31-18 CIVIL STATE OF CALIFORNIA
06/16/2017
DATE

FPUD Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PRODUCT WATER PLAN AND PROFILE STA 59+50.00 TO STA 64+00.00

DRAWING NO. P-13
SHEET NO. 97 OF 387
CLIENT JOB NO. 2744

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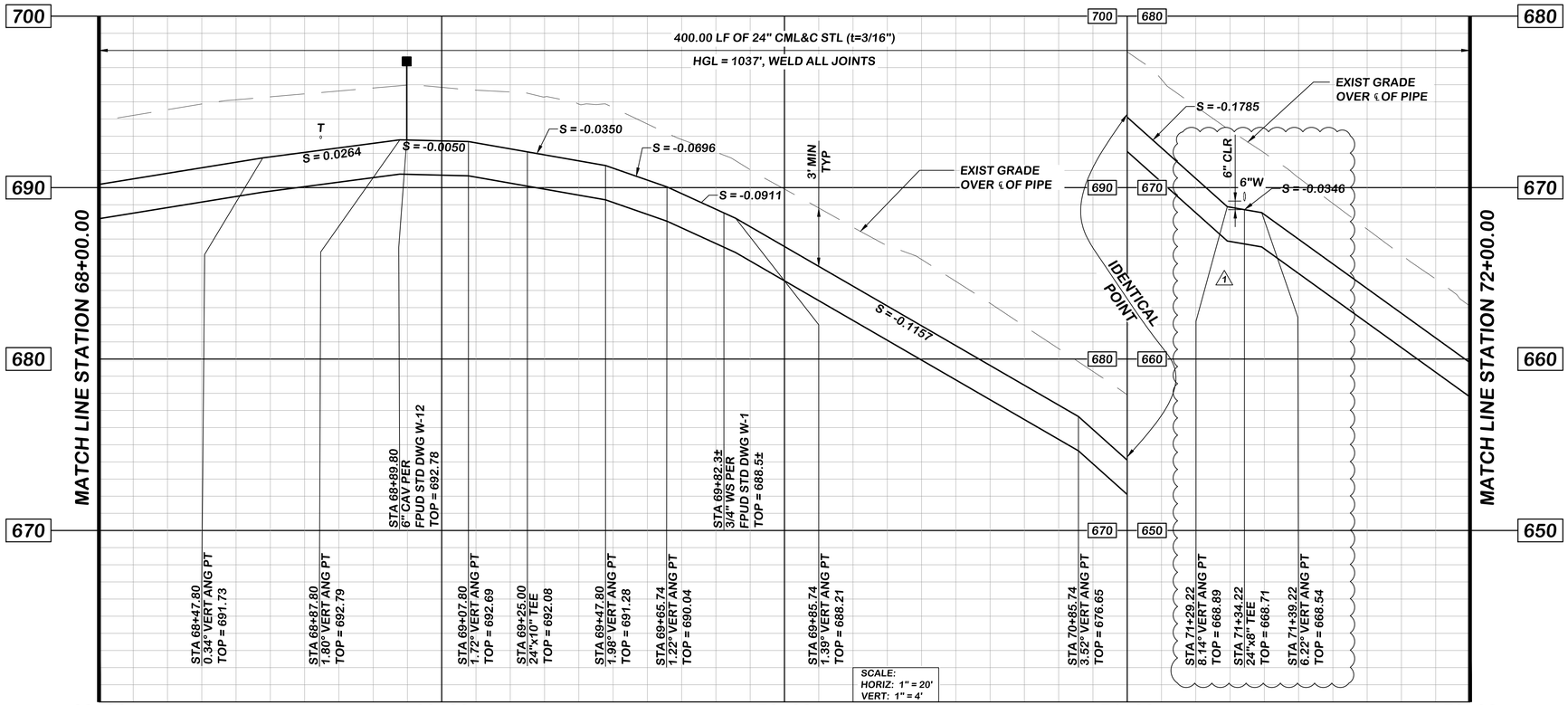

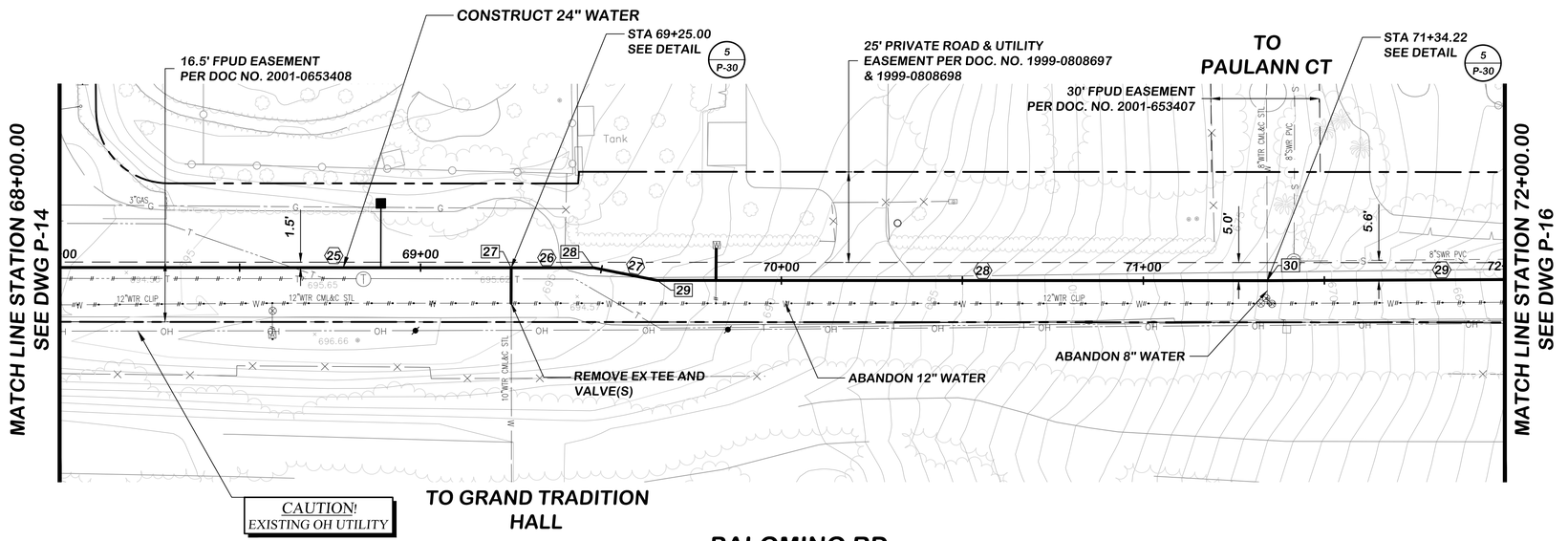

COORDINATE TABLE				
NO	STATION	NORTHING	EASTING	DESCRIPTION
27	69+24.99	2078109.64	6257518.23	TEE
28	69+47.80	2078109.24	6257541.02	11.25° HORIZ ANG PT
29	69+65.74	2078105.43	6257558.55	11.25° HORIZ ANG PT
30	71+34.22	2078102.42	6257727.01	TEE

DATA TABLE					
⬡	△/BEARING	R	L	T	DESCRIPTION
25	SEE DWG P-14				
26	S88° 58' 56"E		22.80'		24" CML&C STL
27	S77° 43' 37"E		17.94'		24" CML&C STL
28	S88° 58' 37"E		168.48'		24" CML&C STL
29	S89° 16' 40"E		212.60'		24" CML&C STL

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED PROFILE	05/24/19	IEC

SCALE 1" = 20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RK
DRAWN BY RI
CHECKED BY DP

Infrastructure ENGINEERING CORPORATION
14271 Danielson Street
Poway, California 92064
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www.iecorporation.com

REGISTERED PROFESSIONAL ENGINEER DAVID PADILLA No. C59714 Exp. 12-31-18 STATE OF CALIFORNIA CIVIL

06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PRODUCT WATER PLAN AND PROFILE STA 68+00.00 TO STA 72+00.00

DRAWING NO. P-15
SHEET NO. 99 OF 387
CLIENT JOB NO. 2744

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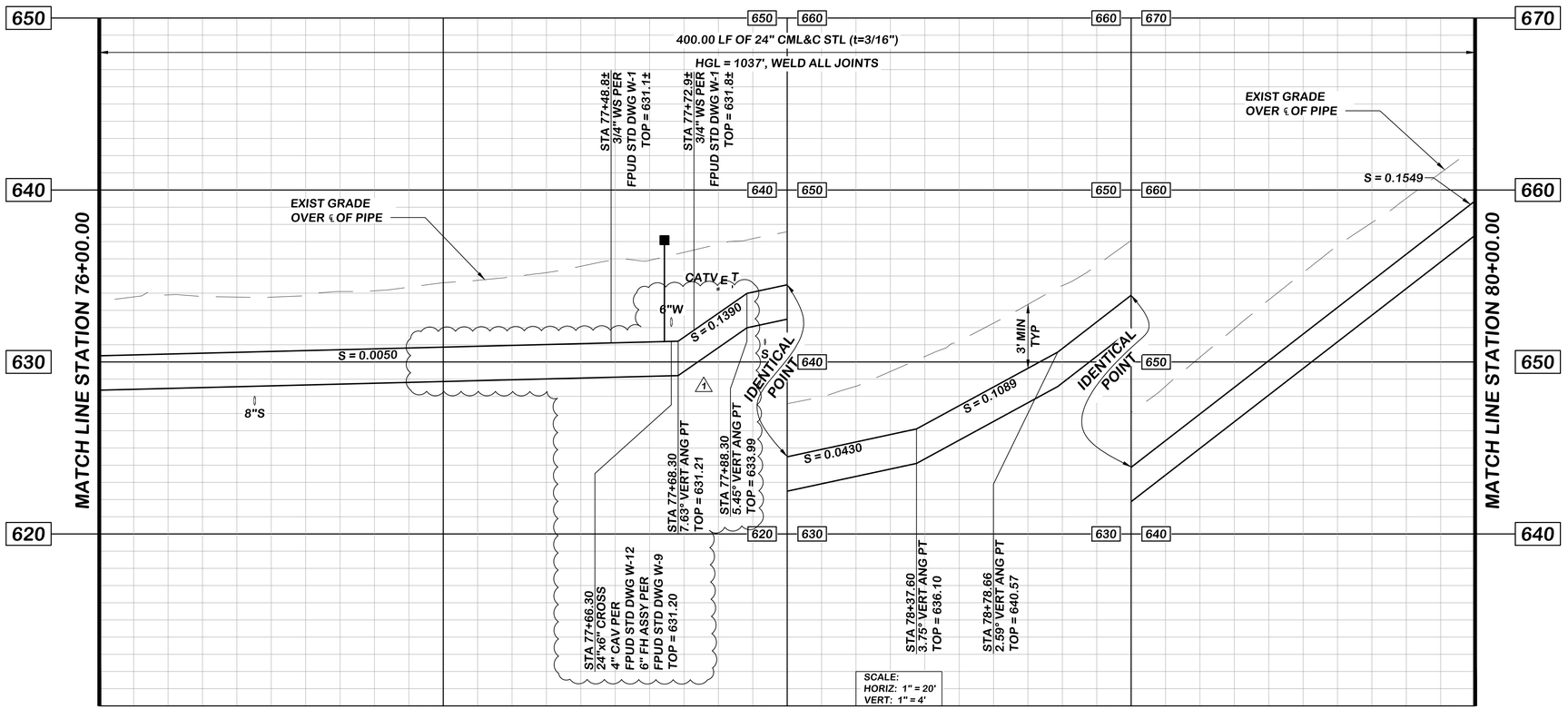

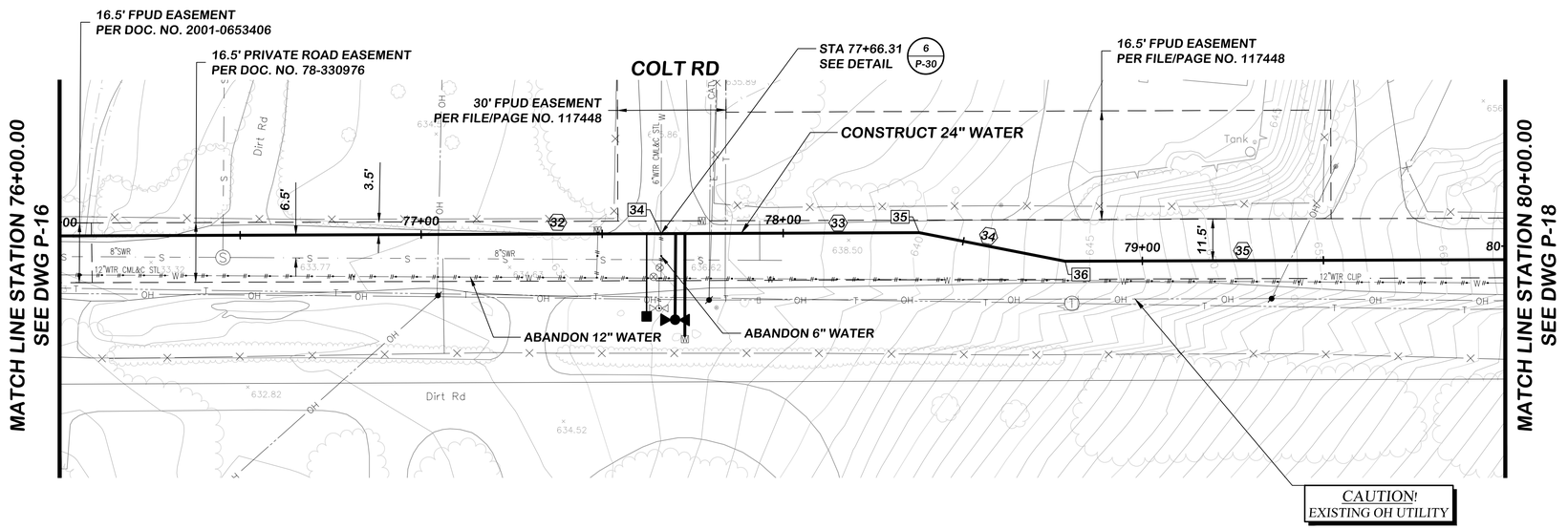

COORDINATE TABLE

NO	STATION	NORTHING	EASTING	DESCRIPTION
34	77+66.30	2078102.69	6258358.92	TEE
35	78+37.60	2078102.94	6258430.23	11.25° HORIZ ANG PT
36	78+78.66	2078095.07	6258470.52	11.25° HORIZ ANG PT

DATA TABLE

⬡	△/BEARING	R	L	T	DESCRIPTION
32	SEE DWG P-16				
33	N89° 47' 43"E		71.30'		24" CML&C STL
34	S78° 56' 53"E		41.06'		24" CML&C STL
35	N89° 48' 07"E		485.44'		24" CML&C STL

N

SCALE: 1" = 20'
0 10' 20'

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED PROFILE	05/24/19	IEC

SCALE 1" = 20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RK
DRAWN BY RI
CHECKED BY DP

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www.iecorporation.com

REGISTERED PROFESSIONAL ENGINEER — DAVID PADILLA — No. C59744 Exp. 12-31-18 — STATE OF CALIFORNIA — CIVIL

06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PRODUCT WATER PLAN AND PROFILE STA 76+00.00 TO STA 80+00.00

DRAWING NO. P-17
SHEET NO. 101 OF 387
CLIENT JOB NO. 2744

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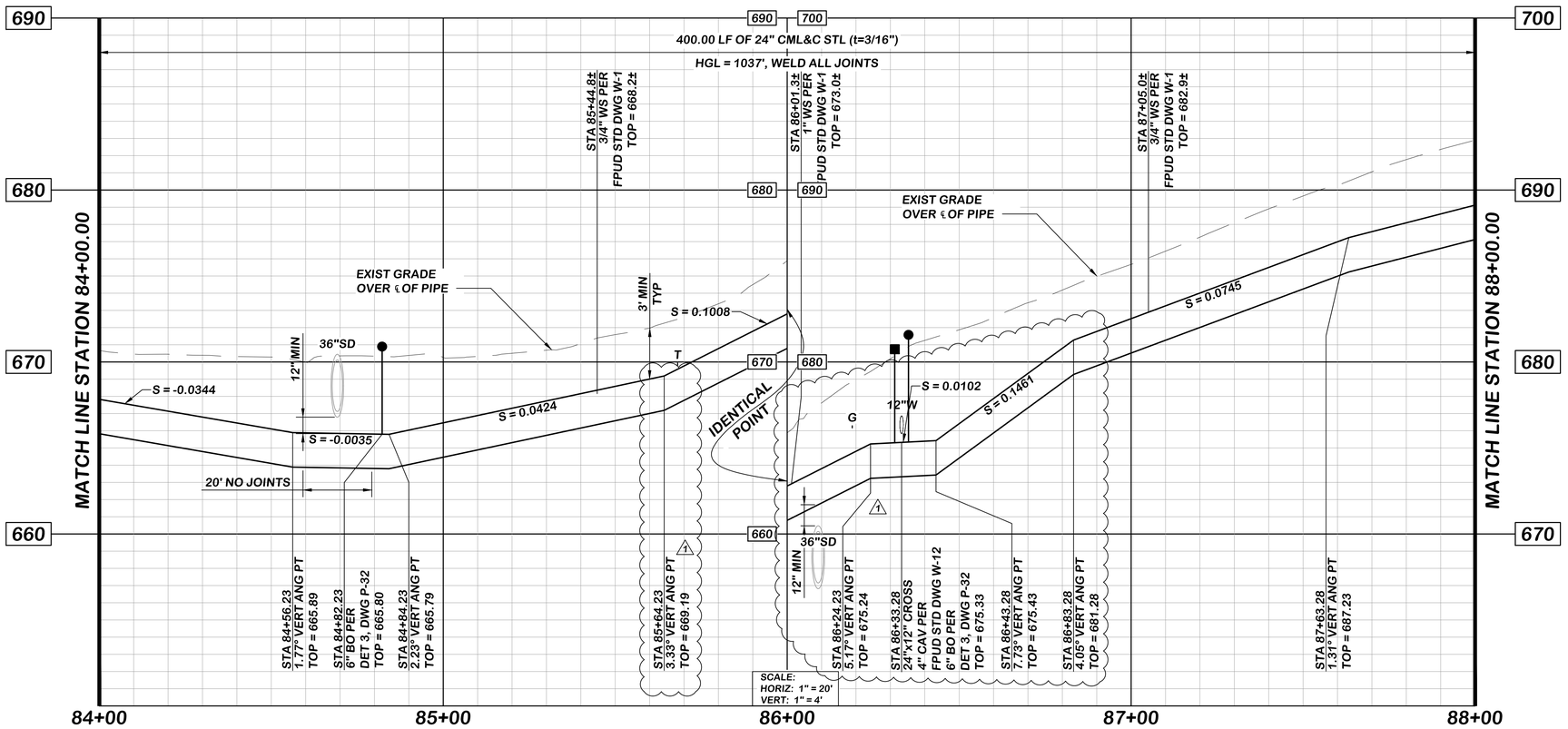

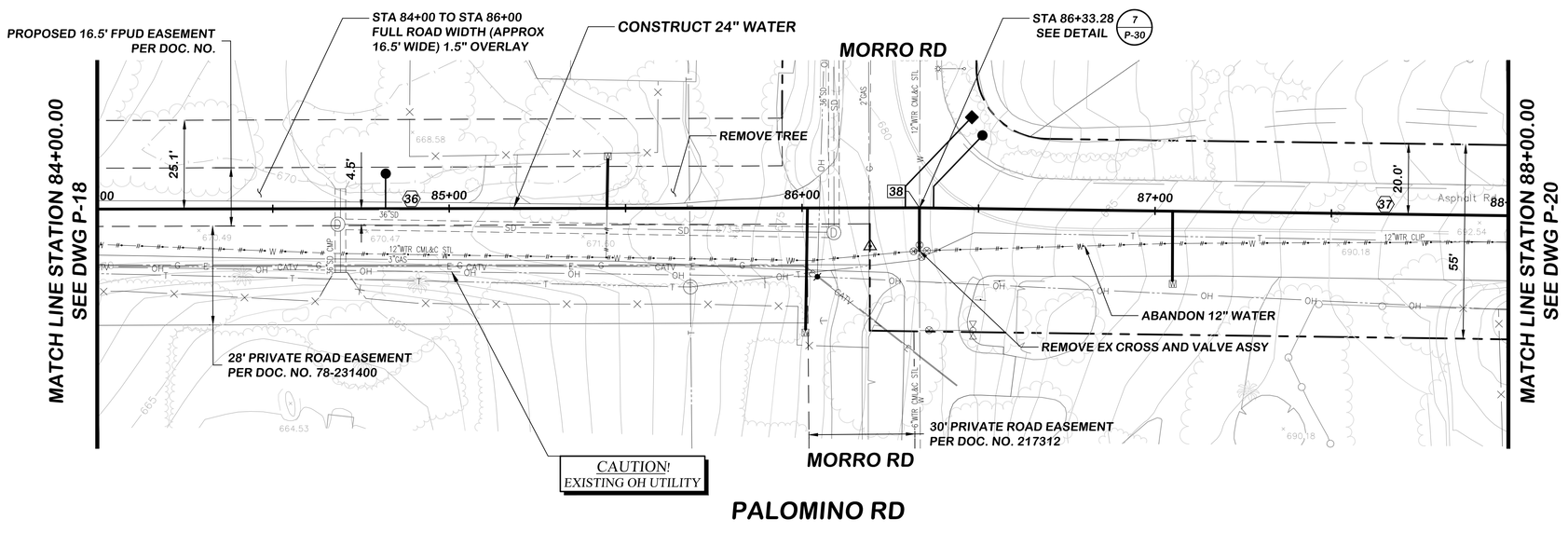

COORDINATE TABLE				
NO	STATION	NORTHING	EASTING	DESCRIPTION
38	86+33.27	2078097.18	6259225.13	TEE

DATA TABLE					
⬡	△/BEARING	R	L	T	DESCRIPTION
36	SEE DWG P-18				
37	S89° 13' 38"E		237.81'		24" CML&C STL

N

SCALE: 1" = 20'
0 10' 20'

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED PROFILE	05/24/19	IEC

SCALE 1" = 20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RK
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REGISTERED PROFESSIONAL ENGINEER DAVID PADILLA No. C059744 Exp. 12-31-18 STATE OF CALIFORNIA CIVIL
06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PRODUCT WATER PLAN AND PROFILE STA 84+00.00 TO STA 88+00.00

DRAWING NO. P-19
SHEET NO. 103 OF 387
CLIENT JOB NO. 2744

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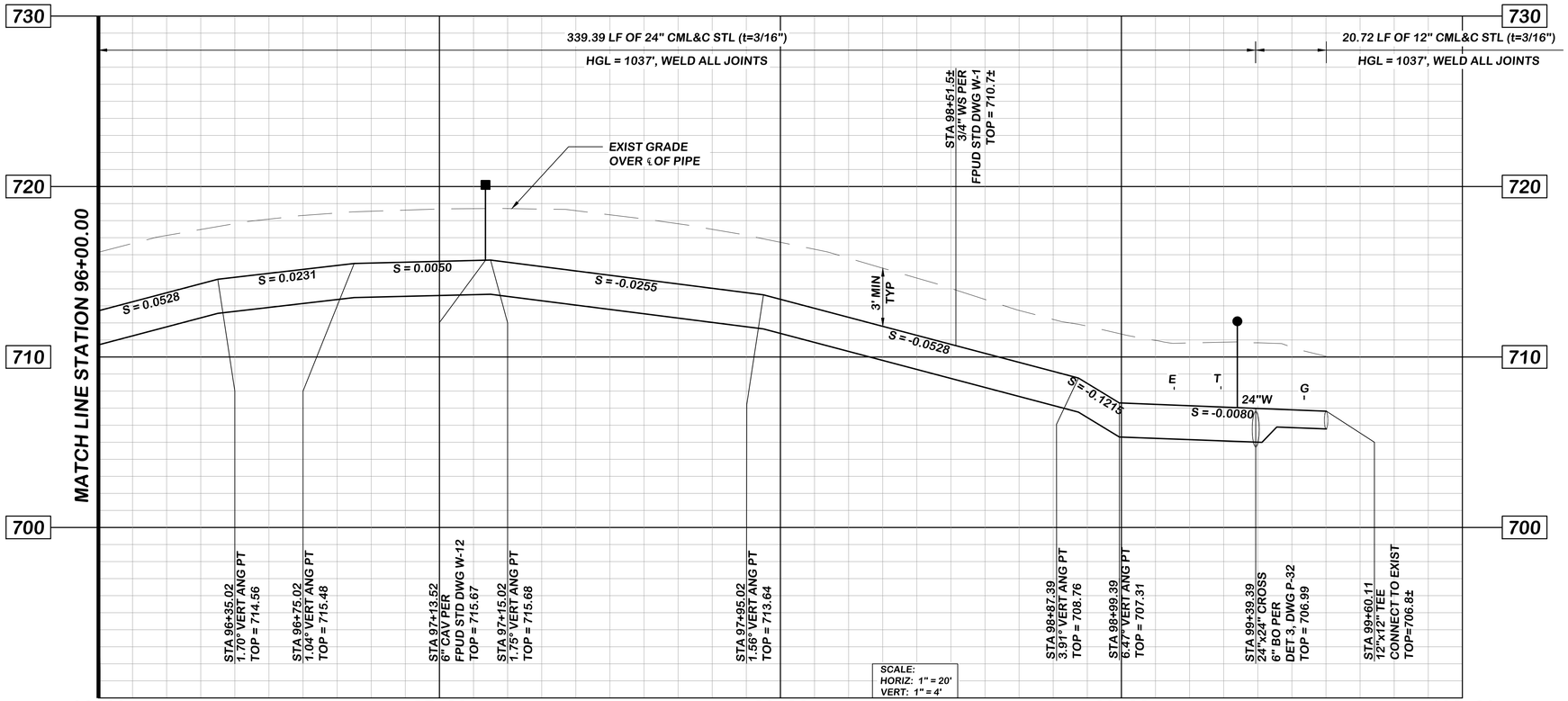

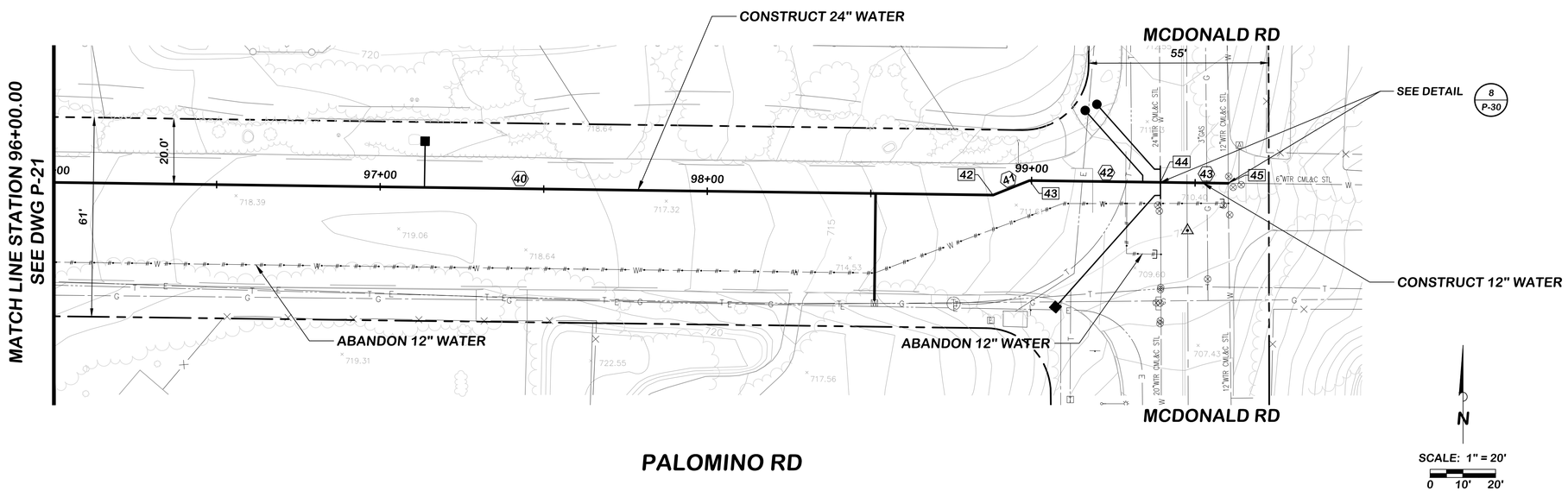

COORDINATE TABLE				
NO	STATION	NORTHING	EASTING	DESCRIPTION
42	98+87.39	2078080.26	6260479.14	22.50° HORIZ ANG PT
43	98+99.39	2078084.70	6260490.28	22.50° HORIZ ANG PT
44	99+39.39	2078084.16	6260530.28	CROSS
45	99+60.11	2078083.88	6260550.99	CROSS / END PIPELINE

DATA TABLE					
⬡	△/BEARING	R	L	T	DESCRIPTION
40	SEE DWG P-21				
41	N68° 16' 25"E		11.99'		24" CML&C STL
42	S89° 13' 37"E		40.00'		24" CML&C STL
43	S89° 13' 37"E		20.72'		12" CML&C STL

NO.	DESCRIPTION	DATE	APPROVED

SCALE 1" = 20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RK
DRAWN BY RI
CHECKED BY DP

Infrastructure ENGINEERING CORPORATION
14271 Danielson Street
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www.iecorporation.com

REGISTERED PROFESSIONAL ENGINEER — DAVID PADILLA — No. C59744 Exp. 12-31-18 — STATE OF CALIFORNIA — CIVIL

06/16/2017
DATE

Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PRODUCT WATER PLAN AND PROFILE STA 96+00.00 TO STA 99+60.11

DRAWING NO. P-22
SHEET NO. 106 OF 387
CLIENT JOB NO. 2744

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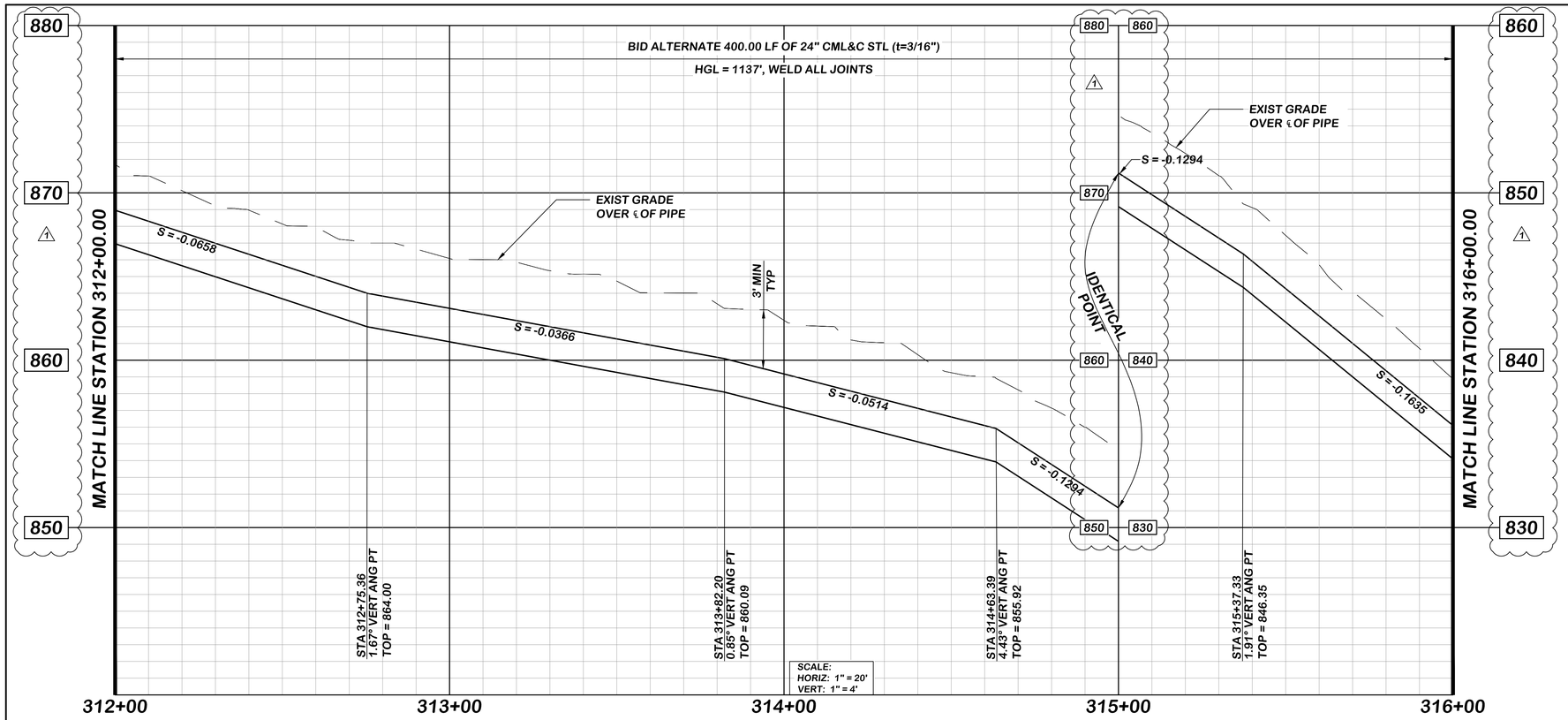

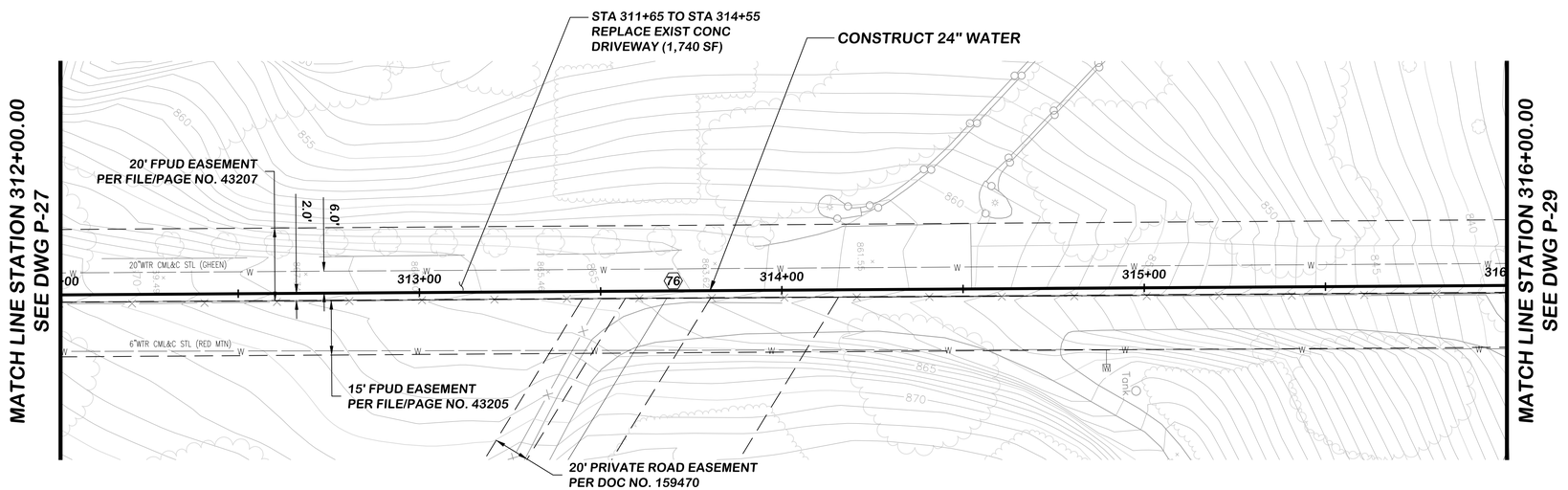

LORELEI LANE

DATA TABLE					
⬡	△/BEARING	R	L	T	DESCRIPTION
76	SEE DWG P-27				

SCALE: 1" = 20'
0 10' 20'

NO.	DESCRIPTION	DATE	APPROVED
1	PROFILE GRID	06/25/19	IEC

SCALE 1" = 20'
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RK
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REGISTERED PROFESSIONAL ENGINEER — DAVID PADILLA — No. C59744 Exp. 12-31-18 — STATE OF CALIFORNIA — CIVIL

06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

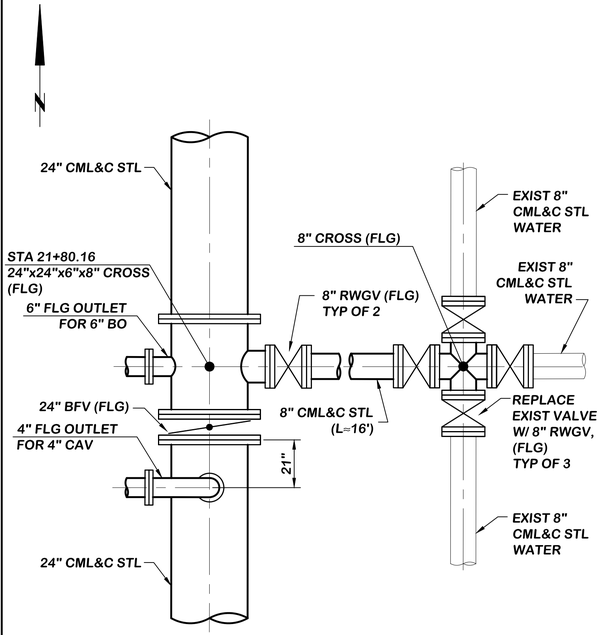
JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

BID ALTERNATE PRODUCT WATER PLAN AND PROFILE STA 312+00.00 TO STA 316+00.00

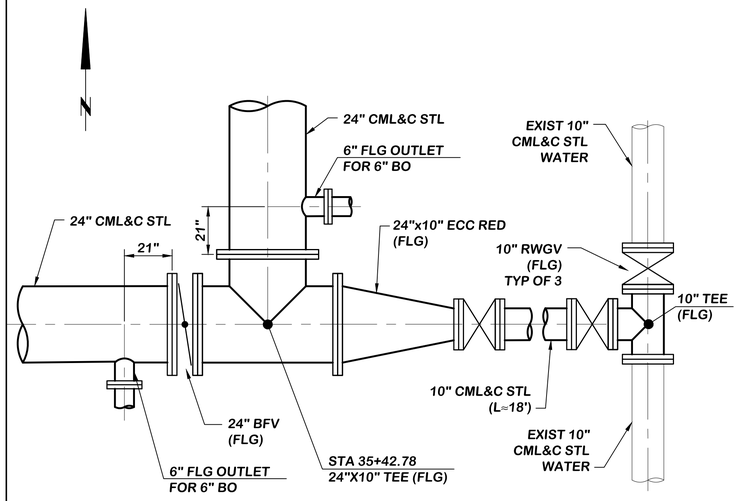
DRAWING NO. P-28
SHEET NO. 112 OF 387
CLIENT JOB NO. 2744

P:\Projects\FPUD (0112)\0002 St Marg Conjunctive Use Project\CAD\P-25 thru P-29 – Gheen.dwg 06/24/2019 11:08



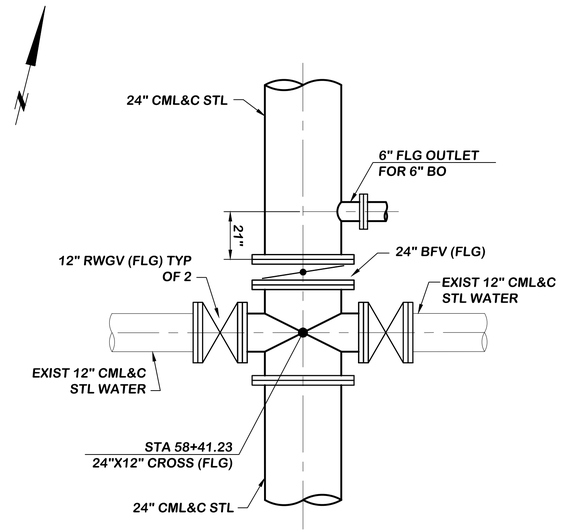
CONNECTION AT ALTURAS RD & MERIDA DR
STA 21+80.16
SCALE: NTS

1
P-03



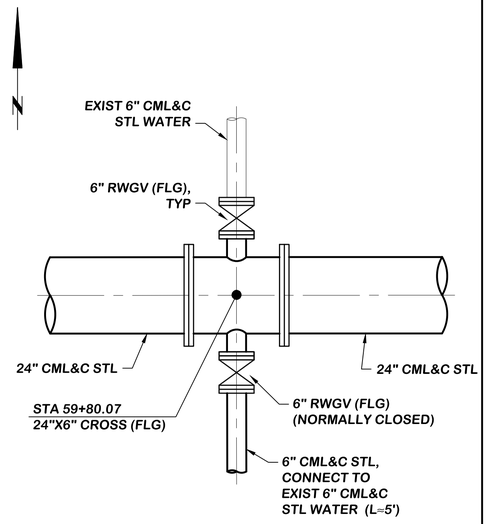
CONNECTION AT MERIDA DR & S HILL AVE
STA 35+42.78
SCALE: NTS

2
P-06



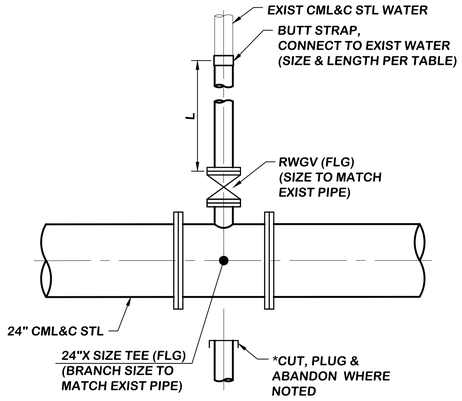
CONNECTION IN S MISSION RD
STA 58+41.23
SCALE: NTS

3
P-12



CONNECTION AT PALOMINO ROAD & OLD STAGE RD
STA 59+80.07
SCALE: NTS

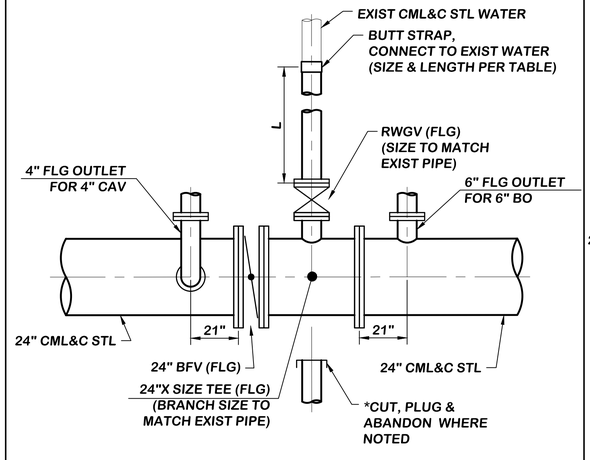
4
P-13



CROSS STREET	STATION	BRANCH SIZE	L (APPROX)	
TO GRAND TRADITION HALL	69+25.00	10"	10'	
TO PAULANN CT	71+34.22	8"	5' (1)	*
TO GRAND TRADITION HALL	73+46.82	10"	6'	
ELIZABETH WY	83+64.09	6"	10'	
TO CRESTVIEW ESTATES	88+71.08	6"	5' (1)	*
CUESTA NORTE	89+83.87	6"	5'	

CONNECTION TO DISTRIBUTION PIPE ALONG PALOMINO ROAD
SCALE: NTS

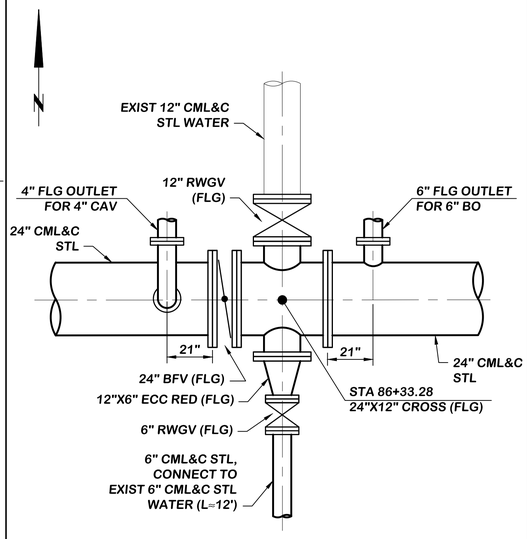
5
-



CROSS STREET	STATION	BRANCH SIZE	L (APPROX)	
EMERALD RIDGE RD	67+71.39	6"	5' (1)	*
COLT RD	77+66.30	6"	5'	*
FARRAND RD	95+45.01	8"	24'	

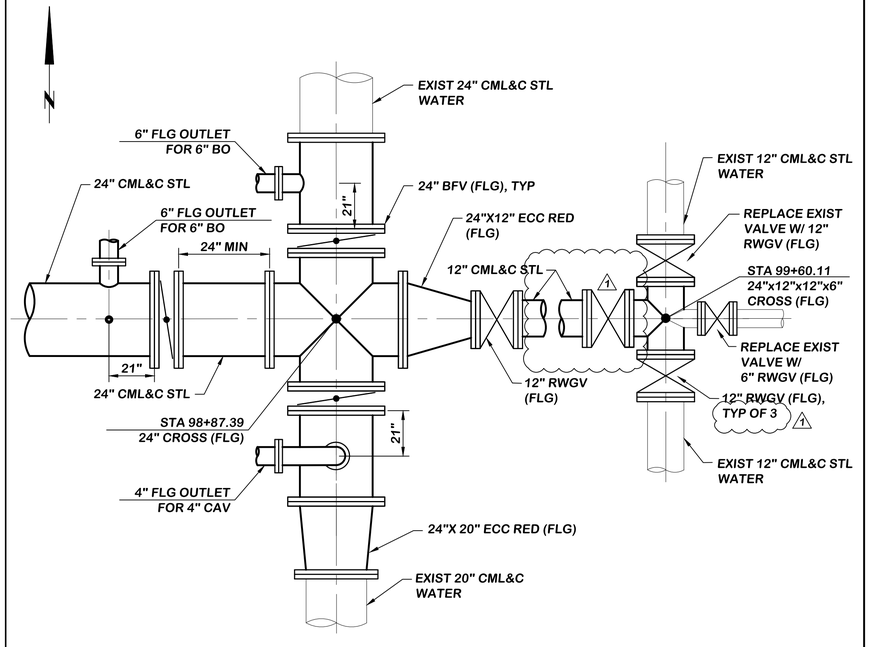
CONNECTION TO DISTRIBUTION PIPE ALONG PALOMINO ROAD WITH ISOLATION VALVE
SCALE: NTS

6
-



CONNECTION AT PALOMINO RD & MORRO RD
STA 86+33.28
SCALE: NTS

7
P-19



CONNECTION AT PALOMINO RD & MCDONALD RD
SCALE: NTS

8
P-22

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED DETAIL	05/24/19	IEC

SCALE NTS
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RK
DRAWN BY RI
CHECKED BY DP

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REGISTERED PROFESSIONAL ENGINEER — DAVID PADILLA — No. C58774 Exp. 12-31-18 — CIVIL — STATE OF CALIFORNIA

06/16/2017
DATE

Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PIPELINE CONNECTION DETAILS I

DRAWING NO. P-30
SHEET NO. 114 OF 387
CLIENT JOB NO. 2744

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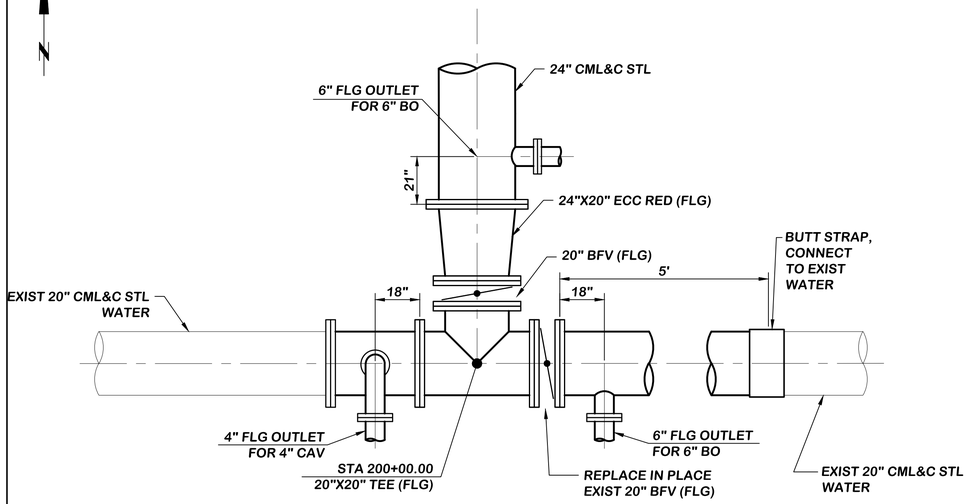
NOT USED

SCALE: NTS

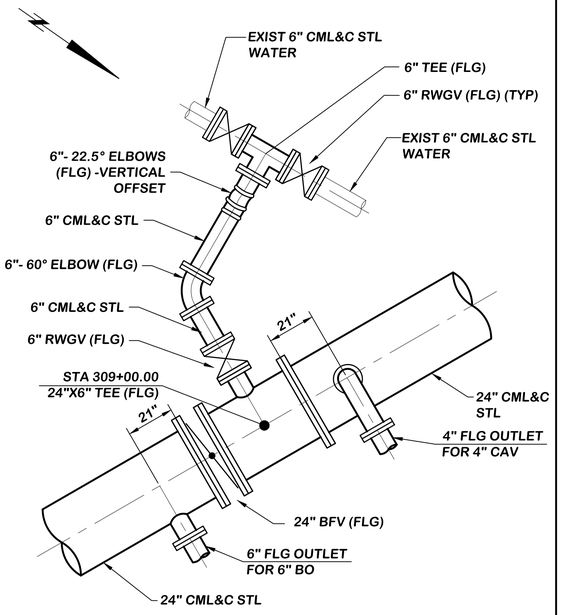
1
-



CONNECTION AT GUMTREE LANE
RED MOUNTAIN ZONE

SCALE: NTS

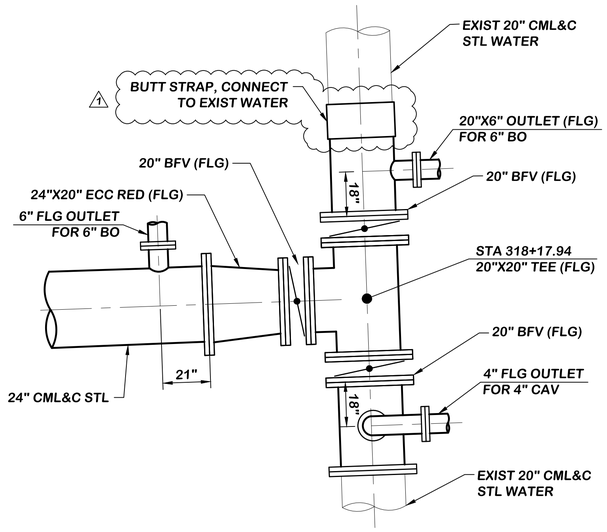
2
P-23



CONNECTION AT FALLEN LEAF LANE AND LORELEI LANE
STA 309+00.00

SCALE: NTS

3
P-27



CONNECTION AT LORELEI LANE AND M&R RANCH ROAD
STA 318+17.94

SCALE: NTS

4
P-29

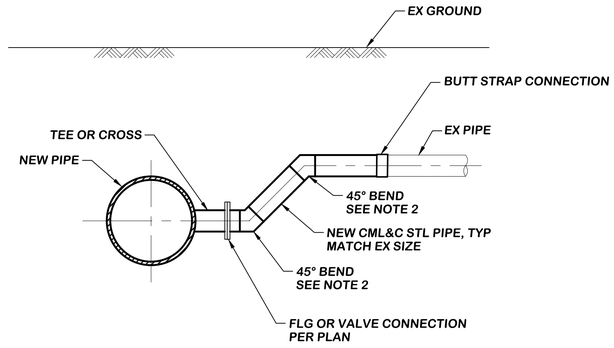
NOTES:

1. CONTRACTOR SHALL LOCATE HORIZONTAL AND VERTICAL LOCATION, BEARING, AND INCLINATION OF EXISTING PIPE AT CONNECTIONS PRIOR TO PURCHASING OR FABRICATING MATERIALS.
2. FURNISH AND INSTALL AWWA C207 CLASS E STEEL FLANGE(S) FOR CONNECTIONS TO EXISTING PIPE AT NEW VALVES OR FITTINGS.

GENERAL CONNECTION NOTES

SCALE: NTS

5
TYP



NOTE:

1. DETAIL APPLIES WHERE NEW WATER MAIN REPLACES EXISTING 12" WATER PIPE AND CONNECTION TO EXISTING SIDE STREET MAINS ARE REQUIRED.
2. VERTICAL OFFSET MAY UTILIZE 22.5° OR 11.25° BENDS AS REQUIRED FOR THE CONNECTION.

TYPICAL CONNECTION TO EXISTING WATER PIPE

SCALE: NTS

6
TYP

NOT USED

7
-

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED DETAIL	05/24/19	IEC

SCALE NTS
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY RK
DRAWN BY RI
CHECKED BY DP

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REGISTERED PROFESSIONAL ENGINEER — DAVID PADILLA — No. C59774 Exp. 12-31-18 — CIVIL — STATE OF CALIFORNIA

06/16/2017
DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PIPELINE CONNECTION DETAILS II

DRAWING NO. P-31
SHEET NO. 115 OF 387
CLIENT JOB NO. 2744

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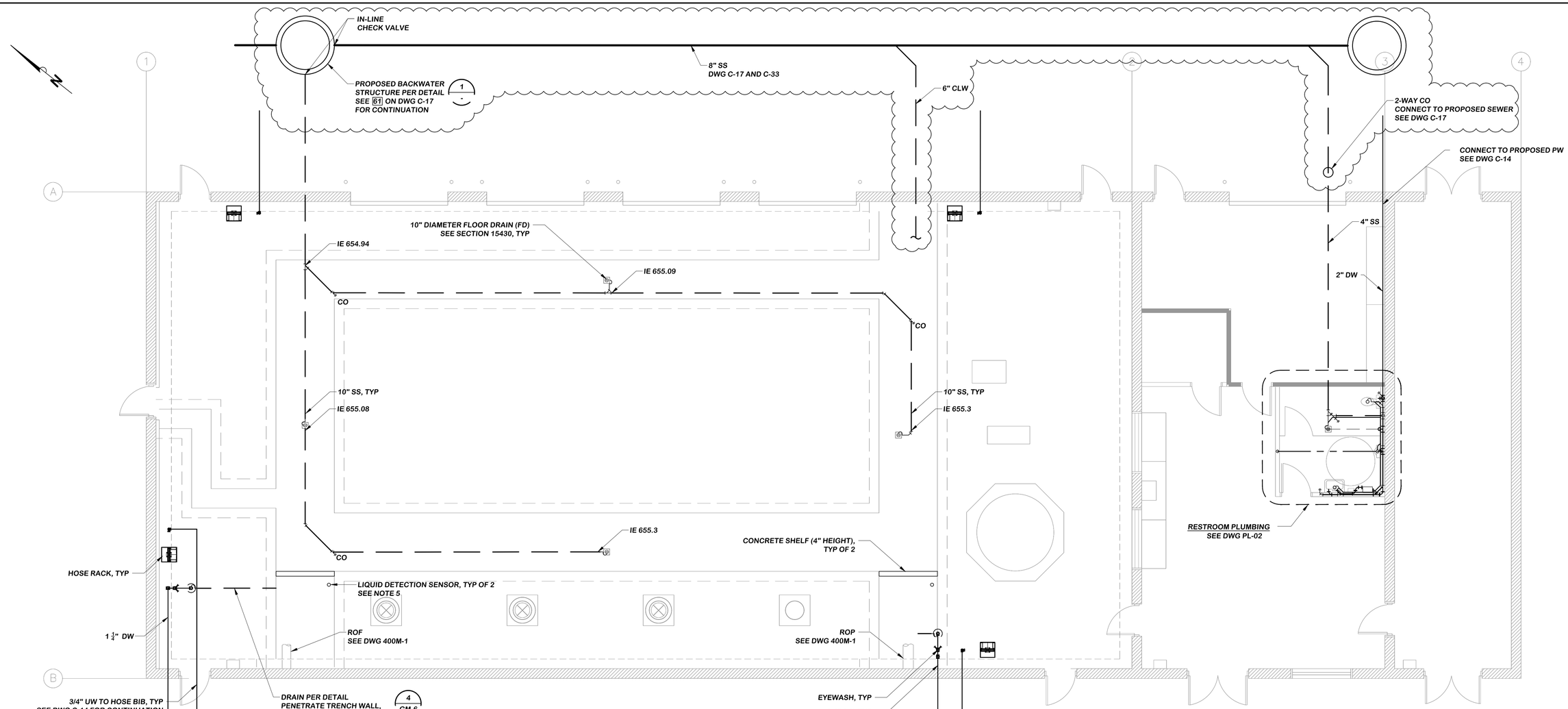

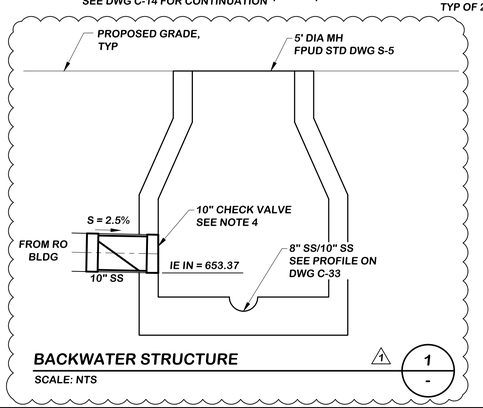

BACKWATER STRUCTURE 1 / 1 / -

SCALE: NTS

NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL PIPE SUPPORTS FOR THE PLUMBING SYSTEMS REPRESENTED ON THE PLUMBING DWGS IN AGREEMENT WITH SPECIFICATION SECTION 15415.
2. CONTRACTOR SHALL PROVIDE AND INSTALL ADDITIONAL FITTINGS AS REQUIRED, TO COORDINATE THE PLUMBING SYSTEMS REPRESENTED ON THE PLUMBING DWGS WITH THE MECH, ELECTRICAL AND HVAC SYSTEMS, MAINTAINING COMPLIANCE WITH THE APPLICABLE PLUMBING CODES.
3. CONTRACTOR SHALL COORDINATE LOCATION OF EQUIPMENT DRAINS WITH EQUIPMENT FURNISHED OR PROPOSED FOR FUTURE INSTALLATION.
4. (1) CHECK VALVE SHALL BE WAPRO WS SERIES, TYPE 316 SS OR APPROVED EQUAL. INSTALLATION SHALL BE PER MANUFACTURER'S REQUIREMENTS.
5. LIQUID DETECTION SENSOR SHALL HAVE A MINIMUM 10' LIQUID SENSOR CABLE, 20' TWO-WIRE CABLE (ENVIROMUX-LDSx-y OR APPROVED EQUAL).

NO.	DESCRIPTION	DATE	APPROVED
1	REVISED	06/25/19	IEC

SCALE 3/16" = 1'-0"
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY IEC
DRAWN BY ARW
CHECKED BY RK

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REGISTERED PROFESSIONAL ENGINEER RICHARD HOWARD KENNEDY No. M18710 Exp. 09-30-18 MECHANICAL STATE OF CALIFORNIA

06/16/2017
DATE

Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

RO BUILDING PLUMBING PLAN

DRAWING NO. PL-01
SHEET NO. 229 OF 387
CLIENT JOB NO. 2744

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CONDUIT PLAN	SINGLE LINE DIAGRAM	SCHEMATIC DIAGRAM	DESCRIPTION
	50A 3P		CIRCUIT BREAKER. UPPER NUMBER IS TRIP RATING. LOWER NUMBER IS NUMBER OF POLES
■			THREE POSITION SWITCH. MAINTAINED CONTACT FUNCTION MAY VARY AS NOTED ON DIAGRAMS. CENTER POSITION IS OFF
■			TWO POSITION SWITCH. MAINTAINED CONTACT FUNCTION MAY VARY AS NOTED ON DIAGRAMS
■			MOMENTARY CONTACT PUSHBUTTON. FUNCTION MAY VARY AS NOTED ON DIAGRAMS
■ LOS		LOS	MOMENTARY CONTACT PUSHBUTTON WITH PROVISION FOR LOCKOUT.
			LOCKABLE DISCONNECT SWITCH. RATING AND DETAILS AS NOTED ON DRAWINGS.
■ ZS			LIMIT SWITCH. NORMALLY OPEN
■ ZS			LIMIT SWITCH. NORMALLY CLOSED
		NOTO	TIME DELAY RELAY CONTACT. OFF DELAY, NORMALLY OPEN, TIME OPEN
		NCTC	TIME DELAY RELAY CONTACT. OFF DELAY, NORMALLY CLOSED, TIME CLOSED
		NOTC	TIME DELAY RELAY CONTACT. ON DELAY, NORMALLY OPEN, TIME CLOSED
		NCTO	TIME DELAY RELAY CONTACT. ON DELAY, NORMALLY CLOSED, TIME OPEN
■ SOV			SOLENOID OPERATED VALVE
			MOTOR CONTROL CENTER DRAWOUT STABS
⊠	2		MOTOR STARTER WITH THERMAL OVERLOADS. NUMBER INDICATES NEMA SIZE
		OL	MOTOR OVERLOAD CONTACT
(2)	(2)	(2)	MOTOR, NUMBER INDICATES HORSEPOWER
		Q	INDICATING LIGHT, PUSH-TO-TEST. LETTER INDICATES COLOR. R=RED B=BLUE G=GREEN A=AMBER W=WHITE
		(M)	CONTACTOR OR RELAY COIL. LETTER OR NUMBER IS DESIGNATION
		M	NORMALLY CLOSED CONTACT. LETTER OR NUMBER IS DESIGNATION
		M	NORMALLY OPEN CONTACT. LETTER OR NUMBER IS DESIGNATION
		(RTM)	RUNNING TIME METER, NON-RESETTABLE
	20A	5A	FUSE, NUMBER INDICATES RATING
			CONTROL TRANSFORMER. RATING AS NOTED ON DRAWINGS OR AS REQUIRED BASED ON LOAD SERVED.
	(KW)		KILOWATT METER
■ PS			PRESSURE SWITCH. CONTACT ACTION AS NOTED ON DRAWINGS

CONDUIT PLAN	SINGLE LINE DIAGRAM	SCHEMATIC DIAGRAM	DESCRIPTION
T			POWER TRANSFORMER. RATINGS AS NOTED ON DRAWINGS
			DUPLEX RECEPTACLE. 20A, SPEC GRADE GROUNDING TYPE. UNLESS OTHERWISE NOTED ON DRAWINGS.
			DATA OUTLET WITH 1" CONDUIT BACK TO RACK TELEPHONE OUTLET WITH 1" CONDUIT BACK TO RACK
J			JUNCTION BOX OR CONDUIT FITTING AS NOTED OR REQUIRED. (SHOWN WITH CONDUIT TURNING UP)
■ LS			LEVEL SWITCH, CONTACT ACTION AS NOTED ON DRAWINGS
			CONTROL PANEL OR EQUIPMENT AS NOTED
■ FS			FLOW SWITCH, CONTACT ACTION AS NOTED ON DRAWINGS
$			FLUSH TOGGLE SWITCH, SINGLE POLE, SINGLE THROW
$3			FLUSH TOGGLE SWITCH, THREE WAY
			FLUORESCENT FIXTURE. SEE LIGHTING SCHEDULE.
			LIGHTING FIXTURE, WALL MOUNTED SEE LIGHTING SCHEDULE
PB			MH-MANHOLE PB-PULLBOX HH-HANDHOLE OR AS NOTED ON DRAWINGS
—T—			TELEPHONE CONDUIT. SIZE AS NOTED
—G—			GROUNDING GRID OR GROUNDING CONDUCTOR SIZE AS REQUIRED OR AS NOTED ON DRAWINGS
—G—			GROUND PIGTAIL. SIZE AS NOTED ON DRAWINGS
—G—			EXOTHERMIC GROUND CONNECTION
—G—			BOLTED GROUND CONNECTION
			CONDUIT BENDING UP
			CONDUIT BENDING DOWN
			UNDERGROUND OR CONCEALED CONDUIT, 1" MINIMUM
			EXPOSED CONDUIT, 3/4" MINIMUM.
PB1 1,3,5			HOMERUN CONDUIT WITH 3 CONDUCTORS, NEUTRAL AND GROUND, CIRCUITS 1,3,5 PANEL PB1, NO HASHMARKS INDICATE 2 CONDUCTORS AND GROUND
			DRIVEN GROUND ROD/TEST WELL 3/4" X 10' Cu CLAD STEEL
			PANELBOARD OR AS NOTED ON DRAWING
			LIQUIDTIGHT FLEXIBLE CONDUIT
XXX	XXX		CONDUIT NUMBER 'XXX', REFER TO CONDUIT SCHEDULE FOR DESCRIPTION

CONDUIT PLAN	SINGLE LINE DIAGRAM	SCHEMATIC DIAGRAM	DESCRIPTION
$M			MANUAL MOTOR STARTER
			GROUND
■			HEATER, RATING AS NOTED ON DRAWING
			HORN OR AUDIBLE SIGNAL
Ø	Ø	Ø	PHASE
		□	TERMINAL, INTERNAL WIRING
		■	TERMINAL, FIELD WIRING
■ DS			DOOR SWITCH
			CONDUIT STUB OUT
F XX	XX		DISCONNECT SWITCH, F = FUSED NF = NON-FUSED XX = AMP RATING
		T	TELEMETRY INPUT POINT
		P	PLC INPUT POINT AT RTU

NOTE:
ALL POWER CONDUITS BETWEEN VFD'S AND MOTORS SHALL BE METALLIC PVC/RGS.

STANDARD ABBREVIATIONS

A	AMPERES
AC	ALTERNATING CURRENT
AF	AMPERE FRAME
AFC	ABOVE FINISHED CONCRETE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AUX	AUXILIARY
AUTO	AUTOMATIC
AWG	AMERICAN WIRE GAUGE
BC	BARE COPPER
BD	BOARD
BKR	BREAKER
C	CONDUIT
CAB	CABINET
CB	CIRCUIT BREAKER
CKT	CIRCUIT
CLG	CEILING
C.O.	CONDUIT ONLY
COMPT	COMPARTMENT
COND	CONDUCTOR
CONT	CONTROL
CONTD	CONTINUED
CPT	CONTROL POWER TRANSFORMER
CP	CONTROL PANEL
CT	CURRENT TRANSFORMER
CU	COPPER
CR	CONTROL RELAY
DC	DIRECT CURRENT
DISC	DISCONNECT
DISC SW	DISCONNECT SWITCH
DPDT	DOUBLE POLE DOUBLE THROW
DPST	DOUBLE POLE SINGLE THROW
DWG	DRAWING
DS	DOOR SWITCH
EL,ELEV	ELEVATION
EMT	ELECTRICAL METALLIC TUBING
EO	ELECTRICALLY OPERATED
EXIST	EXISTING
FBO	FURNISHED BY OWNER
FDR	FEEDER
FIN	FINISHED
FLA	FULL LOAD AMPS
FLEX	FLEXIBLE
FM	FLOW METER
FS	FLOW SWITCH
FT OR '	FEET OR FOOT
FT	FLOW TRANSMITTER
FUT	FUTURE
FVNR	FULL VOLTAGE NON REVERSING
GALV	GALVANIZED
GD	GAS DETECTORS
GFI	GROUND FAULT INTERRUPTER
GFP	GROUND FAULT PROTECTION
GND OR G	GROUND
HH	HANDHOLE
HOA	HAND/OFF/AUTO
HTR	HEATER
IC	INTERRUPTING CURRENT
IN OR "	INCHES OR INCH
IND	INDICATING
INST	INSTANTANEOUS
INSTR	INSTRUMENT
INTLK	INTERLOCK
JB OR J	JUNCTION BOX, CONDULET OR FITTING AS REQUIRED BY NEC. UNLESS OTHERWISE NOTED
KW	KILOWATTS
LCL	LONG CONTINUOUS LOAD
LCP	LOCAL CONTROL PANEL
LEV	LEVEL
LIM	LIMIT
LR	LOCAL/REMOTE
LOS	LOCKOUT STOP STATION
LS	LEVEL OR LIMIT SWITCH
LSIG	LONG TIME, SHORT TIME, INSTANTANEOUS AND GROUND FAULT ADJUSTMENTS
LT	LIGHT
LTG	LIGHTING
LV	LOW VOLTAGE
MA	MILLIAMPERE
MAINT	MAINTAINED
MAN	MANUAL
MAX	MAXIMUM
MC	MAINTAINED CONTACT
MCC	MOTOR CONTROL CENTER
MCM	THOUSAND CIRCULAR MILS
MCP	MOTOR CIRCUIT PROTECTOR
MH	MANHOLE
MIN	MINIMUM OR MINUTE
MLO	MAIN LUGS ONLY
MOV	MOTOR OPERATED VALVE ACTUATOR
MSB	MAIN SWITCHBOARD
MTG	MOUNTING
MTR	MOTOR
N	NEUTRAL
NA	NON-AUTOMATIC
NC	NORMALLY CLOSED
NCIO	NORMALLY CLOSED, INSTANTANEOUS OPEN
NCTC	NORMALLY CLOSED, TIME CLOSE
NCTO	NORMALLY CLOSE, TIME OPEN
NEC	NATIONAL ELECTRIC CODE
NIC	NOT IN CONTRACT
No	NUMBER
NO	NORMALLY OPEN
NOIC	NORMALLY OPEN, INSTANTANEOUS CLOSE
NOTC	NORMALLY OPEN, TIME CLOSE
NOTO	NORMALLY OPEN, TIME OPEN
NP	NAMEPLATE
NTS	NOT TO SCALE
OL	OVERLOAD
OTT	OVERTEMP SWITCH
PB	PUSHBUTTON
PB	PULLBOX
PC	PHOTOCELL
PCV	PUMP CONTROL VALVE
PMR	POWER MONITOR RELAY
PNL	PANEL
POS	POSITION
PR	PAIR
PRI	PRIMARY
PS	PRESSURE SWITCH
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PVC/RGS	PVC JACKETED RIGID GALVANIZED STEEL CONDUIT
PW	PART WINDING
RECEP	RECEPTACLE
RCP	REMOTE CONTROL PANEL
RGS	RIGID GALVANIZED STEEL CONDUIT
RTU	REMOTE TERMINAL UNIT
RVAT	REDUCED VOLTAGE AUTO TRANSFORMER
RVYD	REDUCED VOLTAGE WYE DELTA
SCE	SOUTHERN CALIFORNIA EDISON
SEC	SECONDARY
SEL	SELECTOR
SP	SPARE
SPEC	SPECIFICATION
SPDT	SINGLE POLE DOUBLE THROW
SPST	SINGLE POLE SINGLE THROW
SS	STAINLESS STEEL
SSRV	SOLID STATE REDUCED VOLTAGE STARTER
ST	SHUNT TRIP
STA	STATION
STL	STEEL
STP	SHIELDED TWISTED PAIR
STR	STARTER
STT	SHIELDED TWISTED TRIPLET
SV	SOLENOID VALVE
SW	SWITCH
SWBD	SWITCHBOARD
TB	TERMINAL BOX
TEL	TELEPHONE
TEMP	TEMPERATURE
TERM	TERMINAL
TM	TELEMETRY
TS	TEMPERATURE SWITCH
TS2W	TWO SPEED TWO WINDING
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TW/SH	TWISTED SHIELDED
TYP	TYPICAL
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED
V	VOLTS
W	WATTS
W/	WITH
W/O	WITHOUT
WP	WEATHERPROOF
XFMR	TRANSFORMER
XP	EXPLOSION PROOF
ZS	POSITION SWITCH OR LIMIT SWITCH
3W	THREE WIRE
4W	FOUR WIRE

MORAES/PHAM & ASSOCIATES
CONSULTING ELECTRICAL ENGINEERS
2131 PALOMAR AIRPORT RD., STE. 120
CARLSBAD CA. 92011
(760) 431-7177

REGISTERED PROFESSIONAL ENGINEER — No. E19832 Exp. 3/31/18 — ELECTRICAL — STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY TAA
DRAWN BY AH
CHECKED BY TAA

Infrastructure ENGINEERING CORPORATION
14271 Danielson Street
Poway, California 92064
T 858.413.2400 F 858.413.2440
www.iecorporation.com

DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

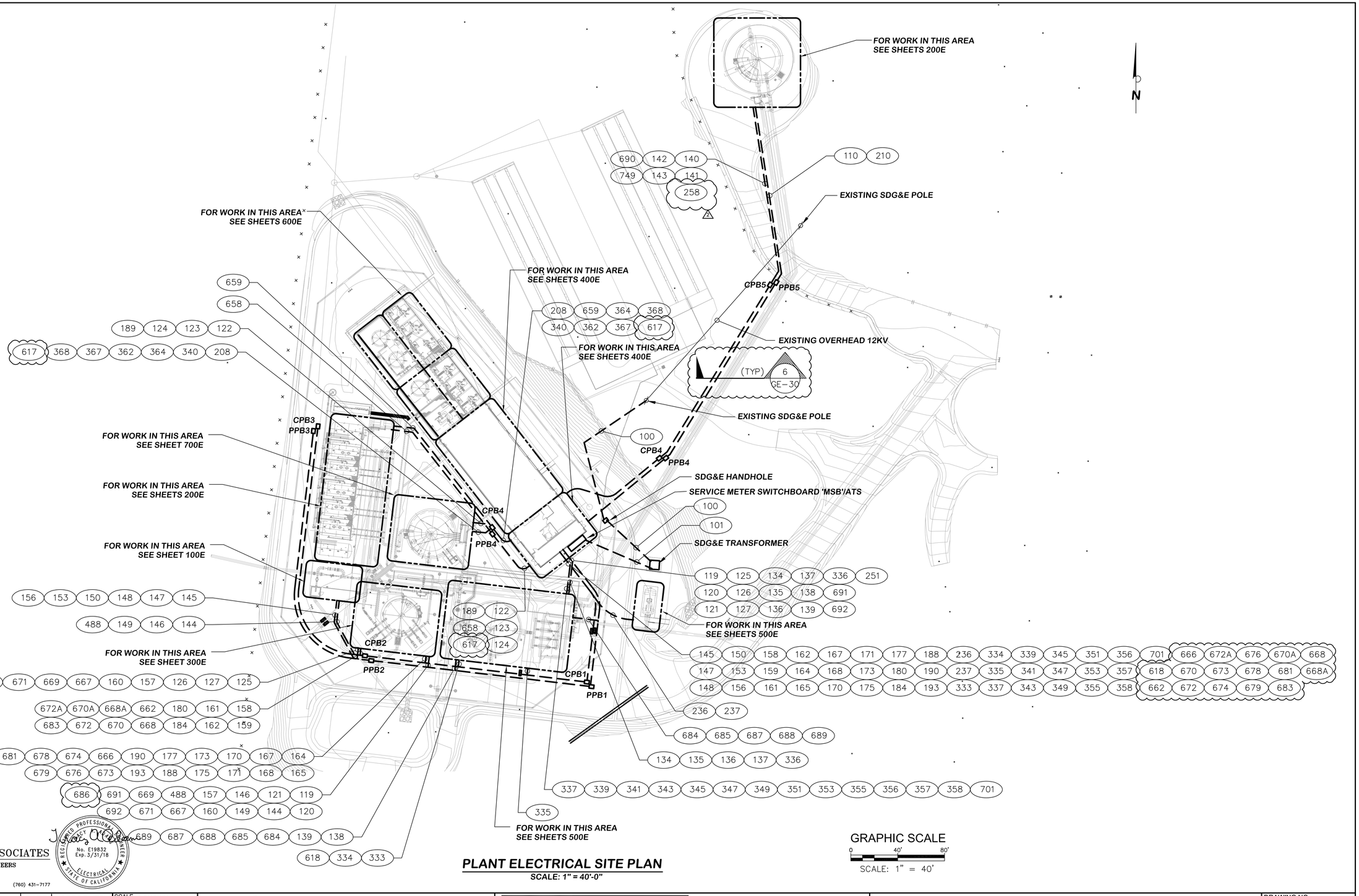
APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

STANDARD ELECTRICAL SYMBOLS AND ABBREVIATIONS

DRAWING NO. GE-1
SHEET NO. 295 OF 387
CLIENT JOB NO. 2744



PLANT ELECTRICAL SITE PLAN

SCALE: 1" = 40'-0"

GRAPHIC SCALE

0 40' 80'

SCALE: 1" = 40'

MORAES/PHAM & ASSOCIATES
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NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA
2	BID ADDENDUM MODIFICATION	5/22/19	TA

SCALE	AS SHOWN
DATE	06/16/2017
PROJECT NO.	112.FPUD.0002
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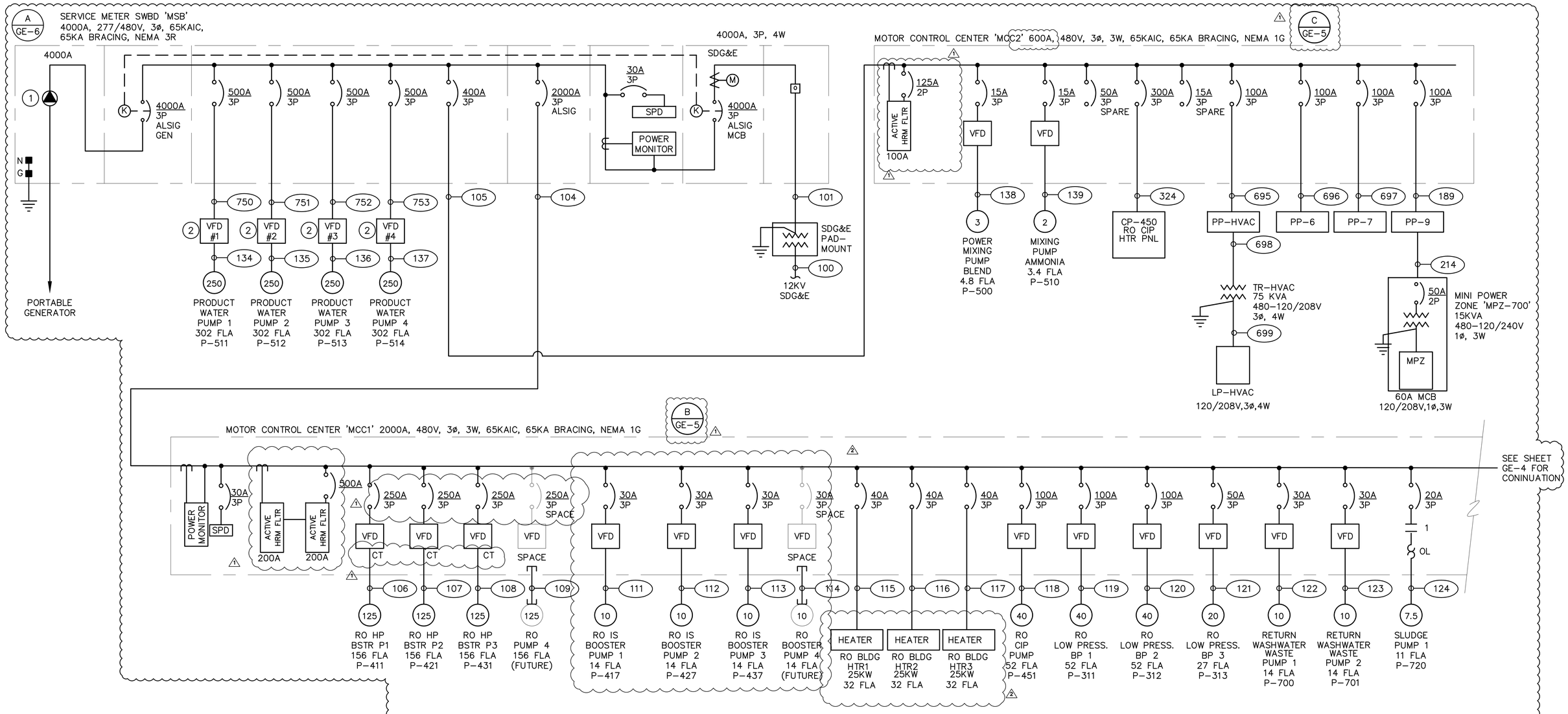
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SITE PLAN

DRAWING NO. GE-2

SHEET NO. 296 OF 387

CLIENT JOB NO. 2744



NOTES:

1. CAM-LOC 400A EACH OR EQUAL 10 PER PHASE + 2GND.
2. VFD'S WILL BE 18-PULSE.

(K) MTS KIRK KEY

LOAD	SERVICE	
MCC-2	532A	
25% LARGEST MOTOR	1.2A	(NEC)
TOTAL	533A	2

LOAD	SERVICE	
MCC-1	1046A	
25% LARGEST MOTOR	39A	(NEC)
TOTAL	1085A	2

LOAD	SERVICE	
MCC-1	1085A	
MCC-2	533A	2
VFD-1	302A	
VFD-2	302A	
VFD-3	302A	
VFD-4	302A	
25% LARGEST MOTOR	75A	(NEC)
TOTAL	2901A	

SINGLE LINE DIAGRAM – WTP

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2	BID ADDENDUM	6/5/19	TA
1	BID ADDENDUM	5/14/19	TA

SCALE NONE
DATE 06/16/2017
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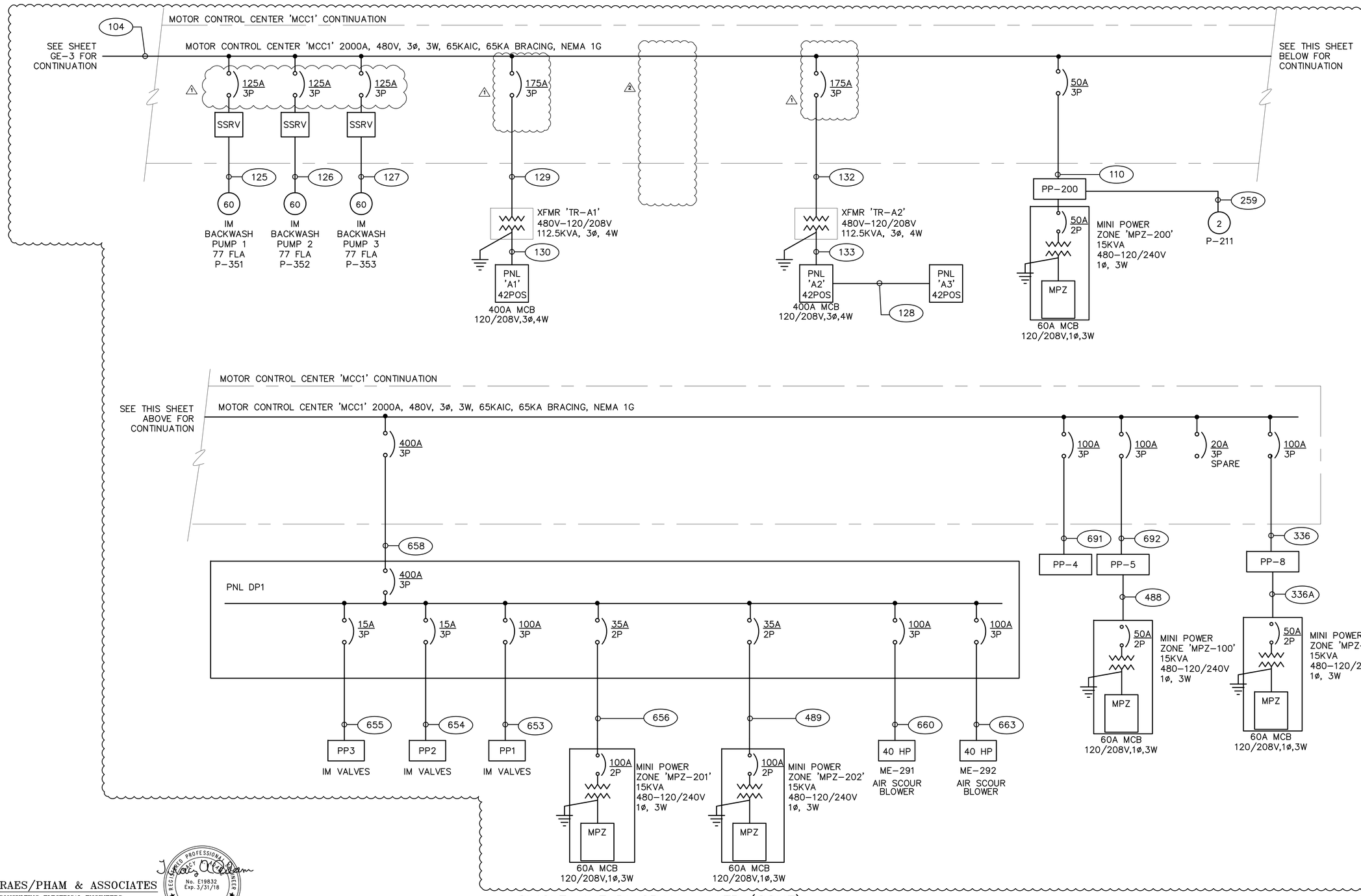
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT SINGLE LINE DIAGRAM 1

DRAWING NO. GE-3
SHEET NO. 297 OF 387
CLIENT JOB NO. 2744



SINGLE LINE DIAGRAM – WTP (CONT)

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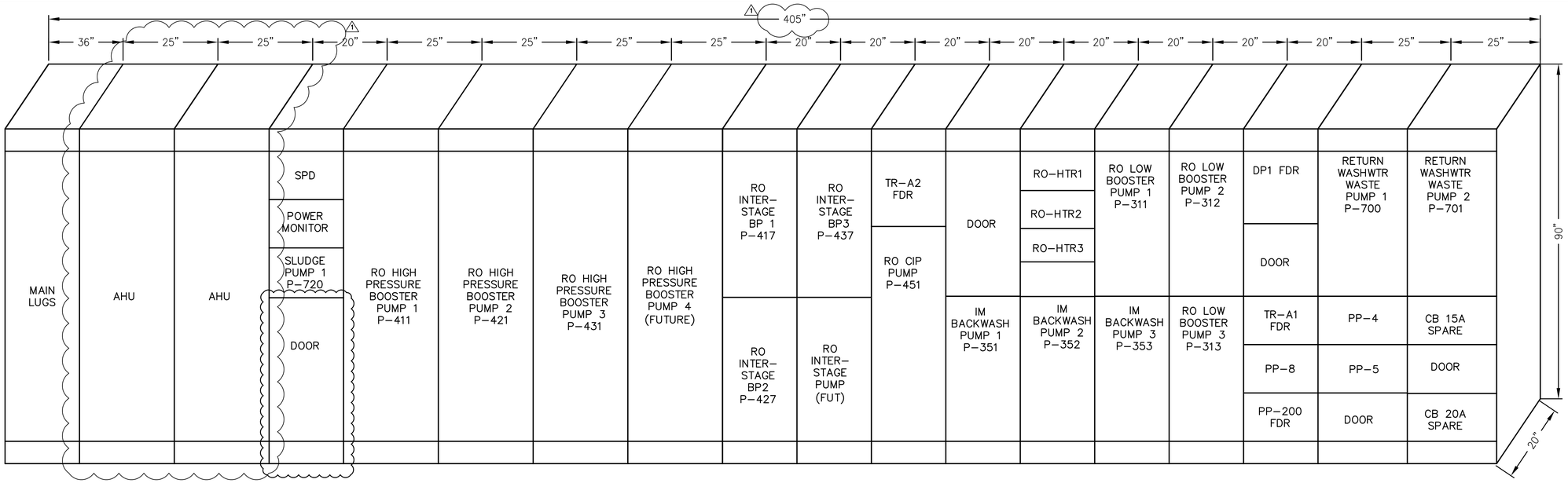
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

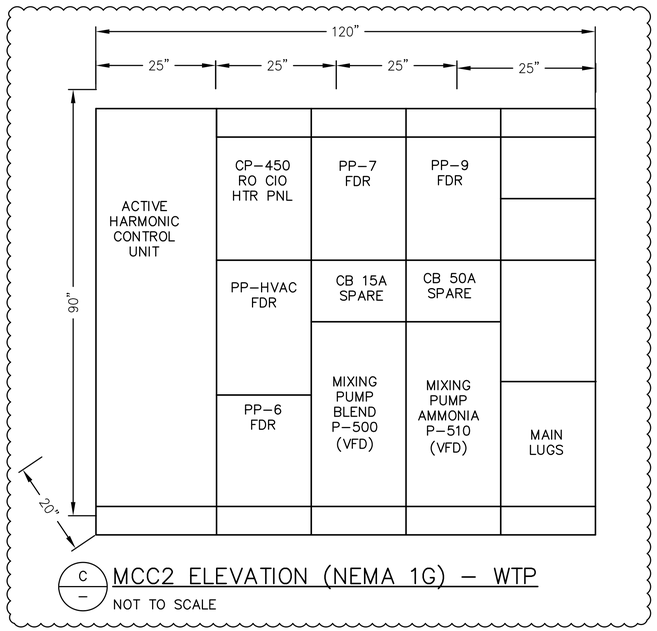
PLANT SINGLE LINE DIAGRAM 2

DRAWING NO. GE-4
SHEET NO. 298 OF 387
CLIENT JOB NO. 2744



B/– MCC1 ELEVATION (NEMA 1G) – WTP

NOT TO SCALE



C/– MCC2 ELEVATION (NEMA 1G) – WTP

NOT TO SCALE

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NO.	DESCRIPTION	DATE	APPROVED
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1	BID ADDENDUM	5/14/19	TA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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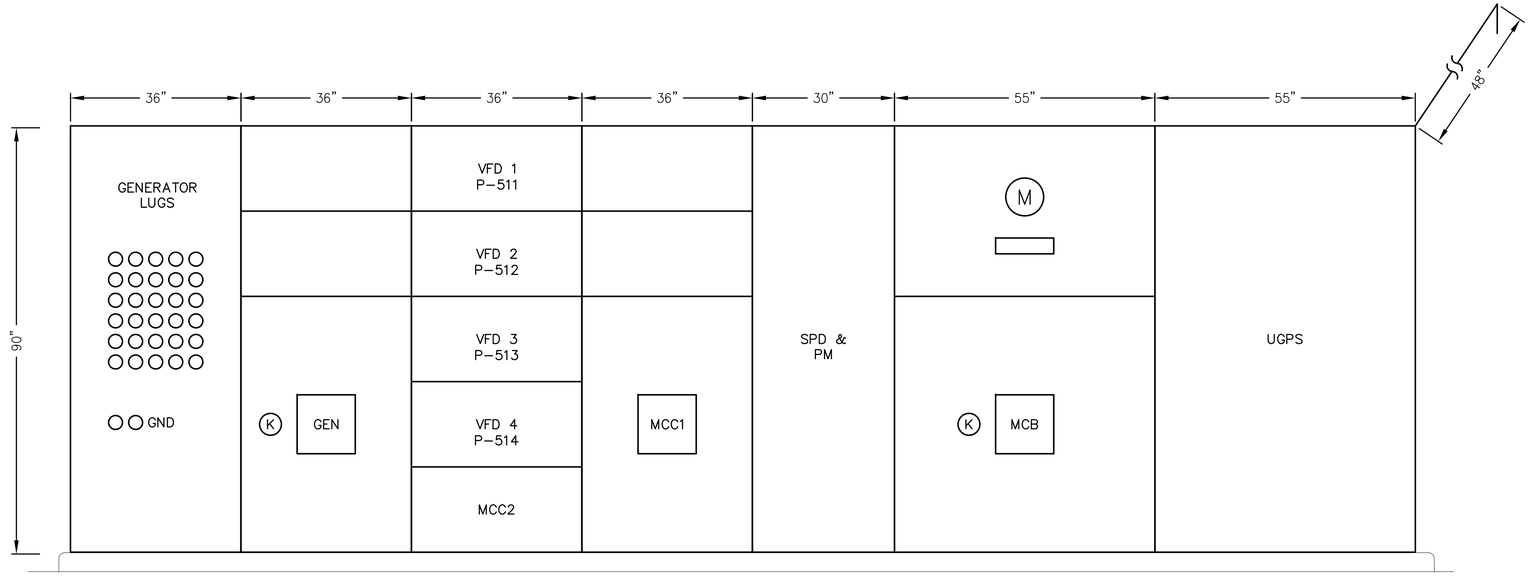
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELEVATIONS 1

DRAWING NO. GE-5
SHEET NO. 299 OF 387
CLIENT JOB NO. 2744



A – SERVICE METER SWBD 'MSB' (NEMA 3R) – WTP
NOT TO SCALE

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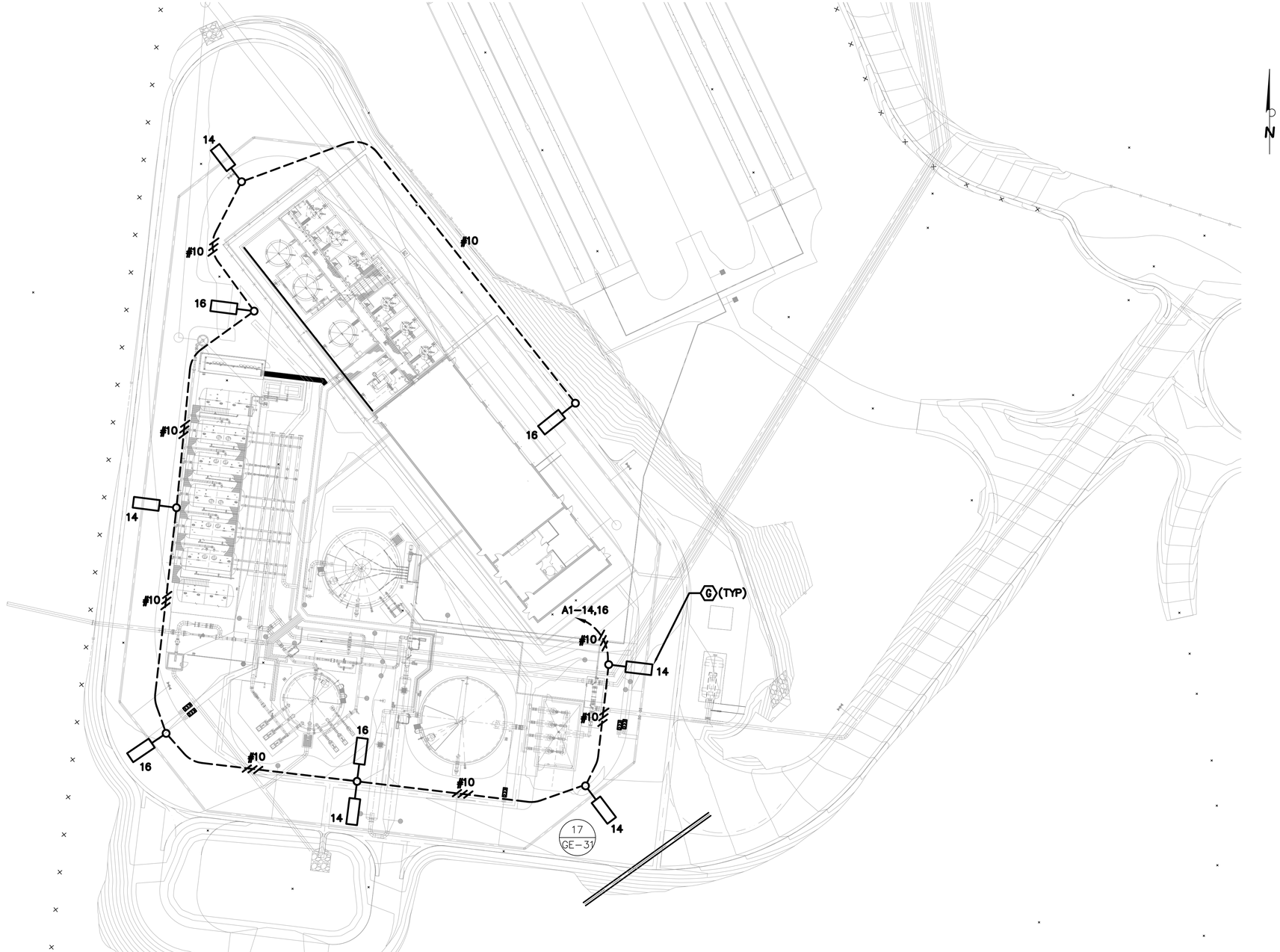
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELEVATIONS 2

DRAWING NO. GE-6
SHEET NO. 300 OF 387
CLIENT JOB NO. 2744



PLANT SITE LIGHTING PLAN
SCALE: 1" = 30'-0"

GRAPHIC SCALE
0 30' 60'
SCALE: 1" = 30'

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SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT SITE LIGHTING PLAN

DRAWING NO. GE-7
SHEET NO. 301 OF 387
CLIENT JOB NO. 2744

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
100		SDG&E 12KV POC	SDG&E TRANSFORMER				12KV	POWER	PER SDG&E REQUIREMENTS
101		SDG&E TRANSFORMER	SERVICE METER SWITCHBOARD MSB				480	POWER	PER SDG&E REQUIREMENTS
102		NOT USED							
103		NOT USED							
104	4"(5)	SERVICE METER SWITCHBOARD 'MSB'	MCC1	15	600KCMIL	250 KCMIL	480	POWER	
105	3"	SERVICE METER SWITCHBOARD 'MSB'	MCC2	3	500KCMIL	4/0	480	POWER	
106	2"	MCC1	RO PUMP P-411	3	#3/0	#6	480	POWER	PVC/RGC
			LOS, PSH-411	4	#14	#14	120	CONTROL	
107	2"	MCC1	RO PUMP P-421	3	#3/0	#6	480	POWER	PVC/RGC
			LOS, PSH-421	4	#14	#14	120	CONTROL	
108	2"	MCC1	RO PUMP P-431	3	#3/0	#6	480	POWER	PVC/RGC
			LOS, PSH-431	4	#14	#14	120	CONTROL	
109	2"	MCC1	RO PUMP (FUTURE)	–	–	–	480	POWER	C.O. W/PULLWIRE (PVC/RGC)
110	1"	MCC1	PANELBOARD PP-200	3	#4	#8	480	POWER	
111	1"	MCC1	RO IS BOOSTER PUMP P-417	3	#12	#10	480	POWER	
			LOS	2	#14	#14	120	CONTROL	
112	1"	MCC1	RO IS BOOSTER PUMP P-427	3	#12	#10	480	POWER	
			LOS	2	#14	#14	120	CONTROL	
113	1"	MCC1	RO IS BOOSTER PUMP P-437	3	#12	#10	480	POWER	
			LOS	2	#14	#14	120	CONTROL	
114	1"	MCC1	RO IS BOOSTER PUMP (FUTURE)	–	–	–	480	POWER	C.O. W/PULLWIRE
			LOS (FUTURE)	–	–	–	120	CONTROL	
115	3/4"	MCC1	RO-HTR1	3	#8	#12	480	POWER	
	3/4"	RO-HTR1	FAN LCP	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
116	3/4"	MCC1	RO-HTR2	3	#8	#12	480	POWER	
	3/4"	RO-HTR2	FAN LCP	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
117	3/4"	MCC1	RO-HTR3	3	#8	#12	480	POWER	
	3/4"	RO-HTR3	FAN LCP	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
118	1"	MCC1	RO CIP PUMP P-451	3	#6	#8	480	POWER	PVC/RGC
			LOS	2	#14	#14	120	CONTROL	
119	1"	MCC1	RO LOW PRESSURE PUMP P-311	3	#3	#10	480	POWER	PVC/RGC
			LOS, TSH, HTR, PSH-311	10	#14	#14	120	CONTROL	
120	1"	MCC1	RO LOW PRESSURE PUMP P-312	3	#3	#10	480	POWER	PVC/RGC
			LOS, TSH, HTR, PSH-312	10	#14	#14	120	CONTROL	
121	1"	MCC1	RO LOW PRESSURE PUMP P-313	3	#3	#10	480	POWER	PVC/RGC
			LOS, TSH, HTR, PSH-313	10	#14	#14	120	CONTROL	
122	1"	MCC1	RETURN WW WASTE P-700	3	#10	#12	480	POWER	PVC/RGC
			LOS, TSH, HTR, PSH-700	8	#14	#14	120	CONTROL	
123	1"	MCC1	RETURN WW WASTE P-701	3	#10	#12	480	POWER	PVC/RGC
			LOS, TSH, HTR, PSH-701	8	#14	#14	120	CONTROL	
124	1"	MCC1	SLUDGE PUMP P-720	3	#12	#12	480	POWER	
			LOS, TSH, HTR, PSH-720	8	#14	#14	120	CONTROL	

*-ONE GROUND CONDUCTOR PER CONDUIT

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
125	1-1/2"	MCC1	IM BACKWASH PUMP P-351	3	#3	#6	480	POWER	
			LOS, TSH, HTR, PSH-351	10	#14	#14	120	CONTROL	
126	1-1/2"	MCC1	IM BACKWASH PUMP P-352	3	#3	#6	480	POWER	
			LOS, TSH, HTR, PSH-352	10	#14	#14	120	CONTROL	
127	1-1/2'	MCC1	IM BACKWASH PUMP P-353	3	#3	#6	480	POWER	
			LOS, TSH, HTR, PSH-353	10	#14	#14	120	CONTROL	
128	–	PANELBOARD A2	PANELBOARD A3	3	1/0	6	120/208	POWER	CKT'S 38,40,42
129	1-1/2"	MCC1	TRANSFORMER TR-A1	3	#2/0	#6	480	POWER	
130	3-1/2"	TRANSFORMER TR-A1	PANELBOARD A1	6	#400KCMIL	#3	480	POWER	
131				–	–	–	–		NOT USED
132	4"	MCC1	TRANSFORMER TR-A2	6	500KCMIL	#2	480	POWER	–
133	3/4"	TRANSFORMER TR-A2	PANELBOARD A2	2	#6	#10	120/208	POWER	–
134	3"	P-511 VFD	PRODUCT WTR PUMP P-511	6	2/0	#3	480	POWER	PVC/RGC
			LOS, TSH, HTR, PSH-511	8	#14	#14	120	CONTROL	
135	3"	P-512 VFD	PRODUCT WTR PUMP P-512	6	2/0	#3	480	POWER	PVC/RGC
			LOS, TSH, HTR, PSH-512	8	#14	#14	120	CONTROL	
136	3"	P-513 VFD	PRODUCT WTR PUMP P-513	6	2/0	#3	480	POWER	PVC/RGC
			LOS, TSH, HTR, PSH-513	8	#14	#14	120	CONTROL	
137	3"	P-514 VFD	PRODUCT WTR PUMP P-514	6	2/0	#3	480	POWER	PVC/RGC
			LOS, TSH, HTR, PSH-514	8	#14	#14	120	CONTROL	
138	1"	MCC2	MIXING PUMP BLEND P-500	3	#14	#14	480	POWER	PVC/RGC
			LOS	2	#14	#14	120	CONTROL	
139	1"	MCC2	MIXING PUMP AMMONIA P-510	3	#14	#14	480	POWER	PVC/RGC
			LOS	2	#14	#14	120	CONTROL	
140	1"	CP-100	V-204	4	#10	#14	120	CONTROL	
141	1"	CP-100	V-203	4	#10	#14	120	CONTROL	
142	1"	CP-100	FS-200	1	#18TSP	#14	24	SIGNAL	
143	1"	CP-100	PT-200	1	#18TSP	#14	24	SIGNAL	
144	1"	PANELBOARD PP5	FSV-100	3	#12	#12	480	POWER	CKT'S 14,16,18
145	1"	CP-100	FSV-100	10	#14	#14	120	CONTROL	
146	1"	PANELBOARD PP5	FCV-105	3	#12	#12	480	POWER	CKT'S 19,21,23
147	1"	CP-100	FCV-105	2	#14	#14	120	CONTROL	
148	1"	CP-100	FCV-105	2	#18TSP	#14	24	SIGNAL	
149	1"	PANELBOARD PP5	MV-110	3	#12	#12	480	POWER	CKT'S 20,22,24
150	1"	CP-100	MV-110	10	#14	#14	120	CONTROL	

*-ONE GROUND CONDUCTOR PER CONDUIT

MORAES/PHAM & ASSOCIATES
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REGISTERED PROFESSIONAL ENGINEER No. E19832 Exp. 3/31/18 ELECTRICAL STATE OF CALIFORNIA

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	ADDENDUM D	6/28/19	TAA
2	BID ADDENDUM 2	5/22/19	TA
1	BID ADDENDUM 1	5/14/19	TA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
2
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 1

DRAWING NO. GE-8
SHEET NO. 302 OF 387
CLIENT JOB NO. 2744

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
151	1"	PANELBOARD MPZ-100	CONV REC (FIT-100A, FIT-100B)	3	#12	#12	120	POWER	CKT'S 1,3
152	1"	PANELBOARD MPZ-100	FIT-100A, FIT-100B	2	#12	#12	120	POWER	CKT 3
153	2"	CP-100	FIT-100A, FIT-100B, (PIT-100, PIT-110)	4	#18TSP	#14	24	SIGNAL	
154	1"	CP-100	PIT-110, (PIT-100)	2	#18TSP	#14	24	SIGNAL	
155	1"	CP-100	PIT-100	1	#18TSP	#14	24	SIGNAL	
156	1"	CP-100	FS-102	2	#14	#14	120	CONTROL	
157	1"	PANELBOARD PP5	MV-355	3	#12	#12	480	POWER	CKT'S 1,3,5
158	1"	CP-100	MV-355	2	#14	#14	120	CONTROL	
159	1"	CP-100	MV-355	2	#18TSP	#14	24	SIGNAL	
160	1"	PANELBOARD PP5	FCV-355	3	#12	#12	480	POWER	CKT'S 2,4,6
161	1"	CP-100	FCV-355	2	#14	#14	120	CONTROL	
162	1"	CP-100	FCV-355	2	#18TSP	#14	24	SIGNAL	
163	1"	PANELBOARD PP4	FCV-340C	3	#12	#12	480	POWER	CKT'S 7,9,11
164	1"	CP-100	FCV-340C	2	#14	#14	120	CONTROL	
165	1"	CP-100	FCV-340C	2	#18TSP	#14	24	SIGNAL	
166	1"	PANELBOARD PP4	FCV-340A	3	#12	#12	480	POWER	CKT'S 1,3,5
167	1"	CP-100	FCV-340A	4	#14	#14	120	CONTROL	
168	1"	CP-100	FCV-340A	1	#18TSP	#14	24	SIGNAL	
169	1"	PANELBOARD PP4	FCV-340B	3	#12	#12	480	POWER	CKT'S 2,4,6
170	1"	CP-100	FCV-340B	2	#14	#14	120	CONTROL	
171	1"	CP-100	FCV-340B	2	#18TSP	#14	24	SIGNAL	
172	1"	PANELBOARD PP4	MV-313	3	#12	#12	480	POWER	CKT'S 19,21,23
173	1"	CP-100	MV-313	8	#14	#14	120	CONTROL	
174	1"	PANELBOARD PP4	MV-312	3	#12	#12	480	POWER	CKT'S 14,16,18
175	1"	CP-100	MV-312	8	#14	#14	120	CONTROL	
176	1"	PANELBOARD PP4	MV-311	3	#12	#12	480	POWER	CKT'S 13,15,17
177	1"	CP-100	MV-311	8	#14	#14	120	CONTROL	
178	1"	PANELBOARD MPZ-100	FIT-354, (FIT-300, FIT-340A, FIT-340B)	6	#10	#10	120	POWER	CKTS 2,4,6,8
179	1"	PANELBOARD MPZ-100	FIT-300, (FIT-340A, FIT-340B)	5	#12	#12	120	POWER	CKT'S 4,6,8
180	1"	CP-100	FIT-354, (FIT-300)	2	#18TSP	#14	24	SIGNAL	

*-ONE GROUND CONDUCTOR PER CONDUIT

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
181	1"	CP-100	FIT-300	1	#18TSP	#14	24	SIGNAL	
182	1"	PANELBOARD MPZ-200	CONV REC	2	#10	#10	120	POWER	CKTS 1
183	1"	PANELBOARD MPZ-200	TANK LT/REC	2	#12	#12	120	POWER	CKT 3
184	1"	CP-100	PSL-351, (PSL-352, PSL-353)	6	#14	#14	120	CONTROL	
185	1"	CP-100	PSL-352 (PSL-353)	4	#14	#14	120	CONTROL	
186	1"	CP-100	PSL-353	2	#14	#14	120	CONTROL	
187	1"	PANELBOARD MPZ-100	FIT-340A, FIT-340B	3	#10	#12	120	POWER	CKTS 6,8
188	1"	CP-100	FIT-340A, FIT-340B	2	#18TSP	#14	24	SIGNAL	
189	1"	MCC2	PANELBOARD PP9	3	#3	#8	480	POWER	
190	1"	CP-100	PSL-313, (PSL-312, PSL-311)	6	#14	#14	120	CONTROL	
191	1"	CP-100	PSL-312, (PSL-311)	4	#14	#14	120	CONTROL	
192	1"	CP-100	PSL-311	2	#14	#14	120	CONTROL	
193	1"	CP-100	PT-300	1	#18TSP	#14	24	SIGNAL	
194	1"	PANELBOARD PP7	MV-410	3	#12	#12	480	POWER	CKT'S 1,3,5
195	1"	CP-100	MV-410	10	#14	#14	120	CONTROL	
196	1"	PANELBOARD PP7	MV-420	3	#12	#12	480	POWER	CKT'S 7,9,11
197	1"	CP-100	MV-420	10	#14	#14	120	CONTROL	
198	1"	PANELBOARD PP7	MV-430	3	#12	#12	480	POWER	CKT'S 13,15,17
199	1"	CP-100	MV-430	10	#14	#14	120	CONTROL	
200	1"	PANELBOARD PP7	MOTORIZED VALVE (FUTURE)				480	POWER	C.O. WITH PULLWIRE
201	1"	CP-100	MOTORIZED VALVE (FUTURE)						C.O. WITH PULLWIRE
202	1"	CP-100	PSH, PSL (FUTURE)						C.O. WITH PULLWIRE
203	1"	CP-100	PSL (FUTURE)						C.O. WITH PULLWIRE
204	1"	CP-100	PSL-431, (PSL-421, PSL-411)	6	#14	#14	120	CONTROL	
205	1"	CP-100	PSL-421, (PSL-411)	4	#14	#14	120	CONTROL	
206	1"	CP-100	PSL-411	2	#14	#14	120	CONTROL	
207	1"	PANELBOARD PP9	MV-720	3	#12	#12	480	POWER	CKT'S 7,9,11

*-ONE GROUND CONDUCTOR PER CONDUIT

MORAES/PHAM & ASSOCIATES
CONSULTING ELECTRICAL ENGINEERS
2131 PALOMAR AIRPORT RD., STE. 120
CARLSBAD CA. 92011 (760) 431-7177

REGISTERED PROFESSIONAL ENGINEER No. E19832 Exp. 3/31/18 ELECTRICAL STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY TAA
DRAWN BY AH
CHECKED BY TAA

Infrastructure ENGINEERING CORPORATION
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DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 2

DRAWING NO. GE-9
SHEET NO. 303 OF 387
CLIENT JOB NO. 2744

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
208	1"	CP-100	MV-720	8	#14	#14	120	CONTROL	
209	1"	PANELBOARD MPZ-700	FIT-750	2	#10	#10	120	POWER	CKT 1 (2)
210	1"	PP-200	FSV-205	3	#10	#10	480	POWER	
211	1"	PANELBOARD MPZ-700	TANK LTS/RECS	2	#10	#10	120	POWER	CKT 2
212	1"	CP-100	PIT-419	1	#18TSP	#14	24	SIGNAL	
213	1"	CP-100	PSH-419	2	#14	#14	120	CONTROL	
214		PANELBOARD PP9	PANELBOARD MPZ-700	2	#8	#10	480	POWER	CKT'S 1,3
215									NOT USED
216	1"	PANELBOARD PP6	MV-419B	3	#12	#12	480	POWER	CKT'S 13,15,17
217	1"	CP-100	MV-419B	8	#14	#14	120	CONTROL	
218	1"	PANELBOARD PP6	MV-419A	3	#12	#12	480	POWER	CKT'S 7,9,11
219	1"	CP-100	MV-419A	8	#14	#14	120	CONTROL	
220	1"	PANELBOARD PP6	MV-412	3	#12	#12	480	POWER	CKT'S 1,3,5
221	1"	CP-100	MV-412	8	#14	#14	120	CONTROL	
222	1"	CP-100	V-413B	4	#14	#14	120	CONTROL	
223	1"	CP-100	V-413A	4	#14	#14	120	CONTROL	
224	1"	CP-100	V-413C	4	#14	#14	120	CONTROL	
225	1"	PANELBOARD PP6	FCV-418	3	#12	#12	480	POWER	CKT'S 19,21,23
226	1"	CP-100	FCV-418	2	#14	#14	120	CONTROL	
227	2"	CP-100	FCV-418	3	#18TSP	#14	24	SIGNAL	
228	1"	CP-100	FS-400	1	#18TSP	#14	24	SIGNAL	SHOWER/EYEWASH
229	1"	CP-100	FS-401	1	#18TSP	#14	24	SIGNAL	SHOWER/EYEWASH
230	(2)2"	CP-100	CPB-400	–	–	–	–	CONTROL	SPARE WITH PULLCORD
	(6)1"	CP-100		–	–	–	–	SIGNAL	SPARE WITH PULLCORD
231	(2)2"	CPB-400	CPB1	–	–	–	–	CONTROL	SPARE WITH PULLCORD
	(6)1"	CPB-400		–	–	–	–	SIGNAL	SPARE WITH PULLCORD
232	(2)2"	CPB1	CPB2	–	–	–	–	CONTROL	SPARE WITH PULLCORD
CPB1	(6)1"	CPB1		–	–	–	–	SIGNAL	SPARE WITH PULLCORD
233									NOT USED
234	1"	CP-100	PIT-429	1	#18TSP	#14	24	SIGNAL	
235	1"	CP-100	PSH-429	2	#14	#14	120	CONTROL	
236	1"	CP-100	PIT-530	1	#18TSP	#14	24	SIGNAL	
237	1"	CP-100	V-530	4	#14	#14	120	CONTROL	

*-ONE GROUND CONDUCTOR PER CONDUIT

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
238	1"	PANELBOARD PP6	MV-429B	3	#12	#12	480	POWER	CKT'S 14,16,18
239	1"	CP-100	MV-429B	8	#14	#14	120	CONTROL	
240	1"	PANELBOARD PP6	MV-429A	3	#12	#12	480	POWER	CKT'S 8,10,12
241	1"	CP-100	MV-429A	8	#14	#14	120	CONTROL	
242	1"	PANELBOARD PP6	MV-422	3	#12	#12	480	POWER	CKT'S 2,4,6
243	1"	CP-100	MV-422	8	#14	#14	120	CONTROL	
244	1"	CP-100	V-423B	4	#14	#14	120	CONTROL	
245	1"	CP-100	V-423A	4	#14	#14	120	CONTROL	
246	1"	CP-100	V-423C	4	#14	#14	120	CONTROL	
247	1"	PANELBOARD PP6	FCV-428	3	#12	#12	480	POWER	CKT'S 20,22,24
248	1"	CP-100	FCV-428	2	#14	#14	120	CONTROL	
249	2"	CP-100	FCV-428	3	#18TSP	#14	24	SIGNAL	
250	(2)2"	MCC'S	PPB-400	–	–	–	–	POWER	SPARE W/ PULLCORD
	(4)1"	MCC'S		–	–	–	–	POWER	SPARE W/ PULLCORD
251	(2)2"	PPB-400	PPB-1	–	–	–	–	POWER	SPARE W/ PULLCORD
	(4)1"	PPB-400		–	–	–	–	POWER	SPARE W/ PULLCORD
252	(2)2"	PPB-1	PPB-2	–	–	–	–	POWER	SPARE W/ PULLCORD
	(4)1"	PPB-1		–	–	–	–	POWER	SPARE W/ PULLCORD
253									NOT USED
254									NOT USED
255									NOT USED
256	1"	CP-100	PIT-439	1	#18TSP	#14	24	SIGNAL	
257	1"	CP-100	PSH-439	2	#14	#14	120	CONTROL	
258	1"	PANELBOARD PP-200	MPZ-200	2	#8	#10	480V	POWER	CKT'S 1,3
259	1"	PANELBOARD PP-200	P-211	3	#12	#14	480	POWER	CKT'S 2,4,6
260	1"	PANELBOARD PP6	MV-439B	3	#12	#12	480	POWER	CKT'S 37,39,41
261	1"	CP-100	MV-439B	8	#14	#14	120	CONTROL	
262	1"	PANELBOARD PP6	MV-439A	3	#12	#12	480	POWER	CKT'S 31,33,35
263	1"	CP-100	MV-439A	8	#14	#14	120	CONTROL	
264	1"	PANELBOARD PP6	MV-432	3	#12	#12	480	POWER	CKT'S 25,27,29
265	1"	CP-100	MV-432	8	#14	#14	120	CONTROL	
266	1"	CP-100	V-433B	4	#14	#14	120	CONTROL	
267	1"	CP-100	V-433A	4	#14	#14	120	CONTROL	

*-ONE GROUND CONDUCTOR PER CONDUIT

MORAES/PHAM & ASSOCIATES
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CARLSBAD CA. 92011 (760) 431-7177

REGISTERED PROFESSIONAL ENGINEER — No. E19832 Exp. 3/31/18 — ELECTRICAL — STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA
2	BID ADDENDUM	6/5/19	TA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 3

DRAWING NO. GE-10
SHEET NO. 304 OF 387
CLIENT JOB NO. 2744

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
268	1"	CP-100	V-433C	4	#14	#14	120	CONTROL	
269	1"	PANELBOARD PP6	FCV-438	3	#12	#12	480	POWER	CKT'S 26,28,30
270	1"	CP-100	FCV-438	2	#14	#14	120	CONTROL	
271	2"	CP-100	FCV-438	3	#18TSP	#14	24	SIGNAL	
272									NOT USED
273									NOT USED
274									NOT USED
275									NOT USED
276									NOT USED
277									NOT USED
278	1"	CP-100	PIT-XXX (FUTURE)				24	SIGNAL	C.O. WITH PULLWIRE
279	1"	CP-100	PSH-XXX (FUTURE)				120	CONTROL	C.O. WITH PULLWIRE
280									NOT USED
281									NOT USED
282	1"	PANELBOARD PP7	MV-XXX (FUTURE)				480	POWER	C.O. WITH PULLWIRE
283	1"	CP-100	MV-XXX (FUTURE)				120	CONTROL	C.O. WITH PULLWIRE
284	1"	PANELBOARD PP7	MV-XXX (FUTURE)				480	POWER	C.O. WITH PULLWIRE
285	1"	CP-100	MV-XXX (FUTURE)				120	CONTROL	C.O. WITH PULLWIRE
286	1"	PANELBOARD PP7	MV-XXX (FUTURE)				480	POWER	C.O. WITH PULLWIRE
287	1"	CP-100	MV-XXX (FUTURE)				120	CONTROL	C.O. WITH PULLWIRE
288	1"	CP-100	V-XXXB (FUTURE)				120	CONTROL	C.O. WITH PULLWIRE
289	1"	CP-100	V-XXXA (FUTURE)				120	CONTROL	C.O. WITH PULLWIRE
290	1"	CP-100	V-XXXC (FUTURE)				120	CONTROL	C.O. WITH PULLWIRE
291	1"	PANELBOARD PP7	FCV-XXX (FUTURE)				480	POWER	C.O. WITH PULLWIRE
292	1"	CP-100	FCV-XXX (FUTURE)				120	CONTROL	C.O. WITH PULLWIRE
293	2"	CP-100	FCV-XXX (FUTURE)				24	SIGNAL	C.O. WITH PULLWIRE
294									NOT USED
295									NOT USED
296									NOT USED
297									NOT USED

*-ONE GROUND CONDUCTOR PER CONDUIT

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
298	1"	PANELBOARD A1	RO INSTRUMENT PNL CP-410	2	#12	#12	120	POWER	CKT 15
299	1"	CP-100	RO INSTRUMENT PNL CP-410	8	#14	#14	120	CONTROL	
300	2-1/2"	CP-100	RO INSTRUMENT PNL CP-410	11	#18TSP	#14	24	SIGNAL	
301	1"	PANELBOARD A1	RO INSTRUMENT PNL CP-420	2	#12	#12	120	POWER	CKT 17
302	1"	CP-100	RO INSTRUMENT PNL CP-420	8	#14	#14	120	CONTROL	
303	2-1/2"	CP-100	RO INSTRUMENT PNL CP-420	11	#18TSP	#14	24	SIGNAL	
304	1"	PANELBOARD A1	RO INSTRUMENT PNL CP-430	2	#12	#12	120	POWER	CKT 19
305	1"	CP-100	RO INSTRUMENT PNL CP-430	8	#14	#14	120	CONTROL	
306	2-1/2"	CP-100	RO INSTRUMENT PNL CP-430	11	#18TSP	#14	24	SIGNAL	
307	1"	PANELBOARD A1	RO INSTRUMENT PNL (FUTURE)				120	POWER	C.O. WITH PULLWIRE
308	1"	CP-100	RO INSTRUMENT PNL (FUTURE)				120	CONTROL	C.O. WITH PULLWIRE
309	2-1/2"	CP-100	RO INSTRUMENT PNL (FUTURE)				24	SIGNAL	C.O. WITH PULLWIRE
310	1"	LCP-460	LSH-450, LSL-450	4	#14	#14	120	CONTROL	
311	1"	LCP-460	TSH-452	2	#14	#14	120	CONTROL	
312	1"	LCP-460	AIT-453	1	#18TSP	#14	24	SIGNAL	
313	1"	LCP-460	FE-457	1	MFG CABLE		24	SIGNAL	
314	1"	LCP-460	CP-450	8	#14	#14	120	CONTROL	
315	1"	PANELBOARD A1	LCP-460	2	#12	#12	120	POWER	CKT 18
316	1"	CP-100	LCP-460	16	#14	#14	120	CONTROL	
317	1"	CP-100	LCP-460	2	#18TSP	#14	24	SIGNAL	
318	1"	CP-100	PSH-455A	2	#14	#14	120	CONTROL	
319	1"	CP-100	PSH-455	2	#14	#14	120	CONTROL	
320	1-1/2"	CP-450	HTR-450 (HTR BOX)	3	#1	#6	480	POWER	
321	1"	CP-450	HTR-450 (HTR BOX)	6	#14	#14	120	CONTROL	
322	1"	CP-450	TC-450	1	#18TSP	#14	24	SIGNAL	
323	1"	LCP-460	MCC1	8	#14	#14	120	CONTROL	
323A	1"	LCP-460	MCC1	2	#18TSP	#14	24	SIGNAL	
324	2"	MCC2	CP-450	6	1/0	#6	480	POWER	
325	1"	CP-100	LIT-450	1	#18TSP	#14	24	SIGNAL	
326	1"	PANELBOARD A1	AIT-453	2	#12	#12	120	POWER	CKT 20
327	2"	SUMP PUMP CP-490	SUMP PUMPS P-490A, P-490B	2	MFG CABLE		120	POWER	SUBMERSIBLE CABLES

*-ONE GROUND CONDUCTOR PER CONDUIT

MORAES/PHAM & ASSOCIATES
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	ADDENDUM D	6/28/19	TAA

SCALE NONE
DATE 06/16/2017
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DATE

Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 4

DRAWING NO. GE-11
SHEET NO. 305 OF 387
CLIENT JOB NO. 2744

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
328	2"	CP-100	LSHH-490	2	#14	#14	120	CONTROL	
329	1"	CP-400	FE-400	1	MFG CABLE		24	SIGNAL	
330	1"	PANELBOARD A1	CP-400	2	#12	#12	120	POWER	CKT 11
331	2"	CP-100	CP-400	11	#18TSP	#14	24	SIGNAL	
332	1"	PANELBOARD PP8	MV-510	3	#12	#12	480	POWER	CKT'S 18,20,22
333	1"	CP-100	MV-510	10	#14	#14	120	CONTROL	
334	1"	CP-100	PT-510	1	#18TSP	#14	24	SIGNAL	
335	1"	CP-100	V-501	4	#14	#14	120	CONTROL	
336	1"	MCC1	PP8	3	#3	#8	480	POWER	
336A	3/4"	PP8	MPZ-500	2	#3	#8	480	POWER	CKT'S 2,4
337	1"	CP-100	PSL-514	2	#14	#14	120	CONTROL	
338	1"	CP-100	FS-630, (FS-600)	2	#18STP	#14	24	SIGNAL	SHOWER/EYE WASHES
338A	1"	CP-100	FS-600	1	#18STP	#14	24	SIGNAL	SHOWER/EYE WASH
339	1"	CP-100	PSL-513	2	#14	#14	120	CONTROL	
340	1"	CP-100	FIT-750	1	#18TSP	#14	24	SIGNAL	
341	1"	CP-100	PSL-512	2	#14	#14	120	CONTROL	
342	1"	CP-100	FS-694	1	#18TSP	#14	24	SIGNAL	SHOWER/EYE WASH
343	1"	CP-100	PSL-511	2	#14	#14	120	CONTROL	
344	1"	CP-100	FS-692	1	#18TSP	#14	24	SIGNAL	SHOWER/EYE WASH
345	1"	CP-100	MV-514	10	#14	#14	120	CONTROL	
346	1"	PANELBOARD PP8	MV-514	3	#12	#12	480	POWER	CKT'S 6,8,10
347	1"	CP-100	MV-513	10	#14	#14	120	CONTROL	
348	1"	PANELBOARD PP8	MV-513	3	#12	#12	480	POWER	CKT'S 25,27,29
349	1"	CP-100	MV-512	10	#14	#14	120	CONTROL	
350	1"	PANELBOARD PP8	MV-512	3	#12	#12	480	POWER	CKT'S 19,21,23
351	1"	CP-100	MV-511	10	#14	#14	120	CONTROL	
352	1"	PANELBOARD PP8	MV-511	3	#12	#12	480	POWER	CKT'S 13,15,17
353	1"	CP-100	FIT-550, (PIT-550)	2	#18TSP	#14	24	SIGNAL	
353A	1"	CP-100	PIT-550	1	#18TSP	#14	24	SIGNAL	
354	1"	PANELBOARD MPZ-500	FIT-550	2	#12	#12	120	POWER	CKT 3
355	1"	CP-100	V-200	4	#14	#14	120	CONTROL	
356	1"	CP-100	V-201, V-554	8	#14	#14	120	CONTROL	
357	1"	CP-100	V-553	4	#14	#14	120	CONTROL	

*-ONE GROUND CONDUCTOR PER CONDUIT

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
358	1"	CP-100	V-550, V-551	8	#14	#14	120	CONTROL	
359									NOT USED
360	1"	CP-100	FS-693	1	#18TSP	#14	24	SIGNAL	SHOWER/EYE WASH
361	1"	PANELBOARD PP9	MV-700	3	#12	#12	480	POWER	CKT'S 2,4,6
362	1"	CP-100	MV-700	8	#14	#14	120	CONTROL	
363	1"	PANELBOARD PP9	MV-701	3	#12	#12	480	POWER	CKT'S 8,10,12
364	1"	CP-100	MV-701	8	#14	#14	120	CONTROL	
365	1"	PANELBOARD MPZ-700	CONV REC	2	#12	#12	120	POWER	CKT 3
366	1"	CONV REC	CONV REC	2	#12	#12	120	POWER	CKT 3 CONTINUING
367	1"	CP-100	PT-710	1	#18TSP	#14	24	SIGNAL	
368	1"	CP-100	PSL-701, (PSL-700)	4	#14	#14	120	CONTROL	
369	1"	CP-100	PSL-700	2	#14	#14	120	CONTROL	
370	2"	CP-100	FS-670, (FS-640, FS-650)	3	#18TSP	#14	24	SIGNAL	SHOWER/EYE WASHES
370A	1"	CP-100	FS-640, (FS-650)	2	#18TSP	#14	24	SIGNAL	SHOWER/EYE WASHES
370B	1"	CP-100	FS-650	1	#18TSP	#14	24	SIGNAL	SHOWER/EYE WASH
371	2"	CP-100	FS-660, (FS-630, FS-600)	3	#18TSP	#14	24	SIGNAL	SHOWER/EYE WASHES
372	1"	CP-100	PT-601	1	#18TSP	#14	24	SIGNAL	
373	1"	CP-100	SUMP PUMP CP (P-691)	1	#18TSP	#14	24	SIGNAL	
374	2"	SUMP PUMP CP (P-691)	LSHH-691, LSL-691	2	MFG CABLE		–	–	SUBMERSIBLE CABLES
375	1"	PANELBOARD A2	SUMP PUMP CP (P-691)	2	#10	#10	120	POWER	CKT 13
376	1"	SUMP PUMP CP (P-691)	SUMP PUMP P-691	1	MFG CABLE		120	POWER	SUBMERSIBLE CABLE
377	1"	PANELBOARD A2	P-605, (P-606)	3	#10	#10	120	POWER	CKT'S 16,18
378	1"	PANELBOARD A2	P-606	2	#10	#10	120	POWER	CKT 18
379	2"	CP-100	P-605, (P-606)	4	#18TSP	#14	24	SIGNAL	
380	1"	CP-100	P-606	2	#18TSP	#14	24	SIGNAL	
381	2"	CP-100	PSH-605,	2	#14	#14	120	CONTROL	
			P-605, (P-606)	16	#14	#14	120	CONTROL	
–	–	–	PSL-605, (PSL-606)	4	#14	#14	120	CONTROL	
382	1"	CP-100	P-606	8	#14	#14	120	CONTROL	
			PSL-606	2	#14	#14	120	CONTROL	
383	1"	PANELBOARD A2	P-603, (P-604)	3	#10	#10	120	POWER	CKT'S 12,14
384	1"	PANELBOARD A2	P-604	2	#10	#10	120	POWER	CKT 14
385	2"	CP-100	P-603, (P-604)	4	#18TSP	#14	24	SIGNAL	

*-ONE GROUND CONDUCTOR PER CONDUIT

MORAES/PHAM & ASSOCIATES
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2131 PALOMAR AIRPORT RD., STE. 120
CARLSBAD CA. 92011 (760) 431-7177

REGISTERED PROFESSIONAL ENGINEER
No. E19832
Exp. 3/31/18
ELECTRICAL
STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 5

DRAWING NO. GE-12
SHEET NO. 306 OF 387
CLIENT JOB NO. 2744

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
386	1"	CP-100	P-604	2	#18TSP	#14	24	SIGNAL	
387	2"	CP-100	PSH-603,	2	#14	#14	120	CONTROL	
			P-603, (P-604),	16	#14	#14	120	CONTROL	
			PSL-603, (PSL-604)	4	#14	#14	120	CONTROL	
388	1"	CP-100	P-604	8	#14	#14	120	CONTROL	
			PSL-604	2	#14	#14	120	CONTROL	
389	1"	PANELBOARD A2	P-601, (P-602)	3	#10	#10	120	POWER	CKT'S 8,10
390	1"	PANELBOARD A2	P-602	2	#10	#10	120	POWER	CKT 10
391	2"	CP-100	P-601, (P-602)	4	#18TSP	#14	24	SIGNAL	
392	1"	CP-100	P-602	2	#18TSP	#14	24	SIGNAL	
393	2"	CP-100	PSH-601,	2	#14	#14	120	CONTROL	
			P-601, (P-602),	16	#14	#14	120	CONTROL	
			PSL-601, (PSL-602)	4	#14	#14	120	CONTROL	
394	1"	CP-100	P-602	8	#14	#14	120	CONTROL	
			PSL-602	2	#14	#14	120	CONTROL	
395	1"	CP-100	PT-610	1	#18TSP	#14	24	SIGNAL	
396	1"	CP-100	SUMP PUMP CP (P-692)	1	#18TSP	#14	24	SIGNAL	
397	2"	SUMP PUMP CP (P-692)	LSHH-692, LSL-692	2	MFG CABLE				SUBMERSIBLE CABLES
398	1"	PANELBOARD A2	SUMP PUMP CP (P-692)	2	#10	#10	120	POWER	CKT 15
399	1"	SUMP PUMP CP (P-692)	SUMP PUMP P-692	1	MFG CABLE		120	POWER	SUBMERSIBLE CABLE
400	1"	PANELBOARD A2	P-611, (P-612)	3	#10	#10	120	POWER	CKT'S 20,22
401	1"	PANELBOARD A2	P-612	2	#10	#10	120	POWER	CKT 22
402	2"	CP-100	P-611, (P-612)	4	#18TSP	#14	24	SIGNAL	
403	1"	CP-100	P-612	2	#18TSP	#14	24	SIGNAL	
404	2"	CP-100	PSH-611,	2	#14	#14	120	CONTROL	
			P-611, (P-612)	16	#14	#14	120	CONTROL	
			PSL-611, (PSL-612)	4	#14	#14	120	CONTROL	
405	1"	CP-100	P-612	8	#14	#14	120	CONTROL	
			PSL-612	2	#14	#14	120	CONTROL	
406	1"	CP-100	PSH-620, PSL-620	4	#14	#14	120	CONTROL	
407	1"	CP-100	TIT-620	1	#18TSP	#14	24	SIGNAL	
408	1"	PANELBOARD A2	TIT-620	2	#10	#10	120	POWER	CKT 32
409	1"	TIT-620	TE-620	1	MFG CABLE		24	SIGNAL	
410	1"	CP-100	LIT-620	1	#18TSP	#14	24	SIGNAL	
411	1"	PANELBOARD A2	LIT-620	2	#10	#10	120	POWER	CKT 34
412	1"	LIT-620	LE-620	1	MFG CABLE		24	SIGNAL	
413	1"	CP-100	SUMP PUMP CP (P-693)	1	#18TSP	#14	24	SIGNAL	
414	2"	SUMP PUMP CP (P-693)	LSHH-693, LSL-693	2	MFG CABLE				SUBMERSIBLE CABLES
415	1"	PANELBOARD A2	SUMP PUMP CP (P-693)	2	#10	#10	120	POWER	CKT 17
416	1"	SUMP PUMP CP (P-693)	SUMP PUMP P-693	1	MFG CABLE		120	POWER	SUBMERSIBLE CABLE
417	1"	PANELBOARD A2	P-621, (P-622)	3	#10	#10	120	POWER	CKT'S 24,26
418	1"	PANELBOARD A2	P-622	2	#10	#10	120	POWER	CKT 26
419	2"	CP-100	P-621, (P-622)	4	#18TSP	#14	24	SIGNAL	
420	1"	CP-100	P-622	2	#18TSP	#14	24	SIGNAL	
421	2"	CP-100	PSH-621,	2	#14	#14	120	CONTROL	
			P-621, (P-622)	16	#14	#14	120	CONTROL	
			PSL-621, (PSL-622)	4	#14	#14	120	CONTROL	
422	1"	CP-100	P-622	8	#14	#14	120	CONTROL	
			PSL-622	2	#14	#14	120	CONTROL	
423	1"	CP-100	PT-630	1	#18TSP	#14	24	SIGNAL	
424	1"	CP-100	SUMP PUMP CP (P-694)	1	#18TSP	#14	24	SIGNAL	
425	2"	SUMP PUMP CP (P-694)	LSHH-694, LSL-694	2	MFG CABLE				SUBMERSIBLE CABLES
426	1"	PANELBOARD A2	SUMP PUMP CP (P-694)	2	#10	#10	120	POWER	CKT 19
427	1"	SUMP PUMP CP (P-694)	SUMP PUMP P-694	1	MFG CABLE		120	POWER	SUBMERSIBLE CABLE
428	1"	PANELBOARD A2	P-631, (P-632)	3	#10	#10	120	POWER	CKT'S 28,30
429	1"	PANELBOARD A2	P-632	2	#10	#10	120	POWER	CKT 30
430	2"	CP-100	P-631, (P-632)	4	#18TSP	#14	24	SIGNAL	
431	1"	CP-100	P-632	2	#18TSP	#14	24	SIGNAL	
432	2"	CP-100	PSH-631,	2	#14	#14	120	CONTROL	
			P-631, (P-632)	16	#14	#14	120	CONTROL	
			PSL-631, (PSL-632)	4	#14	#14	120	CONTROL	
433	1"	CP-100	P-632	8	#14	#14	120	CONTROL	
			PSL-632	2	#14	#14	120	CONTROL	
434									NOT USED
435	1"	PANELBOARD A2	LIT-660	2	#10	#10	120	POWER	CKT 36
436	1"	PANELBOARD A2	SUMP PUMP CP (P-690A)	2	#10	#10	120	POWER	CKT 29
436A	1"	SUMP PUMP CP (P-690A)	SUMP PUMP P-690A	1	MFG CABLE		120	POWER	SUBMERSIBLE CABLE
437	1"	PANELBOARD A2	SUMP PUMP CP (P-690B)	2	#10	#10	120	POWER	CKT 31
437A	1"	SUMP PUMP CP (P-690B)	SUMP PUMP P-690B	1	MFG CABLE		120	POWER	SUBMERSIBLE CABLE

*-ONE GROUND CONDUCTOR PER CONDUIT

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FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 6

DRAWING NO. GE-13
SHEET NO. 307 OF 387
CLIENT JOB NO. 2744

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
438	1"	CP-100	PT-650	1	#18TSP	#14	24	SIGNAL	
439	1"	CP-100	SUMP PUMP CP (P-696)	1	#18TSP	#14	24	SIGNAL	
440	2"	SUMP PUMP CP (P-696)	LSHH-696, LSL-696	2	MFG CABLE				SUBMERSIBLE CABLES
441	1"	PANELBOARD A2	SUMP PUMP CP (P-696)	2	#10	#10	120	POWER	CKT 23
442	1"	SUMP PUMP CP (P-696)	SUMP PUMP P-696	1	MFG CABLE		120	POWER	SUBMERSIBLE CABLE
443	1"	PANELBOARD A3	P-651, (P-652)	3	#10	#10	120	POWER	CKT'S 2,4
444	1"	PANELBOARD A3	P-652	2	#10	#10	120	POWER	CKT 4
445	2"	CP-100	P-651, (P-652)	4	#18TSP	#14	24	SIGNAL	
446	1"	CP-100	P-652	2	#18TSP	#14	24	SIGNAL	
447	2"	CP-100	PSH-651,	2	#14	#14	120	CONTROL	
			P-651, (P-652)	16	#14	#14	120	CONTROL	
			PSL-651, (PSL-652)	4	#14	#14	120	CONTROL	
448	1"	PP-5	MPZ-100	3	#3	#8	480	POWER	
449	1"	CP-100	PT-640	1	#18TSP	#14	24	SIGNAL	
450	1"	CP-100	SUMP PUMP CP (P-695)	1	#18TSP	#14	24	SIGNAL	
451	2"	SUMP PUMP CP (P-695)	LSHH-695, LSL-695	2	MFG CABLE				SUBMERSIBLE CABLES
452	1"	PANELBOARD A2	SUMP PUMP CP (P-695)	2	#10	#10	120	POWER	CKT 21
453	1"	SUMP PUMP CP (P-695)	SUMP PUMP P-695	1	MFG CABLE		120	POWER	SUBMERSIBLE CABLE
454	1"	PANELBOARD A3	P-641, (P-642)	3	#10	#10	120	POWER	CKT'S 6,8
455	1"	PANELBOARD A3	P-642	2	#10	#10	120	POWER	CKT 8
456	2"	CP-100	P-641, (P-642)	4	#18TSP	#14	24	SIGNAL	
457	1"	CP-100	P-642	2	#18TSP	#14	24	SIGNAL	
458	2"	CP-100	PSH-641,	2	#14	#14	120	CONTROL	
			P-641, (P-642)	16	#14	#14	120	CONTROL	
			PSL-641, (PSL-642)	4	#14	#14	120	CONTROL	
459	1"	CP-100	P-642	8	#14	#14	120	CONTROL	
			PSL-642	2	#14	#14	120	CONTROL	
460	1"	CP-100	LIT-670	1	#18TSP	#14	24	SIGNAL	
461	1"	CP-100	SUMP PUMP CP (P-698)	1	#18TSP	#14	24	SIGNAL	
462	2"	SUMP PUMP CP (P-698)	LSHH-698,LSL-698	2	MFG CABLE				SUBMERSIBLE CABLES
463	1"	PANELBOARD A2	SUMP PUMP CP (P-698)	2	#10	#10	120	POWER	CKT 27
464	1"	SUMP PUMP CP (P-698)	SUMP PUMP P-698	1	MFG CABLE		120	POWER	SUBMERSIBLE CABLE
465	1"	PANELBOARD A3	P-671, (P-672)	3	#10	#10	120	POWER	CKT'S 1,3

*-ONE GROUND CONDUCTOR PER CONDUIT

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
466	1"	PANELBOARD A3	P-672	2	#10	#10	120	POWER	CKT 3
467	2"	CP-100	P-671, (P-672)	4	#18TSP	#14	24	SIGNAL	
468	1"	CP-100	P-672	2	#18TSP	#14	24	SIGNAL	
469	2"	CP-100	PSH-675	2	#14	#14	120	CONTROL	
			P-671, (P-672)	16	#14	#14	120	CONTROL	
			PSL-671, (PSL-672)	4	#14	#14	120	CONTROL	
470	1"	CP-100	P-672	8	#14	#14	120	CONTROL	
			PSL-672	2	#14	#14	120	CONTROL	
471	1"	PANELBOARD A3	TANK FILL PANEL	2	#10	#10	120	POWER	CKT 11
472	1"	CP-100	TANK FILL PANEL	1	CAT5E		24	SIGNAL	
473	1"	PANELBOARD PP7	MV-650	3	#12	#12	480	POWER	CKTS 8, 10, 12
474	1"	CP-100	MV-650	8	#14	#14	120	CONTROL	
475	1"	CP-100	LIT-660	1	#18TSP	#14	24	SIGNAL	
476	1"	CP-100	SUMP PUMP CP (P-697)	1	#18TSP	#14	24	SIGNAL	
477	2"	SUMP PUMP CP (P-697)	LSHH-697, LSL-697	2	MFG CABLE				SUBMERSIBLE CABLES
478	1"	PANELBOARD A2	SUMP PUMP CP (P-697)	2	#10	#10	120	POWER	CKT 25
479	1"	SUMP PUMP CP (P-697)	SUMP PUMP P-697	1	MFG CABLE		120	POWER	SUBMERSIBLE CABLE
480	1"	PANELBOARD A3	P-661, P-662	3	#10	#10	120	POWER	CKT'S 10,12
481	1"	PANELBOARD A3	P-662	2	#10	#10	120	POWER	CKT 12
482	2"	CP-100	P-661, (P-662)	4	#18TSP	#14	24	SIGNAL	
483	1"	CP-100	P-662	2	#18TSP	#14	24	SIGNAL	
484	1"	CP-100	P-661, (P-662)	16	#14	#14	120	CONTROL	
			PSH-665, (PSH-666)	4	#14	#14	120	CONTROL	
485	1"	CP-100	P-662	8	#14	#14	120	CONTROL	
			PSH-666	2	#14	#14	120	CONTROL	
486	1"	PANELBOARD A3	LIT-670	2	#10	#10	120	POWER	CKT 14
487	1"	LIT-670	PT-670	1	MFG CABLE				
488	1"	PANELBOARD PP5	PANELBOARD MPZ-100	2	#3	#8	480	POWER	CKT'S 26,28
489	1"	DISTRIBUTION BOARD DP1	PANELBOARD MPZ-202	2	#3	#8	480	POWER	CKT'S 17,19
490	1"	CP-100	MV-660	8	#14	#14	120	CONTROL	
491	1"	PANELBOARD PP7	MV-660	3	#12	#12	480	POWER	CKT'S 2,4,6
492	1"	CP-100	SUMP PUMP CP (P-690A)	1	#18TSP	#14	24	SIGNAL	
492A	2"	SUMP PUMP CP (P-690A)	LSHH-690A, LSL-690A	2	MFG CABLE				SUBMERSIBLE CABLES
493	1"	CP-100	SUMP PUMP CP (P-690B)	1	#18TSP	#14	24	SIGNAL	
493A	2"	SUMP PUMP CP (P-690B)	LSHH-690B, LSL-690B	2	MFG CABLE				SUBMERSIBLE CABLES

*-ONE GROUND CONDUCTOR PER CONDUIT

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APPROVED BY:

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ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 7

DRAWING NO. GE-14
SHEET NO. 308 OF 387
CLIENT JOB NO. 2744

CONDUIT		FROM	TO	CABLE			VOLTAGE		REMARKS
NO.	SIZE			QTY.	SIZE	GND. *			
494	1"	PANELBOARD PP1	FCV-256B, MV-254B, MV-258B,	3	#12	#12	480	POWER	CKT'S 1,3,5
			MV-257B, FCV-255B						
495	1"	PANELBOARD PP1	FCV-256A, MV-254A, MV-258A,	3	#12	#12	480	POWER	CKT'S 7,9,11
			MV-257A, FCV-255A						
496	1"	PANELBOARD PP1	FCV-246B, MV-244B, MV-248B,	3	#12	#12	480	POWER	CKT'S 13,15,17
			MV-247B, FCV-245B						
497	1"	PANELBOARD PP1	FCV-246A, MV-244A, MV-248A,	3	#12	#12	480	POWER	CKT'S 2,4,6
			MV-247A, FCV-245A						
498	1"	PANELBOARD PP2	FCV-236B, MV-234B, MV-238B,	3	#12	#12	480	POWER	CKT'S 1,3,5
			MV-237B, FCV-235B						
499	1"	PANELBOARD PP2	FCV-236A, MV-234A, MV-238A,	3	#12	#12	480	POWER	CKT'S 7,9,11
			MV-237A, FCV-235A						
500	1"	PANELBOARD PP2	FCV-226B, MV-224B, MV-228B,	3	#12	#12	480	POWER	CKT'S 13,15,17
			MV-227B, FCV-225B						
501	1"	PANELBOARD PP2	FCV-226A, MV-224A, MV-228A,	3	#12	#12	480	POWER	CKT'S 2,4,6
			MV-227A, FCV-225A						
502	1"	PANELBOARD PP3	FCV-216B, MV-214B, MV-218B,	3	#12	#12	480	POWER	CKT'S 1,3,5
			MV-217B, FCV-215B						
503	1"	PANELBOARD PP3	FCV-216A, MV-214A, MV-218A,	3	#12	#12	480	POWER	CKT'S 7,9,11
			MV-217A, FCV-215A						
504	1"	CP-200	FCV-256B, (FCV-256A)	20	#14	#14	120	CONTROL	
505	1"	CP-200	FCV-256A	10	#14	#14	120	CONTROL	
506	1"	CP-200	MV-254B, (MV-254A)	20	#14	#14	120	CONTROL	
507	1"	CP-200	MV-254A	10	#14	#14	120	CONTROL	
508	1"	CP-200	MV-258B, (MV-258A)	20	#14	#14	120	CONTROL	
509	1"	CP-200	MV-258A	10	#14	#14	120	CONTROL	
510	2"	CP-200	MV-257B, FCV-255B,	32	#14	#14	120	CONTROL	
			(MV-257A, FCV-255A)						
511	1"	CP-200	FCV-255B, (FCV-255A)	2	#18TSP	#14	24	SIGNAL	
512	1"	CP-200	MV-257A, FCV-255A,	16	#14	#14	120	CONTROL	
513	1"	CP-200	FCV-255A	1	#18TSP	#14	24	SIGNAL	
514	1"	PANELBOARD MPZ-201	FIT-258B, (FIT-258A)	3	#12	#12	120	POWER	CKT'S 5,7
515	1"	PANELBOARD MPZ-201	FIT-258A	2	#12	#12	120	POWER	CKT 5
516	1-1/2"	CP-200	FIT-258B,(FIT-258A,DPIT-250A&B)	4	#18TSP	#14	24	SIGNAL	
517	1"	CP-200	DPIT-250A, DPIT-250B	2	#18TSP	#14	24	SIGNAL	

*-ONE GROUND CONDUCTOR PER CONDUIT

CONDUIT		FROM	TO	CABLE			VOLTAGE		REMARKS
NO.	SIZE			QTY.	SIZE	GND. *			
518	1"	CP-200	FIT-258A	1	#18TSP	#14	24	SIGNAL	
519	1"	CP-200	FCV-246B, (FCV-246A)	20	#14	#14	120	CONTROL	
520	1"	CP-200	FCV-246A	10	#14	#14	120	CONTROL	
521	1"	CP-200	MV-244B, (MV-244A)	20	#14	#14	120	CONTROL	
522	1"	CP-200	MV-244A	10	#14	#14	120	CONTROL	
523	1"	CP-200	MV-248B, (MV-248A)	20	#14	#14	120	CONTROL	
524	1"	CP-200	MV-248A	10	#14	#14	120	CONTROL	
525	2"	CP-200	MV-247B, FCV-245B,	32	#14	#14	120	CONTROL	
			(MV-247A, FCV-245A)						
526	1"	CP-200	FCV-245B, (FCV-245A)	2	#18TSP	#14	24	SIGNAL	
527	1"	CP-200	MV-247A, FCV-245A,	16	#14	#14	120	CONTROL	
528	1"	CP-200	FCV-245A	1	#18TSP	#14	24	SIGNAL	
529	1"	PANELBOARD MPZ-201	FIT-248B, (FIT-248A)	3	#12	#12	120	POWER	CKT'S 9,11
530	1"	PANELBOARD MPZ-201	FIT-248A	2	#12	#12	120	POWER	CKT 9
531	1-1/2"	CP-200	FIT-248B,(FIT-248A,DPIT-240A&B)	4	#18TSP	#14	24	SIGNAL	
532	1"	CP-200	DPIT-240A, DPIT-240B	2	#18TSP	#14	24	SIGNAL	
533	1"	CP-200	FIT-248A	1	#18TSP	#14	24	SIGNAL	
534	1"	CP-200	FCV-236B, (FCV-236A)	20	#14	#14	120	CONTROL	
535	1"	CP-200	FCV-236A	10	#14	#14	120	CONTROL	
536	1"	CP-200	MV-234B, (MV-234A)	20	#14	#14	120	CONTROL	
537	1"	CP-200	MV-234A	10	#14	#14	120	CONTROL	
538	1"	CP-200	MV-238B, (MV-238A)	20	#14	#14	120	CONTROL	
539	1"	CP-200	MV-238A	10	#14	#14	120	CONTROL	
540	2"	CP-200	MV-237B, FCV-235B,	32	#14	#14	120	CONTROL	
			(MV-237A, FCV-235A)						
541	1"	CP-200	FCV-235B, (FCV-235A)	2	#18TSP	#14	24	SIGNAL	
542	1"	CP-200	MV-237A, FCV-235A,	16	#14	#14	120	CONTROL	
543	1"	CP-200	FCV-235A	1	#18TSP	#14	24	SIGNAL	
544	1"	PANELBOARD MPZ-202	FIT-238B, (FIT-238A)	3	#12	#12	120	POWER	CKT'S 1,3
545	1"	PANELBOARD MPZ-202	FIT-238A	2	#12	#12	120	POWER	CKT 1
546	1-1/2"	CP-200	FIT-238B,(FIT-238A,DPIT-230A&B)	4	#18TSP	#14	24	SIGNAL	

*-ONE GROUND CONDUCTOR PER CONDUIT

MORAES/PHAM & ASSOCIATES
CONSULTING ELECTRICAL ENGINEERS
2131 PALOMAR AIRPORT RD., STE. 120
CARLSBAD CA. 92011 (760) 431-7177

REGISTERED PROFESSIONAL ENGINEER
No. E19832
Exp. 3/31/18
ELECTRICAL
STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY TAA
DRAWN BY AH
CHECKED BY TAA

Infrastructure
ENGINEERING CORPORATION
14271 Danielson Street
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DATE

Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 8

DRAWING NO. GE-15
SHEET NO. 309 OF 387
CLIENT JOB NO. 2744

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
547	1"	CP-200	DPIT-230A, DPIT-230B	2	#18TSP	#14	24	SIGNAL	
548	1"	CP-200	FIT-238A	1	#18TSP	#14	24	SIGNAL	
549	1"	CP-200	FCV-226B, (FCV-226A)	20	#14	#14	120	CONTROL	
550	1"	CP-200	FCV-226A	10	#14	#14	120	CONTROL	
551	1"	CP-200	MV-224B, (MV-224A)	20	#14	#14	120	CONTROL	
552	1"	CP-200	MV-224A	10	#14	#14	120	CONTROL	
553	1"	CP-200	MV-228B, (MV-228A)	20	#14	#14	120	CONTROL	
554	1"	CP-200	MV-228A	10	#14	#14	120	CONTROL	
555	2"	CP-200	MV-227B, FCV-225B, (MV-227A, FCV-225A)	32	#14	#14	120	CONTROL	
556	1"	CP-200	FCV-225B, (FCV-225A)	2	#18TSP	#14	24	SIGNAL	
557	1"	CP-200	MV-227A, FCV-225A,	16	#14	#14	120	CONTROL	
558	1"	CP-200	FCV-225A	1	#18TSP	#14	24	SIGNAL	
559	1"	PANELBOARD MPZ-202	FIT-228B, (FIT-228A)	3	#12	#12	120	POWER	CKT'S 5,7
560	1"	PANELBOARD MPZ-202	FIT-228A	2	#12	#12	120	POWER	CKT 5
561	1"	CP-200	FIT-228B,(FIT-228A,DPIT-220A&B)	4	#18TSP	#14	24	SIGNAL	
562	1"	CP-200	DPIT-220A, DPIT-220B	2	#18TSP	#14	24	SIGNAL	
563	1"	CP-200	FIT-228A	1	#18TSP	#14	24	SIGNAL	
564	1"	CP-200	FCV-216B, (FCV-216A)	20	#14	#14	120	CONTROL	
565	1"	CP-200	FCV-216A	10	#14	#14	120	CONTROL	
566	1"	CP-200	MV-214B, (MV-214A)	20	#14	#14	120	CONTROL	
567	1"	CP-200	MV-214A	10	#14	#14	120	CONTROL	
568	1"	CP-200	MV-218B, (MV-218A)	20	#14	#14	120	CONTROL	
569	1"	CP-200	MV-218A	10	#14	#14	120	CONTROL	
570	2"	CP-200	MV-217B, FCV-215B, (MV-217A, FCV-215A)	32	#14	#14	120	CONTROL	
571	1"	CP-200	FCV-215B, (FCV-215A)	2	#18TSP	#14	24	SIGNAL	
572	1"	CP-200	MV-217A, FCV-215A,	16	#14	#14	120	CONTROL	
573	1"	CP-200	FCV-215A	1	#18TSP	#14	24	SIGNAL	
574	1"	PANELBOARD MPZ-201	FIT-218B, (FIT-218A)	3	#12	#12	120	POWER	CKT'S 10,12
575	1"	PANELBOARD MPZ-201	FIT-218A	2	#12	#12	120	POWER	CKT 10
576	1-1/2"	CP-200	FIT-218B,(FIT-218A,DPIT-210A&B)	4	#18TSP	#14	24	SIGNAL	
577	1"	CP-200	DPIT-210A, DPIT-210B	2	#18TSP	#14	24	SIGNAL	
578	1"	CP-200	FIT-218A	1	#18TSP	#14	24	SIGNAL	
579	1"	PANELBOARD PP1	MV-250B, MV-250A, MV-251B, MV-251A, MV-259	3	#12	#12	480	POWER	CKT'S 8,10,12
580	1"	PANELBOARD PP1	MV-240B, MV-240A, MV-241B, MV-241A, MV-249	3	#12	#12	480	POWER	CKT'S 14,16,18
581	1"	PANELBOARD PP2	MV-230B, MV-230A, MV-231B, MV-231A, MV-239	3	#12	#12	480	POWER	CKT'S 8,10,12
582	1"	PANELBOARD PP2	MV-220B, MV-220A, MV-221B, MV-221A, MV-229	3	#12	#12	480	POWER	CKT'S 14,16,18
583	1"	PANELBOARD PP3	MV-210B, MV-210A, MV-211B, MV-211A, MV-219	3	#12	#12	480	POWER	CKT'S 8,10,12
584	1-1/2"	CP-200	MV-250B, MV-250A, (MV-259)	30	#14	#14	120	CONTROL	
585	1"	CP-200	MV-259	10	#14	#14	120	CONTROL	
586	1"	CP-200	MV-251B, (MV-251A)	20	#14	#14	120	CONTROL	
587	1"	CP-200	MV-251A	10	#14	#14	120	CONTROL	
588	1-1/2"	CP-200	MV-240B, MV-240A, (MV-249)	30	#14	#14	120	CONTROL	
589	1"	CP-200	MV-249	10	#14	#14	120	CONTROL	
590	1"	CP-200	MV-241B, (MV-241A)	20	#14	#14	120	CONTROL	
591	1"	CP-200	MV-241A	10	#14	#14	120	CONTROL	
592	1-1/2"	CP-200	MV-230B, MV-230A, (MV-239)	30	#14	#14	120	CONTROL	
593	1"	CP-200	MV-239	10	#14	#14	120	CONTROL	
594	1"	CP-200	MV-231B, (MV-231A)	20	#14	#14	120	CONTROL	
595	1"	CP-200	MV-231A	10	#14	#14	120	CONTROL	
596	1-1/2"	CP-200	MV-220B, MV-220A, (MV-229)	30	#14	#14	120	CONTROL	
597	1"	CP-200	MV-229	10	#14	#14	120	CONTROL	
598	1"	CP-200	MV-221B, (MV-221A)	20	#14	#14	120	CONTROL	
599	1"	CP-200	MV-221A	10	#14	#14	120	CONTROL	
600	1-1/2"	CP-200	MV-210B, MV-210A, (MV-219)	30	#14	#14	120	CONTROL	
601	1"	CP-200	MV-219	10	#14	#14	120	CONTROL	

*-ONE GROUND CONDUCTOR PER CONDUIT

*-ONE GROUND CONDUCTOR PER CONDUIT

MORAES/PHAM & ASSOCIATES
CONSULTING ELECTRICAL ENGINEERS
2131 PALOMAR AIRPORT RD., STE. 120
CARLSBAD CA. 92011 (760) 431-7177

REGISTERED PROFESSIONAL ENGINEER No. E19832 Exp. 3/31/18 ELECTRICAL STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY TAA
DRAWN BY AH
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DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 9

DRAWING NO. GE-16
SHEET NO. 310 OF 387
CLIENT JOB NO. 2744

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND.*	VOLTAGE		REMARKS
602	1"	CP-200	MV-211B, (MV-211A)	20	#14	#14	120	CONTROL	
603	1"	CP-200	MV-211A	10	#14	#14	120	CONTROL	
604	1"	PANELBOARD PP1	MOTORIZED VALVE (FUTURE)					POWER	C.O. WITH PULLWIRE
605	1"	MOTORIZED VALVE (FUTURE)	MOTORIZED VALVE (FUTURE)					POWER	C.O. WITH PULLWIRE
606	1"	MOTORIZED VALVE (FUTURE)	MOTORIZED VALVE (FUTURE)					POWER	C.O. WITH PULLWIRE
607	1"	MOTORIZED VALVE (FUTURE)	MOTORIZED VALVE (FUTURE)					POWER	C.O. WITH PULLWIRE
608	1"	MOTORIZED VALVE (FUTURE)	MOTORIZED VALVE (FUTURE)					POWER	C.O. WITH PULLWIRE
609	1-1/2"	CP-200	MOTORIZED VALVE (FUTURE)					CONTROL	C.O. WITH PULLWIRE
610	1"	MOTORIZED VALVE (FUTURE)	MOTORIZED VALVE (FUTURE)					CONTROL	C.O. WITH PULLWIRE
611	1"	CP-200	MOTORIZED VALVE (FUTURE)					CONTROL	C.O. WITH PULLWIRE
612	1"	MOTORIZED VALVE (FUTURE)	MOTORIZED VALVE (FUTURE)					CONTROL	C.O. WITH PULLWIRE
613	1"	PANELBOARD PP3	MOTORIZED VALVE (FUTURE)					POWER	C.O. WITH PULLWIRE
614	1"	MOTORIZED VALVE (FUTURE)	MOTORIZED VALVE (FUTURE)					POWER	C.O. WITH PULLWIRE
615	1"	MOTORIZED VALVE (FUTURE)	MOTORIZED VALVE (FUTURE)					POWER	C.O. WITH PULLWIRE
616	1"	MOTORIZED VALVE (FUTURE)	MOTORIZED VALVE (FUTURE)					POWER	C.O. WITH PULLWIRE
617	1"	CP-100	FS-720	2	#14	#14	120	CONTROL	SHOWER/EYE WASH
618	1"	CP-100	FS-500	2	#14	#14	120	CONTROL	SHOWER/EYE WASH
619	1"	CP-200	DPIT'S (FUTURE)					SIGNAL	C.O. W/PULLWIRE
620	1"	CP-100	PT-600	1	#18TSP	#14	24	SIGNAL	
621	1"	CP-200	DPIT'S (FUTURE)					SIGNAL	C.O. W/PULLWIRE
622	1"	PANELBOARD A3	P-681, FIT-680, (P-682)	4	#10	#10	120	POWER	CKT'S 5,7,9
623	1"	PANELBOARD A3	P-682	2	#10	#10	120	POWER	CKT 7
624	2"	CP-100	P-681, (P-682), & FIT-680	5	#18TSP	#14	24	SIGNAL	
625	1"	CP-100	P-682	2	#18TSP	#14	24	SIGNAL	
626	1"	CP-100	PSH-681,	2	#14	#14	120	CONTROL	
			P-681, (P-682),	16	#14	#14	120	CONTROL	
			PSL-681, (PSL-682)	4	#14	#14	120	CONTROL	
627	1"	CP-100	P-682, PSL-682	10	#14	#14	120	CONTROL	
628	1"	CP-100	PT-680	1	#18TSP	#14	24	SIGNAL	
629	1"	CP-100	SUMP PUMP CP (P-699)	1	#18TSP	#14	24	SIGNAL	
630	2"	SUMP PUMP CP (P-699)	LSHH-699, LSL-699	2	MFG CABLE				SUBMERSIBLE CABLES
631	1"	PANELBOARD A2	SUMP PUMP CP (P-699)	2	#10	#10	120	POWER	CKT 35

*-ONE GROUND CONDUCTOR PER CONDUIT

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND.*	VOLTAGE		REMARKS
632	1"	SUMP PUMP CP (P-699)	SUMP PUMP P-699	1	MFG CABLE		120	POWER	SUBMERSIBLE CABLE
633	1"	MOTORIZED VALVE (FUTURE)	MOTORIZED VALVE (FUTURE)					POWER	C.O. WITH PULLWIRE
634	1-1/2"	CP-200	MOTORIZED VALVE (FUTURE)					CONTROL	C.O. WITH PULLWIRE
635	1"	MOTORIZED VALVE (FUTURE)	MOTORIZED VALVE (FUTURE)					CONTROL	C.O. WITH PULLWIRE
636	1"	CP-200	MOTORIZED VALVE (FUTURE)					CONTROL	C.O. WITH PULLWIRE
637	1"	MOTORIZED VALVE (FUTURE)	MOTORIZED VALVE (FUTURE)					CONTROL	C.O. WITH PULLWIRE
638	1"	CP-200	V-281, V-282	8	#14	#14	120	CONTROL	
639	1"	PANELBOARD MPZ-202	FIT-284	2	#12	#12	120	POWER	CKT 2
640	1"	CP-200	FIT-284	1	#18TSP	#14	24	SIGNAL	
641	1"	PANELBOARD MPZ-202	RECEPTACLES	2	#12	#12	120	POWER	CKT 9
642	1"	PANELBOARD MPZ-201	AE-505,AE-301,AE-356,AE-501	3	#10	#10	120	POWER	CKT'S 2,4
			AE-504,AE-506,AE-750,AE-201						
643	1"	PANELBOARD MPZ-201	AE-286,AE-509-AE-285,AE-501	3	#10	#10	120	POWER	CKT'S 6,8
			SC-1000'S (4 TOTAL)						
644	2"	CP-200	SC-1000	8	#18TSP	#14	24	SIGNAL	
645	2"	CP-200	SC-1000	8	#18TSP	#14	24	SIGNAL	
646	2"	CP-200	SC-1000	8	#18TSP	#14	24	SIGNAL	
647	2"	CP-200	SC-1000	8	#18TSP	#14	24	SIGNAL	
648	1"	PANELBOARD PP1	FCV-284	3	#12	#12	480	POWER	CKT'S 26,28,30
649	1"	CP-200	FCV-284	2	#14	#14	120	CONTROL	
650	1"	CP-200	FCV-284	2	#18TSP	#14	24	SIGNAL	
651	1"	PANELBOARD MPZ-202	RECEPTACLES & LIGHTS	4	#10	#10	120	POWER	CKT'S 11,13
651A	1"	J-BOX	SAMPLING ENCLOSURE LTS	2	#12	#12	120	POWER	CKT 13
652	1"	PANELBOARD MPZ-100	TANK LTS/RECS	2	#10	#10	120	POWER	CKT 7
653	1"	DISTRIBUTION BOARD DP1	PANELBOARD PP1	3	#3	#8	480	POWER	CKT'S 1,3,5
654	1"	DISTRIBUTION BOARD DP1	PANELBOARD PP2	3	#3	#8	480	POWER	CKT'S 7,9,11
655	1"	DISTRIBUTION BOARD DP1	PANELBOARD PP3	3	#3	#8	480	POWER	CKT'S 2,4,6
656	1"	DISTRIBUTION BOARD DP1	PANELBOARD MPZ-201	2	#8	#10	480	POWER	CKT'S 13,15
657	1"	PANELBOARD MPZ-201	CP-200	3	#12	#12	120	POWER	CKT'S 1,3
658	1-1/2"	MCC1	DISTRIBUTION BOARD DP1	6	500	#3	480	POWER	
659	1-1/2"	CP-100	CP-200	1	FO			SIGNAL	8 STRAND MULTIMODE

*-ONE GROUND CONDUCTOR PER CONDUIT

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REGISTERED PROFESSIONAL ENGINEER No. E19832 Exp. 3/31/18 ELECTRICAL STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY TAA
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DATE

Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 10

DRAWING NO. GE-17
SHEET NO. 311 OF 387
CLIENT JOB NO. 2744

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
660	1"	DISTRIBUTION BOARD DP1	BLOWER ME-291	3	#6	#10	480	POWER	CKT'S 8,10,12
661	1"	CP-200	BLOWER ME-291	10	#14	#14	120	CONTROL	
662	1"	CP-100	FSV-360	10	#14	#14	120	CONTROL	
663	1"	DISTRIBUTION BOARD DP1	BLOWER ME-292	3	#6	#10	480	POWER	CKT'S 14,16,18
664	1"	CP-200	BLOWER ME-292	10	#14	#14	120	CONTROL	
665	1"	PANELBOARD PP4	FSV-315	3	#12	#12	480	POWER	CKT'S 20,22,24
666	1"	CP-100	FSV-315	10	#14	#14	120	CONTROL	
667	1"	PANELBOARD PP5	MV-351	3	#12	#12	480	POWER	CKT'S 7,9,11
668	1"	CP-100	MV-351	2	#14	#14	120	CONTROL	
668A	1"	CP-100	MV-351	2	#18TSP	#14	24	SIGNAL	
669	1"	PANELBOARD PP5	MV-352	3	#12	#12	480	POWER	CKT'S 8,10,12
670	1"	CP-100	MV-352	2	#14	#14	120	CONTROL	
670A	1"	CP-100	MV-352	2	#18TSP	#14	24	SIGNAL	
671	1"	PANELBOARD PP5	MV-353	3	#12	#12	480	POWER	CKT'S 13,15,17
672	1"	CP-100	MV-353	2	#14	#14	120	CONTROL	
672A	1"	CP-100	MV-353	2	#18TSP	#14	24	SIGNAL	
673	1"	CP-100	PIT-341	1	#18TSP	#14	24	SIGNAL	
674	1"	CP-100	PIT-340	1	#18TSP	#14	24	SIGNAL	
675	1"	PANELBOARD MPZ-100	FIT-341, (FIT-315)	3	#12	#12	120	POWER	CKT'S 10,12
676	1"	CP-100	FIT-341	1	#18TSP	#14	24	SIGNAL	
677	1"	PANELBOARD PP4	FCV-341	3	#12	#12	480	POWER	CKT'S 8,10,12
678	1"	CP-100	FCV-341	2	#14	#14	120	CONTROL	
679	1"	CP-100	FCV-341	2	#18TSP	#14	24	SIGNAL	
680	1"	PANELBOARD MPZ-100	FIT-315	2	#12	#12	120	POWER	CKT 12
681	1"	CP-100	FIT-315	1	#18TSP	#14	24	SIGNAL	
682	1"	PANELBOARD MPZ-100	RECEPTACLES	2	#10	#10	120	POWER	CKT 5
683	1"	CP-100	FS-300	1	#18TSP	#14	24	SIGNAL	SHOWER/EYE WASH
684	1"	PANELBOARD MPZ-500	RECEPTACLE	2	#10	#10	120	POWER	CKT 8
685	1"	PANELBOARD MPZ-500	TANK LTG & RECEPTACLE	2	#10	#10	120	POWER	CKT 5
686	1"	PANELBOARD PP4	FSV-360	3	#12	#12	480	POWER	CKT'S 26,28,30
687	1"	PANELBOARD PP8	P-531	3	#12	#12	480	POWER	CKT'S 24,26,28
688	1"	PANELBOARD PP8	P-532	3	#12	#12	480	POWER	CKT'S 30,32,34
689	1"	PANELBOARD PP8	P-533	3	#12	#12	480	POWER	CKT'S 36,38,40

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY. △2	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
690	1"	CP-100	FSV-205	10	#10	#10	120	CONTROL	
691	1-1/2"	MCC1	PANELBOARD PP4	3	#3	#8	480	POWER	
692	1-1/2"	MCC1	PANELBOARD PP5	3	#3	#8	480	POWER	
693	1"	PANELBOARD A1	SUMP PUMP CP-490	2	#10	#10	120	POWER	CKT 13
694	2"	SUMP PUMP CP-490	LSL-490, LSLL-490, LSH-490	3	MFG CABLE	#10	120	CONTROL	
695	1-1/2"	MCC2	PANELBOARD PP-HVAC	3	#3	#8	480	POWER	
696	1-1/2"	MCC2	PANELBOARD PP6	3	350KCM	#8	480	POWER	
697	1-1/2"	MCC2	PANELBOARD PP7	3	#3	#8	480	POWER	
698	1-1/2"	PANELBOARD PP-HVAC	XFMR TR-HVAC	2	1/0	#6	480	POWER	CKT'S 38,40
699	2"	XFMR TR-HVAC	PANELBOARD LP-HVAC	3	300KCM	#6	120/208	POWER	
700	1"	PANELBOARD PP8	MV-202	3	#12	#12	480	POWER	CKT'S 12,14,16
701	1"	CP-100	MV-202	10	#14	#14	120	CONTROL	
702	1"	RO-EF-1	PP-HVAC	3	#12	#12	480	POWER	CKT'S 1,3,5
	3/4"	RO-EF-1	FAN LCP	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
703	1"	RO-EF-2	PP-HVAC	3	#12	#12	480	POWER	CKT'S 7,9,11
	3/4"	RO-EF-2	FAN LCP	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
704	1"	RO-EF-3	PP-HVAC	3	#12	#12	480	POWER	CKT'S 13,15,17
	3/4"	RO-EF-3	FAN LCP	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
705	1"	RO-EF-4	PP-HVAC	3	#12	#12	480	POWER	CKT'S 19,21,23
	3/4"	RO-EF-4	FAN LCP	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
706	1"	RO-SF-1	PP-HVAC	3	#12	#12	480	POWER	CKT'S 2,4,6
	3/4"	RO-SF-1	SWITCH	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
707	1"	RO-SF-2	PP-HVAC	3	#12	#12	480	POWER	CKT'S 8,10,12
	3/4"	RO-SF-2	FAN LCP	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
708	1"	RO-SF-3	PP-HVAC	3	#12	#12	480	POWER	CKT'S 14,16,18
	3/4"	RO-SF-3	FAN LCP	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
709	1"	RO-SF-4	PP-HVAC	3	#12	#12	480	POWER	CKT'S 20,22,24
	3/4"	RO-SF-4	FAN LCP	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
710	1"	HP-01	LP-HVAC	3	#10	#14	208	POWER	CKT'S 1,3,5
	3/4"	HP-01	FC-01	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
711	1"	HP-02	LP-HVAC	3	#10	#14	208	POWER	CKT'S 2,4,6
	3/4"	HP-02	FC-02	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
712	1"	HP-03	LP-HVAC	3	#10	#14	208	POWER	CKT'S 7,9,11
	3/4"	HP-03	FC-03	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
713	1"	HP-04A	LP-HVAC	3	#10	#14	208	POWER	CKT'S 8,10,12
	3/4"	HP-04A	FC-04A	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
714	1"	HP-04B	LP-HVAC	3	#10	#14	208	POWER	CKT'S 14,16,18
	3/4"	HP-04B	FC-04B	–	–	–	–	SIGNAL	C.O. W/PULLWIRE

*-ONE GROUND CONDUCTOR PER CONDUIT

*-ONE GROUND CONDUCTOR PER CONDUIT

MORAES/PHAM & ASSOCIATES
CONSULTING ELECTRICAL ENGINEERS
2131 PALOMAR AIRPORT RD., STE. 120
CARLSBAD CA. 92011 (760) 431-7177

REGISTERED PROFESSIONAL ENGINEER — No. E19832 Exp. 3/31/18 — ELECTRICAL — STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA
2	BID ADDENDUM	6/5/19	TA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY TAA
DRAWN BY AH
CHECKED BY TAA

Infrastructure ENGINEERING CORPORATION
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DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 11

DRAWING NO. GE-18
SHEET NO. 312 OF 387
CLIENT JOB NO. 2744

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND.*	VOLTAGE		REMARKS
715	1"	FC-01	LP-HVAC	2	8	#12	208	POWER	CKT'S 13,15
	3/4"	FC-01	T-STAT (FC-01)	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
716	1"	FC-02	LP-HVAC	2	8	#12	208	POWER	CKT'S 17,19
	3/4"	FC-02	T-STAT (FC-02)	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
717	1"	FC-03	LP-HVAC	2	#8	#12	208	POWER	CKT'S 21,23
	3/4"	FC-03	T-STAT (FC-03)	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
718	1"	FC-04A	LP-HVAC	2	#8	#10	208	POWER	CKT'S 20,22
	3/4"	FC-04A	T-STAT (FC-04A)	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
719	1"	FC-04B	LP-HVAC	2	#8	#10	208	POWER	CKT'S 24,26
	3/4"	FC-04B	T-STAT (FC-04B)	–	–	–	–	SIGNAL	C.O. W/PULLWIRE
720	1"	FAN LCP	LP-HVAC	2	#12	#12	120	POWER	CKT 25
721	1"	ME-291	MV-290	3	#12	#12	480	POWER	POWER FROM BLOWER
722	1"	CP-200	MV-290	10	#14	#14	120	CONTROL	
723	2"	CP-100	RO BOOSTER PUMP	4			24	CONTROL	SERIAL CABLES
724	2"	CP-100	MCC1	1				CONTROL	CAT5
725									NOT USED
726									NOT USED
727									NOT USED
728	1"	CP-200	LSH-210A, LSL-210A, (LSH-210B, LSL-210B)	8	#14	#14	120	CONTROL	
729	1"	CP-200	LSH-210B, LSL-210B	4	#14	#14	120	CONTROL	
730	1"	CP-200	LSH-220A, LSL-220A, (LSH-220B, LSL-220B)	8	#14	#14	120	CONTROL	
731	1"	CP-200	LSH-220B, LSL-220B	4	#14	#14	120	CONTROL	
732	1"	CP-200	LSH-230A, LSL-230A, (LSH-230B, LSL-230B)	8	#14	#14	120	CONTROL	
733	1"	CP-200	LSH-230B, LSL-230B	4	#14	#14	120	CONTROL	
734	1"	CP-200	LSH-240A, LSL-240A, (LSH-240B, LSL-240B)	8	#14	#14	120	CONTROL	
735	1"	CP-200	LSH-240B, LSL-240B	4	#14	#14	120	CONTROL	
736	1"	CP-200	LSH-250A, LSL-250A, (LSH-250B, LSL-250B)	8	#14	#14	120	CONTROL	
737	1"	CP-200	LSH-250B, LSL-250B	4	#14	#14	120	CONTROL	

*-ONE GROUND CONDUCTOR PER CONDUIT

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND.*	VOLTAGE		REMARKS
738	1"	CP-200	FUTURE LSH, LSL						C.O. W/PULLWIRE
739	1"	CP-200	FUTURE LSH, LSL						C.O. W/PULLWIRE
740	1"	CP-200	FUTURE LSH, LSL						C.O. W/PULLWIRE
741	1"	CP-200	FUTURE LSH, LSL						C.O. W/PULLWIRE
742	1"	PANELBOARD MPZ-202	FIT-290	2	#12	#12	120	POWER	CKT 10
743	1"	CP-200	FIT-290	1	#18TSP	#14	24	SIGNAL	
744									NOT USED
745									NOT USED
746	2"	CP-100	FS-620, (FS-610, FS-680)	3	#18TSP	#14	24	SIGNAL	SHOWER/EYE WASHES
746A	1"	CP-100	FS-610, (FS-680)	2	#18TSP	#14	24	SIGNAL	SHOWER/EYE WASHES
746B	1"	CP-100	FS-680	1	#18TSP	#14	24	SIGNAL	SHOWER/EYE WASH
747	3/4"	PANELBOARD PP8	500-SF-1	3	#12	#14	480	POWER	CKT'S 7,9,11
748	3/4"	PANELBOARD PP8	500-EF-1	3	#12	#14	480	POWER	CKT'S 1,3,5
749	2"	EQUALIZATION TANK	SERVER ROOM						MM FIBER OPTIC (6 FIBERS BUNDLED)
750	3"	SERVICE METER SWITCHBOARD 'MSB'	PRODUCT WTR PUMP P-511 VFD	6	2/0	#3	480	POWER	
751	3"	SERVICE METER SWITCHBOARD 'MSB'	PRODUCT WTR PUMP P-512 VFD	6	2/0	#3	480	POWER	
752	3"	SERVICE METER SWITCHBOARD 'MSB'	PRODUCT WTR PUMP P-513 VFD	6	2/0	#3	480	POWER	
753	3"	SERVICE METER SWITCHBOARD 'MSB'	PRODUCT WTR PUMP P-514 VFD	6	2/0	#3	480	POWER	

*-ONE GROUND CONDUCTOR PER CONDUIT

MORAES/PHAM & ASSOCIATES
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CARLSBAD CA. 92011 (760) 431-7177

REGISTERED PROFESSIONAL ENGINEER — No. E19832 Exp. 3/31/18 — ELECTRICAL — STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA
2	BID ADDENDUM	5/22/19	TA
1	BID ADDENDUM	5/14/19	TA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 12

DRAWING NO. GE-19
SHEET NO. 313 OF 387
CLIENT JOB NO. 2744

LIGHTING FIXTURE SCHEDULE

SYMBOL	TAG	DESCRIPTION	FIXTURE WATTS / VOLTAGE	LAMP TYPE NO. OF LAMPS / WATTS	MOUNTING	MANUFACTURER CATALOG NO.
	A	2X4 RECESSED LED TROFFER WITH LED DRIVER AND SURGE PROTECTOR AND .125" THICK ACRYLIC LENS. SUITABLE FOR LAY-IN CEILING.	49W 120VAC	LED 49W	RECESSED	COLUMBIA LIGHTING LJT24-40HLG-FSA12125-EU
	AE	SAME AS TYPE 'A' EXCEPT WITH EMERGENCY BATTER PACK.	49W 120VAC	LED 49W	RECESSED	COLUMBIA LIGHTING LJT24-40HLG-FSA12125-EU-ELL14
	BE	SAME AS TYPE 'AE' EXCEPT 1X4 RECESSED LED TROFFER.	36W 120VAC	LED 36W	RECESSED	COLUMBIA LIGHTING LLT14-40HLG-A19F-EU-ELL14-PAF
	C	4' LED FIXTURE WITH LED DRIVER AN SURGE PROTECTION. REINFORCED FIBERGLASS HOUSING. IMPACT RESISTANT, UV RESISTANT ACRYLIC, CLEAR DEEP LENS. FULLY GASKETED. UL WET LOCATION LISTED. PENDANT MOUNTED	47W 120VAC	LED 47W	PENDANT	COLUMBIA LIGHTING LXEM4-40ML-RFP-EU
	C1	4' LED FIXTURE WITH LED DRIVER AN SURGE PROTECTION. REINFORCED FIBERGLASS HOUSING. IMPACT RESISTANT, UV RESISTANT ACRYLIC, CLEAR DEEP LENS. FULLY GASKETED. UL WET LOCATION LISTED. PENDANT MOUNTED	36W 120VAC	LED 36W	PENDANT	COLUMBIA LIGHTING LXEM4-40LW-RFP-EU
	D1	LED AREA LIGHT LUMINAIRE WITH FULL SPECTRUM TYPE 1 DISTRIBUTION. HEAT & IMPACT RESISTANT GLASS LENS WITH WIRE GUARD. DIE-CAST ALUMINUM LAMP HOUSING & ADAPTER WITH EPOXY POWDER COAT, SILICONE GASKETS AND STAINLESS STEEL EXTERNAL HARDWARE. FACTORY SEALED. UL WET LOCATION LISTED. PENDANT MOUNTED.	62W 120VAC	LED 62W	PENDANT	EATON CROUSE-HINDS PVM7L-3A-R1/UNV1-S831
	D2	SAME AS TYPE 'D1' EXCEPT WITH TYPE V DISTRIBUTION.	62W 120VAC	LED 62W	PENDANT	EATON CROUSE-HINDS PVM7L-3A/UNV1-S831
	E	LED EXIT SIGN WITH HEAVY-DUTY, CORROSION-PROOF, THERMOPLASTIC HOUSING AND HEAVY-DUTY POLYCARBONATE CLEAR HOUSING LENS. UNIVERSAL MOUNTING AND UNIVERSAL CHEVRONS. RED LETTERS ON WHITE HOUSING.	2.6W 120VAC	LED 2.6W	WALL	LITHONIA WLTE-W-1-R-EL
	E1	EMERGENCY LIGHT, 6V SELF CONTAINED NI-CAD BATTERY. WHITE, HEAVY-DUTY POLYCARBONATE HOUSING AND POLYCARBONATE CLEAR HOUSING LENS WITH LINEAR PATTERN LED LAMPS. HOUSING SHALL BE SEALED, GASKETED AND CORROSION-RESISTANT. 90 MINUTES OF ILLUMINATION MIN. SELF-DIAGNOSTICS AND AUDIBLE FAILURE INDICATION. 120V, UL LISTED	20W 120VAC	LED 20W	PENDANT	LITHONIA INDX618-W-LP05VS-PREM WHITE
	F	LED WALL PACK WITH DRIVER AND SURGE PROTECTION. ONE PIECE DIE-CAST ALUMINUM HOUSING, HIGH IMPACT POLYCARBONATE LENS, U.L. LISTED FOR WET LOCATIONS. COLOR DARK BRONZE.	71W 120VAC	LED 71W	WALL	LITHONIA LMC-30LU-3K-4-1-WIH DARK BRONZE
	G	LED AREA LIGHT WITH LED DRIVERS AND SURGE PROTECTOR. 2-3/8" SLIP-FITTER MOUNT, WHITE COLOR. 20' TAPERED STEEL POLE (6" ARM) WITH RECEPTACLE FESTOON BOX AND GREY POWDER COAT. TYPE III DISTRIBUTION	268W 120VAC	LED (120) 268W	POLE	LITHONIA LIGHTING CSX2-LED-120C-700-40K-T3M-MVOLT -RPUMBA-HS-SF-BS-DNATXD
	H	LED AREA LIGHT WITH FULL SPECTRUM TYPE III DISTRIBUTION, HEAT AND IMPACT RESISTANT GLASS LENS. ALUMINUM EXTRUSION HOUSING. MOUNT AS INDICATED. COLOR GRAY. 5000K. DIFFUSED LENS, WIRE GUARD.	71W 120VAC	LED 71W	WALL OR STANCHION	EATON CROUSE-HINDS PVM7L2TWG/UNVIS891 (WALL) PVM7L2PG/UNVIS891 (STANCHION)

MPA MORAES/PHAM & ASSOCIATES
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NO.	DESCRIPTION	DATE	APPROVED

SCALE NONE
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PROJECT NO. 112.FPUD.0002
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DATE

FRD Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 13

DRAWING NO. GE-20
SHEET NO. 314 OF 387
CLIENT JOB NO. 2744

PANEL 'A3'

MOUNTING SURFACE | 120/208V VOLT | 3ø PHASE | 4W WIRE | MAIN 100A | BUS 100A | 10,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	ØA ØB ØC	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
CHEM PUMP P-671	1176					1	20	1		2	20	1			1176			CHEM PUMP P-651
CHEM PUMP P-672		1176				1	20	3		4	20	1				1176		CHEM PUMP P-652
CHEM PUMP P-681			1176			1	20	5		6	20	1					1176	CHEM PUMP P-641
CHEM PUMP P-682	1176					1	20	7		8	20	1			1176			CHEM PUMP P-642
FIT-680		200				1	20	9		10	20	1				1176		CHEM PUMP P-661
TANK FILL PANEL			500			1	20	11		12	20	1					1176	CHEM PUMP P-662
CP-410	1000					1	20	13		14	20	1			200			LIT-670
CP-410		1000				1	20	15		16								
SPARE						1	20	17		18								
SPARE						1	20	19		20								
								21		22								
								23		24								
								25		26								
								27		28								
								29		30								
								31		32								
								33		34								
								35		36								
								37		38								
								39		40								
								41		42								
	3352	2376	1676	WATTS/LINE											2552	2352	2352	

ØA= 5904 | ØB= 4728 | ØC= 4028

TOTAL WATTS= 14660 | AMPS/LINE= 41 | LCL AMPS=

PANEL 'A1'

MOUNTING SURFACE | 120/208V VOLT | 3ø PHASE | 4W WIRE | MAIN 200A | BUS 225A | 10,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	ØA ØB ØC	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION	
RO RM REC	1440			8		1	20	1		2	20	1	7		329			ELEC RM LTS	(1)
RO RM REC		1260		7		1	20	3		4	20	1	13			1198		STR/CNTR/RR/SCR LTS	(1)
CONTROL RM REC			900	5		1	20	5		6	20	1	19				1178	RO RM LTS	(1)
CONTROL RM REC	720			4		1	20	7		8	20	1	18		1116			RO RM LTS	(1)
STOR/ELEC RM REC		900		5		1	20	9		10	20	1				320		EM LIGHTS	
CP-400			1800			1	20	11		12	20	1					500	EXIT LIGHTS	
CP-490	1800					1	20	13		14	20	1	4		1072			SITE LIGHTING	(1)
CP-410		960				1	20	15		16	20	1	5			1340		SITE LIGHTING	(1)
CP-420			960			1	20	17		18	20	1					1200	LCP-460	
CP-430	960					1	20	19		20	20	1			200			AIT-453	
CP-440 (FUTURE)		960				1	20	21		22	20	1				500		REC (LTG CTRL PNL)	
HAND DRYER			2300			1	30	23		24									
WH-1	4750					2	40	25		26									
–		4750				–	–	27		28									
								29		30									
								31		32									
								33		34									
								35		36									
								37		38									
								39		40									
								41		42									
	9670	8830	5960	WATTS/LINE											2717	3358	2878		

ØA= 12387 | ØB= 12188 | ØC= 8838

TOTAL WATTS= 33413 | AMPS/LINE= 93 | LCL AMPS= 114

PANEL 'A2'

MOUNTING SURFACE | 120/208V VOLT | 3ø PHASE | 4W WIRE | MAIN 400A | BUS 200A | 10,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	ØA ØB ØC	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION	
CHEM AREA REC	1080			6		1	20	1		2	20	1	15		930			CHEM AREA LIGHTS	(1)
CHEM AREA REC		1260		7		1	20	3		4	20	1	19			1178		CHEM AREA LIGHTS	(1)
CHEM AREA REC			1260	7		1	20	5		6	20	1	13				243	EMERGENCY LIGHTS	
SPARE						1	20	7		8	20	1			1176			CHEM PUMP P-601	
SPARE						1	20	9		10	20	1				1176		CHEM PUMP P-602	
SPARE						1	20	11		12	20	1					1176	CHEM PUMP P-603	
SUMP PUMP P-691	1176					1	20	13		14	20	1			1176			CHEM PUMP P-604	
SUMP PUMP P-692		1176				1	20	15		16	20	1				1176		CHEM PUMP P-605	
SUMP PUMP P-693			1176			1	20	17		18	20	1					1176	CHEM PUMP P-606	
SUMP PUMP P-694	1176					1	20	19		20	20	1			1176			CHEM PUMP P-611	
SUMP PUMP P-695		1176				1	20	21		22	20	1				1176		CHEM PUMP P-612	
SUMP PUMP P-696			1176			1	20	23		24	20	1					1176	CHEM PUMP P-621	
SUMP PUMP P-697	1176					1	20	25		26	20	1			1176			CHEM PUMP P-622	
SUMP PUMP P-698		1176				1	20	27		28	20	1				1176		CHEM PUMP P-631	
SUMP PUMP P-690A			1176			1	20	29		30	20	1					1176	CHEM PUMP P-632	
SUMP PUMP P-690B	1176					1	20	31		32	20	1			200			TIT-620	
SUMP PUMP		1176				1	20	33		34	20	1				200		LIT-620	
SUMP PUMP P-699			1176			1	20	35		36	20	1					200	LIT-660	
								37		38	100	3			35984			PNL A3	
								39		40						35984			
								41		42							35984		
	5784	5964	5964	WATTS/LINE											41818	42066	41131		

ØA= 47602 | ØB= 48030 | ØC= 47095

TOTAL WATTS= 142727 | AMPS/LINE= 396 | LCL AMPS= 140

PANEL MPZ-500

MOUNTING STANCHION | 120/208 VOLT | 1 PHASE | 3 WIRE | MAIN 100A | BUS 100A | 10,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	REC	LTG	POLE	BKR	CKT NO.	ØA ØB	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	LOCATION
PUMP RM EM LTS	46				1	20	1		2	20	1	10		360		PUMP RM LTS
FIT-550		200			1	20	3		4	20	1		3		540	PUMP RM REC
T-500 LTS/RECS	502		2	2	1	20	5		6	20	1		1	180		PUMP RM EXT REC
PUMP RM EXT LTS		142		2	1	20	7		8	20	1		1		180	AREA 500 CONV REC
							9		10							
							11		12							
							13		14							
							15		16							
							17		18							
							19		20							
	548	342	WATTS/LINE											540	720	

ØA= 1088 | ØB= 1062

TOTAL WATTS= 2150 | AMPS/LINE= 10 | LCL AMPS= 14

NOTES

(1) ROUTE CIRCUITS VIA LIGHTING CONTROL PANEL. REFER TO LIGHTING CONTROL DIAGRAM.

MORAES/PHAM & ASSOCIATES
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CARLSBAD CA. 92011 (760) 431-7177

REGISTERED PROFESSIONAL ENGINEER — No. E19832 Exp. 3/31/18 — ELECTRICAL — STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY 315
DRAWN BY AH
CHECKED BY TAA

Infrastructure ENGINEERING CORPORATION
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DATE

FRD Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 14

DRAWING NO. GE-21
SHEET NO. 315 OF 387
CLIENT JOB NO. 2744

PANEL MPZ-201

MOUNTING: STANCHION | 120/208 VOLT | 1 PHASE | 3 WIRE | MAIN: 100A | BUS: 100A | 10,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	REC	LTG	POLE	BKR	CKT NO.	ØA ØB	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	LOCATION
CP-200	1000				1	20	1		2	20	1			1000		AE-505,301,356,501
CP-200		1000			1	20	3		4	20	1				1000	AE-504,506,750,201
FIT-258A	200				1	20	5		6	20	1			1000		AE-286,509,285,501
FIT-258B		200			1	20	7		8	20	1				1000	SC-1000'S
FIT-248A	200				1	20	9		10	20	1			200		FIT-218A
FIT-248B		200			1	20	11		12	20	1				200	FIT-218B
SPARE					1	20	13		14	20	1					SPARE
SPARE					1	20	15		16	20	1					SPARE
SPARE					1	20	17		18	20	1					SPARE
SPARE					1	20	19		20	20	1					SPARE
	1400	1400	WATTS/LINE											2200	2200	

ØA= 3600 ØB= 3600

TOTAL WATTS= 7200 AMPS/LINE= 35 LCL AMPS=

PANEL PP8

MOUNTING: SURFACE | 480 VOLT | 3ø PHASE | 4W WIRE | MAIN: 100A | BUS: 100A | 25,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	ØA ØC ØB	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
500-EF-1	582					3	15	1		2		2						PNL MPZ-500
–		582				–	–	3		4	–	–						–
–			582			–	–	5		6	15	3					443	MV-514
500-SF-1	582					3	15	7		8	–	–			443			–
–		582				–	–	9		10	–	–				443		–
–			582			–	–	11		12	15	3					443	MV-202
MV-511	443					3	15	13		14	–	–			443			–
–		443				–	–	15		16	–	–				443		–
–			443			–	–	17		18	15	3					443	MV-510
MV-512	443					3	15	19		20	–	–			443			–
–		443				–	–	21		22	–	–				443		–
–			443			–	–	23		24	15	3					942	P-531
MV-513	443					3	15	25		26	–	–			942			–
–		443				–	–	27		28	–	–				942		–
–			443			–	–	29		30	15	3					942	P-532
								31		32	–	–			942			–
								33		34	–	–				942		–
								35		36	15	3					942	P-533
								37		38	–	–			942			–
								39		40	–	–				942		–
								41		42								SPACE
	2493	2493	2493	WATTS/LINE											6648	6648	6648	

ØA= 19944 ØB= 6648 ØC= 6648

TOTAL WATTS= 19944 AMPS/LINE= 24 LCL AMPS=

PANEL PP-HVAC

MOUNTING: SURFACE | 480 VOLT | 3ø PHASE | 4W WIRE | MAIN: 100A | BUS: 100A | 25,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	ØA ØC ØB	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
RO-EF-1	942					3	15	1		2	15	3			1330			RO-SF-1
–		942				–	–	3		4	–	–				1330		–
–			942			–	–	5		6	–	–					1330	–
RO-EF-2	942					3	15	7		8	15	3			1330			RO-SF-2
–		942				–	–	9		10	–	–				1330		–
–			942			–	–	11		12	–	–					1330	–
RO-EF-3	942					3	15	13		14	15	3			1330			RO-SF-3
–		942				–	–	15		16	–	–				1330		–
–			942			–	–	17		18	–	–					1330	–
RO-EF-4	942					3	15	19		20	15	3			1330			RO-SF-4
–		942				–	–	21		22	–	–				1330		–
–			942			–	–	23		24	–	–					1330	–
								25		26								
								27		28								
								29		30								
								31		32								SPACE
								33		34								SPACE
								35		36								SPACE
								37		38		2						XFMR TR-HVAC
								39		40	–	–						–
								41		42	–	–						–
	3768	3768	3768	WATTS/LINE											5320	5320	5320	

ØA= 9088 ØB= 9088 ØC= 9088

TOTAL WATTS= 27264 AMPS/LINE= 33 LCL AMPS=

PANEL LP-HVAC

MOUNTING: SURFACE | 120/208 VOLT | 3ø PHASE | 4W WIRE | MAIN: 200A | BUS: 200A | 10,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	ØA ØC ØB	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
HP-01	1250					3	20	1		2	20	3			1250			HP-02
–		1250				–	–	3		4	–	–				1250		–
–			1250			–	–	5		6	–	–					1250	–
HP-03	1250					3	20	7		8	60	3			1860			HP-04A
–		1250				–	–	9		10	–	–				1860		–
–			1250			–	–	11		12	–	–					1860	–
FC-01	3220					2	50	13		14	60	3			1860			HP-04B
–		3220				–	–	15		16	–	–				1860		–
FC-02			3220			2	50	17		18	–	–					1860	–
–	3220					–	–	19		20	20	2			1860			FC-04A
FC-03		3220				2	50	21		22	–	–				1860		–
–			3220			–	–	23		24	20	2					1860	FC-04B
FAN LCP	500					1	20	25		26	–	–			1860			–
								27		28	20	1						SPARE
								29		30	20	1						SPARE
								31		32								
								33		34								
								35		36								
								37		38								
								39		40								
								41		42								
	11,300	10,800	10,800	WATTS/LINE											6830	7330	7330	

ØA= 18130 ØB= 18130 ØC= 18130

TOTAL WATTS= 54390 AMPS/LINE= 151 LCL AMPS=

MORAES/PHAM & ASSOCIATES
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REGISTERED PROFESSIONAL ENGINEER — James O. Pham — No. E19832 Exp. 3/31/18 — ELECTRICAL — STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY TAA
DRAWN BY AH
CHECKED BY TAA

Infrastructure ENGINEERING CORPORATION
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APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 15

DRAWING NO. GE-22
SHEET NO. 316 OF 387
CLIENT JOB NO. 2744

MOUNTING STANCHION — PANEL PP9 — 25,000 A.I.C. SYM.

480 VOLT 3ø PHASE 4W WIRE — MAIN 100A — BUS 100A

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	ØA ØB ØC	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
MPZ–700	10,400					2		1		2	15	3			443			MV–700
–		10,400				–	–	3		4	–	–				443		–
SPARE						1	20	5		6	–	–					443	–
MV–720	443					3	15	7		8	15	3			443			MV–701
–		443				–	–	9		10	–	–				443		–
–			443			–	–	11		12	–	–					443	–
								13		14								
								15		16								
								17		18								
								19		20								
								21		22								
								23		24								
	10,843	10,843	443	WATTS/LINE											886	886	886	

ØA= 11,729 — ØB= 11,729 — ØC= 1,309

TOTAL WATTS= 24,767 — AMPS/LINE= 30 — LCL AMPS=

MOUNTING STANCHION — PANEL PP–200 — 25,000 A.I.C. SYM.

480 VOLT 3ø PHASE 4W WIRE — MAIN 100A — BUS 100A

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	ØA ØB ØC	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
MPZ–200	5000					2	50	1		2	15	3			750			P–211
		5000				–	–	3		4	–	–				750		
								5		6	–	–					750	
								7		8								
								9		10								
								11		12								
								16		14								
								15		16								
								17		18								
	5000	5000	0	WATTS/LINE											750	750	750	

ØA= 5750 — ØB= 5750 — ØC= 750

TOTAL WATTS= 12250 — AMPS/LINE= 15 — LCL AMPS=

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REGISTERED PROFESSIONAL ENGINEER — No. E19832 Exp. 3/31/18 — ELECTRICAL — STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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DRAWN BY AH
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Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER — DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 16

DRAWING NO. GE-23
SHEET NO. 317 OF 387
CLIENT JOB NO. 2744

PANEL MPZ-100

MOUNTING STANCHION | 120/208 VOLT | 1 PHASE | 3 WIRE | MAIN 100A | BUS 100A | 10,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	REC	LTG	POLE	BKR	CKT NO.	ØA ØB	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	LOCATION
CONV. RECEPTACLE	180		1		1	20	1		2	20	1			200		FIT-354
FIT-100A, FIT-100B		400			1	20	3		4	20	1				200	FIT-300
CONV REC	360		2		1	20	5		6	20	1			200		FIT-340A
TANK LTS/REC		1080	2	2	1	20	7		8	20	1				200	FIT-340B
							9		10	20	1			200		FIT-341
							11		12	20	1				200	FIT-315
							13		14							
							15		16							
							17		18							
							19		20							
							21		22							
							23		24							
	540	1,480	WATTS/LINE											600	600	

ØA= 1140 ØB= 2080

TOTAL WATTS= 3220 AMPS/LINE= 27 LCL AMPS=

PANEL MPZ-202

MOUNTING STANCHION | 120/208 VOLT | 1 PHASE | 3 WIRE | MAIN 100A | BUS 100A | 10,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	REC	LTG	POLE	BKR	CKT NO.	ØA ØB	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	LOCATION
FIT-238A	200				1	20	1		2	20	1			200		FIT-284
FIT-238B		200			1	20	3		4	20	1				200	FIT (FUTURE)
FIT-228A	200				1	20	5		6	20	1			200		FIT (FUTURE)
FIT-228B		200			1	20	7		8	20	1				200	FIT (FUTURE)
CONV. RECEPTACLE	540		3		1	20	9		10	20	1			200		FIT-290
CONV. RECEPTACLE		720	4		1	20	11		12	20	1					SPARE
SAMPLING/PLATFORM LTG	650		1	10	1	20	13		14	20	1					SPARE
SPACE							15		16	20	1					SPARE
							17		18							
							19		20							
	1590	1120	WATTS/LINE											600	400	

ØA= 2190 ØB= 1,520

TOTAL WATTS= 3710 AMPS/LINE= 18 LCL AMPS=

PANEL MPZ-200

MOUNTING STANCHION | 120/208 VOLT | 1 PHASE | 3 WIRE | MAIN 100A | BUS 100A | 10,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	REC	LTG	POLE	BKR	CKT NO.	ØA ØB	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	LOCATION
CONV REC	180		1		1	20	1		2	20	1					
TANK LTS/RECS		600	2	2	1	20	3		4	20	1					
					1	20	5		6	20	1					
					1	20	7		8	20	1					
					1	20	9		10	20	1					
					1	20	11		12	20	1					
	180	600	WATTS/LINE											0	0	

ØA= 180 ØB= 600

TOTAL WATTS= 780 AMPS/LINE= 4 LCL AMPS=

PANEL MPZ-700

MOUNTING STANCHION | 120/208 VOLT | 1 PHASE | 3 WIRE | MAIN 100A | BUS 100A | 10,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	REC	LTG	POLE	BKR	CKT NO.	ØA ØB	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	LOCATION
FIT-750	400				1	20	1		2	20	1	2	2	1080		TANK LTS/RECS
CONV. REC.		360		2	1	20	3		4	20	1					
					1	20	5		6	20	1					
					1	20	7		8	20	1					
					1	20	9		10	20	1					
					1	20	11		12	20	1					
	400	360	WATTS/LINE											1,080	0	

ØA= 1,480 ØB= 360

TOTAL WATTS= 1,840 AMPS/LINE= 9 LCL AMPS=

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REGISTERED PROFESSIONAL ENGINEER — No. E19832 Exp. 3/31/18 — ELECTRICAL — STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 17

DRAWING NO. GE-24
SHEET NO. 318 OF 387
CLIENT JOB NO. 2744

PANEL PP2

MOUNTING STANCHION — 480 VOLT — 3ø PHASE — 4W WIRE — 25,000 A.I.C. SYM. — MAIN 100A — BUS 100A

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
FCV–236B,MV–234B	2216					3	15	1	2	15	3			2216			FCV–226A,MV–224A,
MV–238B,MV–237B,		2216				–	–	3	4	–	–				2216		MV–228A,MV–227A,
& FCV–235B			2216			–	–	5	6	–	–					2216	& FCV–225A
FCV–236A,MV–234A,	2216					3	15	7	8	15	3			2216			MV–230B,MV–231B
MV–238A,MV–237A,		2216				–	–	9	10	–	–				2216		MV–230A,MV–231A,
& FCV–235A			2216			–	–	11	12	–	–					2216	& MV–239
FCV–226B,MV–224B,	2216					3	15	13	14	15	3			2216			MV–220B,MV–221B,
MV–228B,MV–227B,		2216				–	–	15	16	–	–				2216		MV–220A,MV–221A,
& FCV–225B			2216			–	–	17	18	–	–					2216	& MV–229
								19	20								
								21	22								
								23	24								
								25	26								
								27	28								
								29	30								
								31	32								
								33	34								
								35	36								
								37	38								
								39	40								
								41	42								
	6648	6648	6648	WATTS/LINE										6648	6648	6648	

ØA= 13296 — ØB= 13296 — ØC= 13296

TOTAL WATTS= 39888 — AMPS/LINE= 48 — LCL AMPS=

PANEL DP1

MOUNTING STANCHION — 480 VOLT — 3ø PHASE — 4W WIRE — 100,000 A.I.C. SYM. — MAIN 400A — BUS 225A

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
PANELBOARD PP1	18171					3		1	2		3			13296			PANELBOARD PP3
–		18171				–	–	3	4	–	–				13296		–
–			18171			–	–	5	6	–	–					13296	–
PANELBOARD PP2	13296					3		7	8	100	3			13793			ME–291
–		13296				–	–	9	10	–	–				13793		–
–			13296			–	–	11	12	–	–					13793	–
PANELBOARD MPZ–201	3600					2		13	14	100	3			13793			ME–292
–		3600				–	–	15	16	–	–				13793		–
PANELBOARD MPZ–202			2010			2		17	18	–	–					13793	–
–	1520					–	–	19	20	15	3			2216			MV–290
								21	22	–	–				2216		–
								23	24	–	–					2216	–
								25	26								
								27	28								
								29	30								
								31	32								
								33	34								
								35	36								
								37	38								
								39	40								
								41	42								
	36587	35067	33477	WATTS/LINE										43098	43098	43098	

ØA= 79685 — ØB= 78165 — ØC= 76575

TOTAL WATTS= 234425 — AMPS/LINE= 282 — LCL AMPS=

PANEL PP3

MOUNTING STANCHION — 480 VOLT — 3ø PHASE — 4W WIRE — 25,000 A.I.C. SYM. — MAIN 100A — BUS 100A

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
FCV–216B,MV–214B,	2216					3	15	1	2	15	3			2216			FUTURE MOV'S
MV–218B,MV–217B		2216				–	–	3	4	–	–				2216		FUTURE MOV'S
& FCV–215B			2216			–	–	5	6	–	–					2216	FUTURE MOV'S
FCV–216A,MV–214A,	2216					3	15	7	8	15	3			2216			MV–210B,MV–211B
MV–218A,MV–217A,		2216				–	–	9	10	–	–				2216		MV–210A,MV–211A,
& FCV–215A			2216			–	–	11	12	–	–					2216	& MV–219
FUTURE MOV'S	2216					3	15	13	14	15	3			2216			FUTURE MOV'S
FUTURE MOV'S		2216				–	–	15	16	–	–				2216		FUTURE MOV'S
FUTURE MOV'S			2216			–	–	17	18	–	–					2216	FUTURE MOV'S
								19	20								
								21	22								
								23	24								
								25	26								
								27	28								
								29	30								
								31	32								
								33	34								
								35	36								
								37	38								
								39	40								
								41	42								
	6648	6648	6648	WATTS/LINE										6648	6648	6648	

ØA= 13296 — ØB= 13296 — ØC= 13296

TOTAL WATTS= 39888 — AMPS/LINE= 48 — LCL AMPS=

PANEL PP1

MOUNTING STANCHION — 480 VOLT — 3ø PHASE — 4W WIRE — 25,000 A.I.C. SYM. — MAIN 100A — BUS 225A

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
FCV–256B,MV–254B,	2216					3	15	1	2	15	3			2216			FCV–246A,MV–244A,
MV–258B,MV–257B,		2216				–	–	3	4	–	–				2216		MV–248A,MV–247A,
& FCV–255B			2216			–	–	5	6	–	–					2216	& FCV–245A
FCV–256A,MV–254A	2216					3	15	7	8	15	3			2216			MV–250B,MV–251B
MV–258A,MV–257A		2216				–	–	9	10	–	–				2216		MV–250A,MV–251A,
& FCV–255A			2216			–	–	11	12	–	–					2216	& MV–259
FCV–246B,MV–244B,	2216					3	15	13	14	15	3			2216			MV–240B,MV–241B,
MV–248B,MV–247B,		2216				–	–	15	16	–	–				2216		MV–240A,MV–241A,
& FCV–245B			2216			–	–	17	18	–	–					2216	& MV–249
FUTURE MOV'S	2216					3	15	19	20	15	3			2216			FUTURE MOV'S
FUTURE MOV'S		2216				–	–	21	22	–	–				2216		FUTURE MOV'S
FUTURE MOV'S			2216			–	–	23	24	–	–					2216	FUTURE MOV'S
								25	26	15	3			443			FCV–284
								27	28	–	–				443		–
								29	30	–	–					443	–
								31	32								
								33	34								
								35	36								
								37	38								
								39	40								
								41	42								
	8864	8864	8864	WATTS/LINE										9307	9307	9307	

ØA= 18171 — ØB= 18171 — ØC= 18171

TOTAL WATTS= 54513 — AMPS/LINE= 66 — LCL AMPS=

MORAES/PHAM & ASSOCIATES
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REGISTERED PROFESSIONAL ENGINEER — No. E19832 Exp. 3/31/18 — ELECTRICAL — STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY TAA
DRAWN BY AH
CHECKED BY TAA

Infrastructure ENGINEERING CORPORATION
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DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

PLANT ELECTRICAL SCHEDULES 18

DRAWING NO. GE-25
SHEET NO. 319 OF 387
CLIENT JOB NO. 2744

PANEL PP6

MOUNTING SURFACE | 480 VOLT | 3ø PHASE | 4W WIRE | MAIN 100A | BUS 100A | 25,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	ØA ØB ØC	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
MV–412	305					3	15	1		2	15	3			305			MV–422
–		305				–	–	3		4	–	–				305		–
–			305			–	–	5		6	–	–					305	–
MV–419A	443					3	15	7		8	15	3			443			MV–429A
–		443				–	–	9		10	–	–				443		–
–			443			–	–	11		12	–	–					443	–
MV–419B	305					3	15	13		14	15	3			305			MV–429B
–		305				–	–	15		16	–	–				305		–
–			305			–	–	17		18	–	–					305	–
FCV–418	305					3	15	19		20	15	3			305			FCV–428
–		305				–	–	21		22	–	–				305		–
–			305			–	–	23		24	–	–					305	–
MV–432	305					3	15	25		26	15	3			305			FCV–438
–		305				–	–	27		28	–	–				305		–
–			305			–	–	29		30	–	–					305	–
MV–439A	443					3	15	31		32								
–		443				–	–	33		34								
–			443			–	–	35		36								
MV–439B	305					3	15	37		38								
–		305				–	–	39		40								
–			305			–	–	41		42								
	2411	2411	2411	WATTS/LINE											1663	1663	1663	

ØA= 4074 | ØB= 4074 | ØC= 4074

TOTAL WATTS= 12222 | AMPS/LINE= 15 | LCL AMPS=

PANEL PP4

MOUNTING STANCHION | 480 VOLT | 3ø PHASE | 4W WIRE | MAIN 100A | BUS 100A | 25,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	ØA ØB ØC	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
FCV–340A	443					3	15	1		2	15	3			443			FCV–340B
–		443				–	–	3		4	–	–				443		–
–			443			–	–	5		6	–	–					443	–
FCV–340C	443					3	15	7		8	15	3			305			FCV–341
–		443				–	–	9		10	–	–				305		–
–			443			–	–	11		12	–	–					305	–
MV–311	443					3	15	13		14	15	3			443			MV–312
–		443				–	–	15		16	–	–				443		–
–			443			–	–	17		18	–	–					443	–
MV–313	443					3	15	19		20	15	3			443			FSV–315
–		443				–	–	21		22	–	–				305		–
–			443			–	–	23		24	–	–					305	–
								25		26	15	3			443			FSV–360
								27		28	–	–				443		–
								29		30	–	–					443	–
								31		32								
								33		34								
								35		36								
								37		38								
								39		40								
								41		42								
	1772	1772	1772	WATTS/LINE											2077	2207	2077	

ØA= 3849 | ØB= 3849 | ØC= 3849

TOTAL WATTS= 11547 | AMPS/LINE= 14 | LCL AMPS=

PANEL PP7

MOUNTING SURFACE | 480 VOLT | 3ø PHASE | 4W WIRE | MAIN 100A | BUS 100A | 25,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	ØA ØB ØC	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
MV–410	443					3	15	1		2	15	3			305			MV–660
–		443				–	–	3		4	–	–				305		–
–			443			–	–	5		6	–	–					305	–
MV–420	443					3	15	7		8	15	3			443			MV–650
–		443				–	–	9		10	–	–				443		–
–			443			–	–	11		12	–	–					443	–
MV–430	443					3	15	13		14	15	3			443			FUTRE MOV
–		443				–	–	15		16	–	–				443		–
–			443			–	–	17		18	–	–					443	–
FUTURE MOV	443					3	15	19		20	15	3			443			FUTURE MOV
–		443				–	–	21		22	–	–				443		–
–			443			–	–	23		24	–	–					443	–
FUTURE MOV	443					3	15	25		26	15	3			443			FUTURE MOV
–		443				–	–	27		28	–	–				443		–
–			443			–	–	29		30	–	–					443	–
								31		32								
								33		34								
								35		36								
								37		38								
								39		40								
								41		42								
	2215	2215	2215	WATTS/LINE											2077	2077	2077	

ØA= 4292 | ØB= 4292 | ØC= 4292

TOTAL WATTS= 12876 | AMPS/LINE= 16 | LCL AMPS=

PANEL PP5

MOUNTING STANCHION | 480 VOLT | 3ø PHASE | 4W WIRE | MAIN 100A | BUS 100A | 25,000 A.I.C. SYM.

LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	REC	LTG	POLE	BKR	CKT NO.	ØA ØB ØC	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
MV–355	443					3	15	1		2	15	3			305			FCV–355
–		443				–	–	3		4	–	–				305		–
–			443			–	–	5		6	–	–					305	–
MV–351	443					3	15	7		8	15	3			443			MV–352
–		443				–	–	9		10	–	–				443		–
–			443			–	–	11		12	–	–					443	–
MV–353	443					3	15	13		14	15	3			443			FSV–100
–		443				–	–	15		16	–	–				443		–
–			443			–	–	17		18	–	–					443	–
FCV–105	443					3	15	19		20	15	3			443			MV–110
–		443				–	–	21		22	–	–				443		–
–			443			–	–	23		24	–	–					443	–
								25		26		2			1140			PANELBOARD MPZ–100
								27		28	–	–				2080		–
								29		30								
								31		32								
								33		34								
								35		36								
								37		38								
								39		40								
								41		42								
	1772	1772	1772	WATTS/LINE											23740	3714	1634	

ØA= 25512 | ØB= 5486 | ØC= 3406

TOTAL WATTS= 34404 | AMPS/LINE= 42 | LCL AMPS=

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SCALE NONE
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PROJECT NO. 112.FPUD.0002
DESIGNED BY TAA
DRAWN BY AH
CHECKED BY TAA

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14271 Danielson Street
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DATE

Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

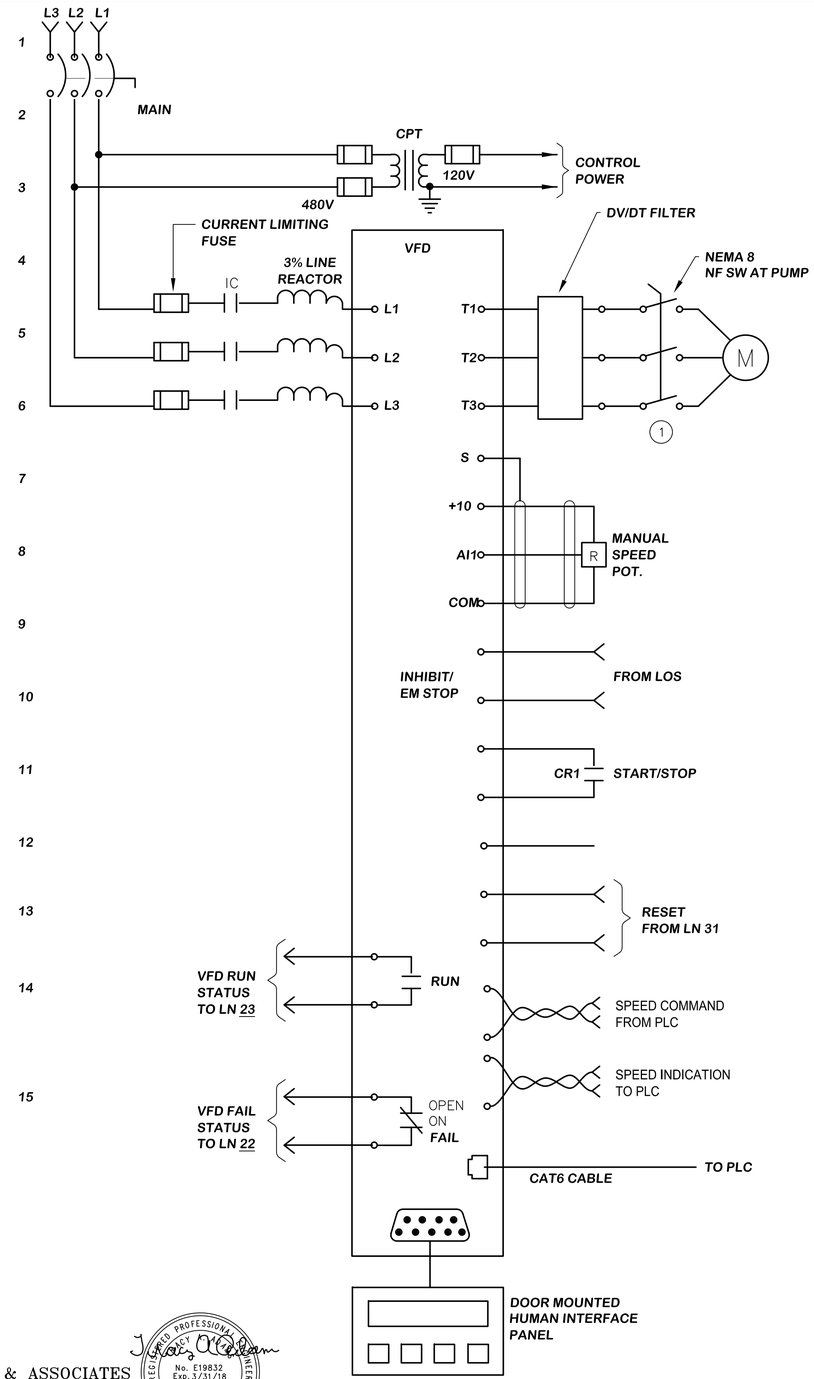
APPROVED BY:

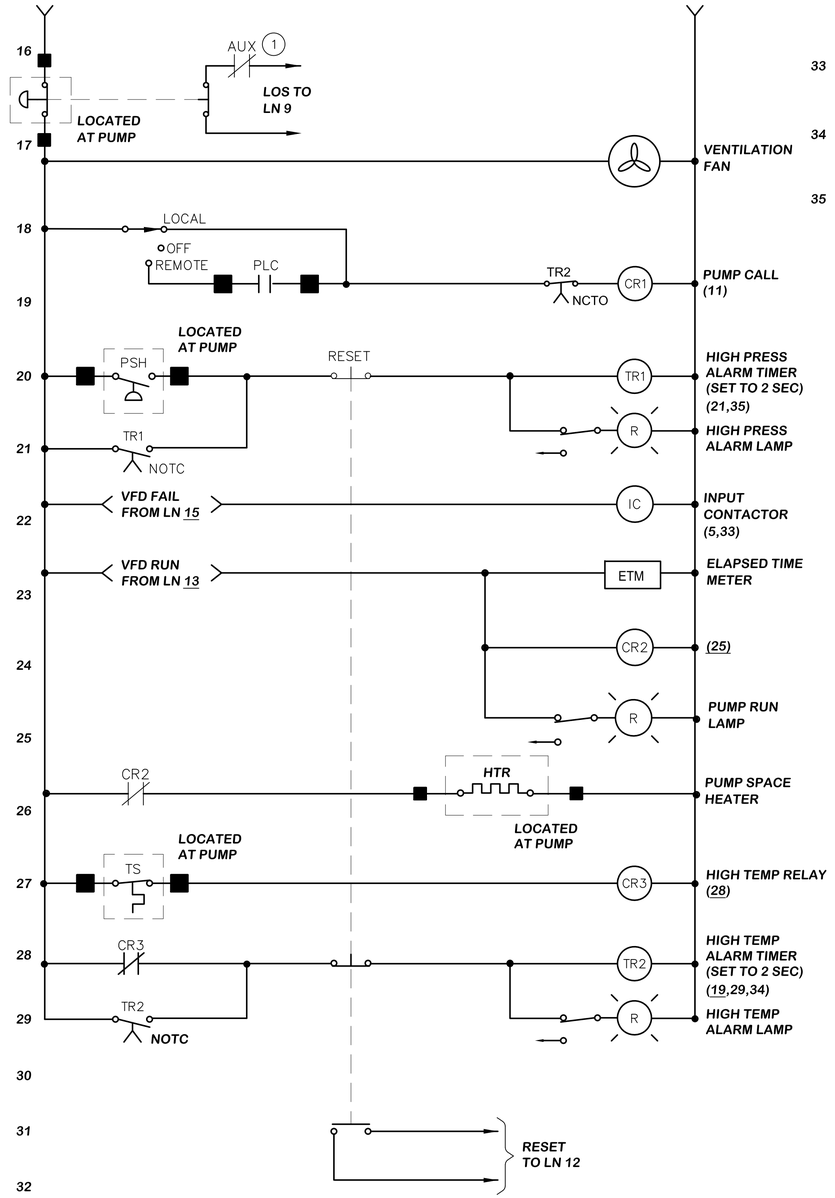
JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

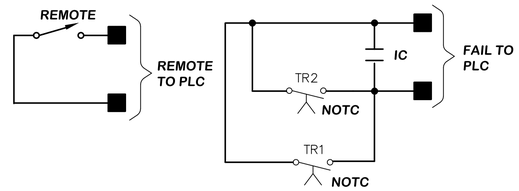
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

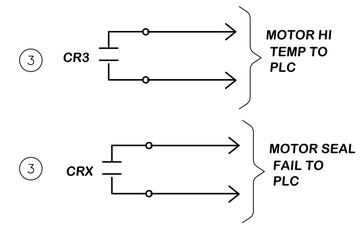
PLANT ELECTRICAL SCHEDULES 19

DRAWING NO. GE-26
SHEET NO. 320 OF 387
CLIENT JOB NO. 2744









NOTES

1. EARLY BREAK AUXILIARY CONTACT ON LOCAL DISCONNECT SWITCH.
2. SUBMERGED PUMPS WILL ALSO HAVE MOTOR SEAL FAIL ALARM IN CONTROL CIRCUIT AND TO PLC.
3. THESE SIGNALS TO BE HARDWIRED TO PLC IN ADDITION TO COMMON FAIL IF MOTOR EQUIPPED WITH THESE SIGNALS. IF SIGNALS CAN BE TRANSMITTED VIA ETHERNET TO PLC THEN HARDWIRED SIGNALS NOT REQUIRED.
4. CHECK P&ID'S FOR FIELD DEVICE INTERLOCKS.

TYPICAL VFD CONTROL DIAGRAM

MORAES/PHAM & ASSOCIATES
CONSULTING ELECTRICAL ENGINEERS
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DATE

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FALLBROOK, CA 92028

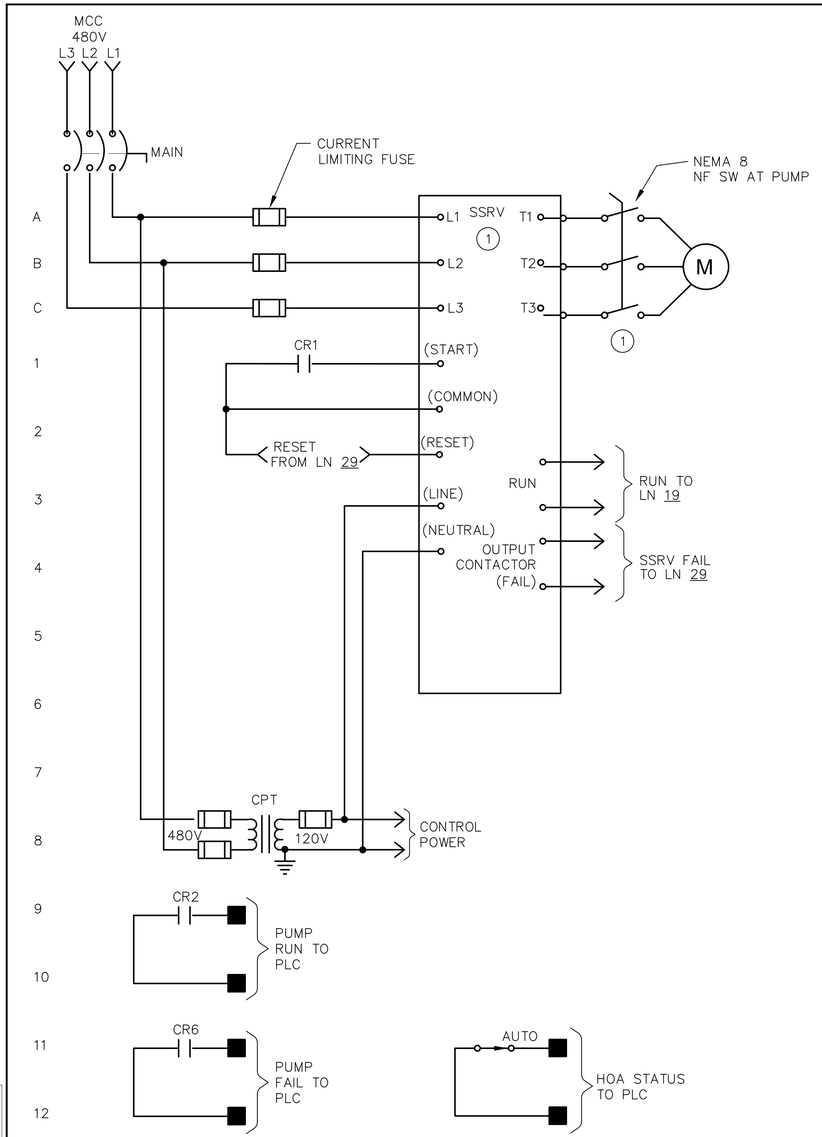
APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

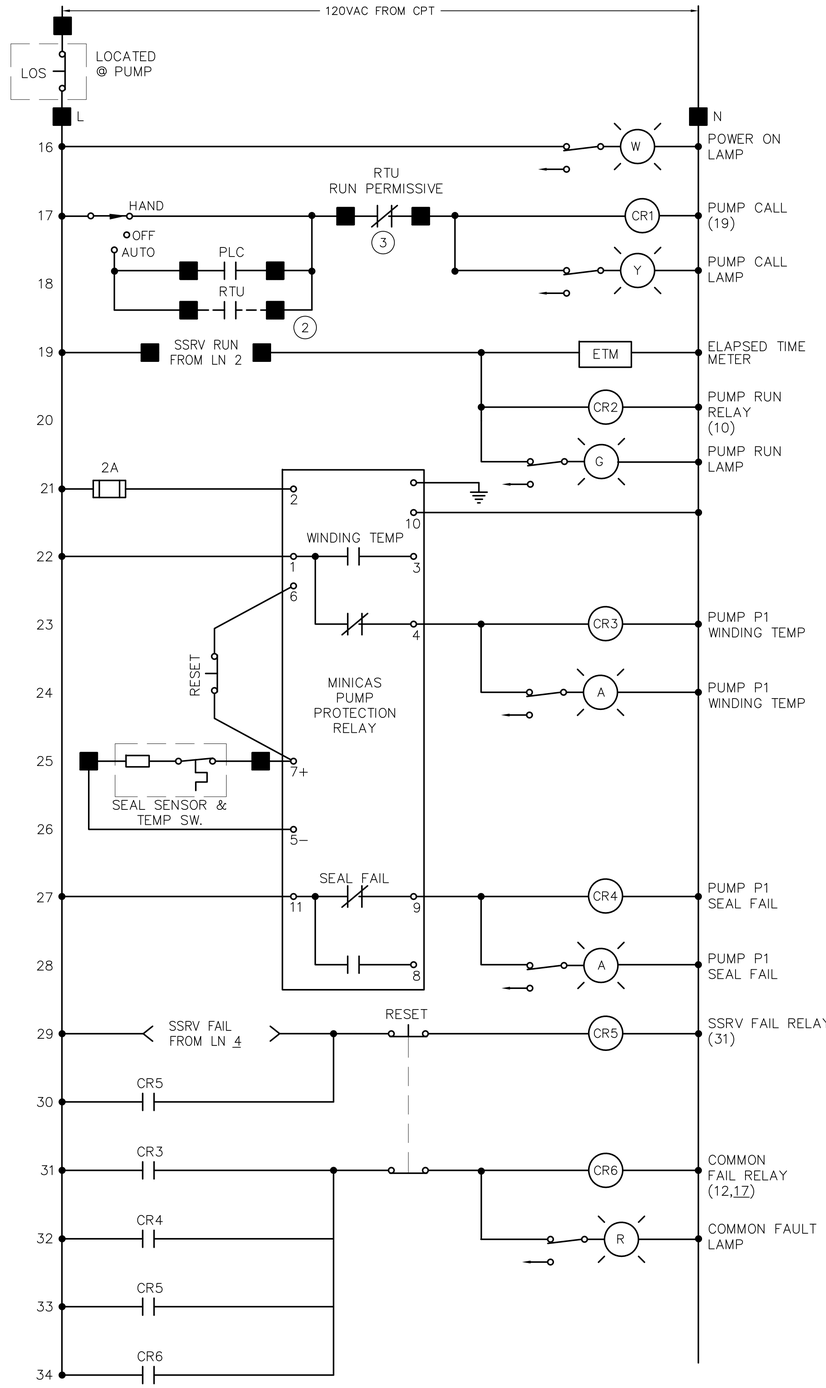
CONTROL DIAGRAM VFD

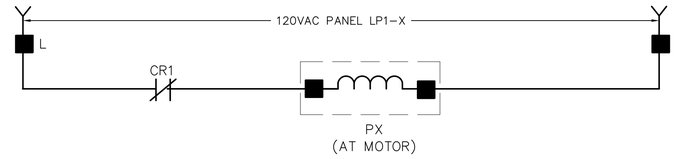
DRAWING NO. GE-27
SHEET NO. 321 OF 387
CLIENT JOB NO. 2744



PUMP TYPICAL CONTROL DIAGRAM

(1) SSRV HAS INTERNAL BYPASS (SHORTING) CONTACTOR.





TYPICAL PUMP HEATER DIAGRAM

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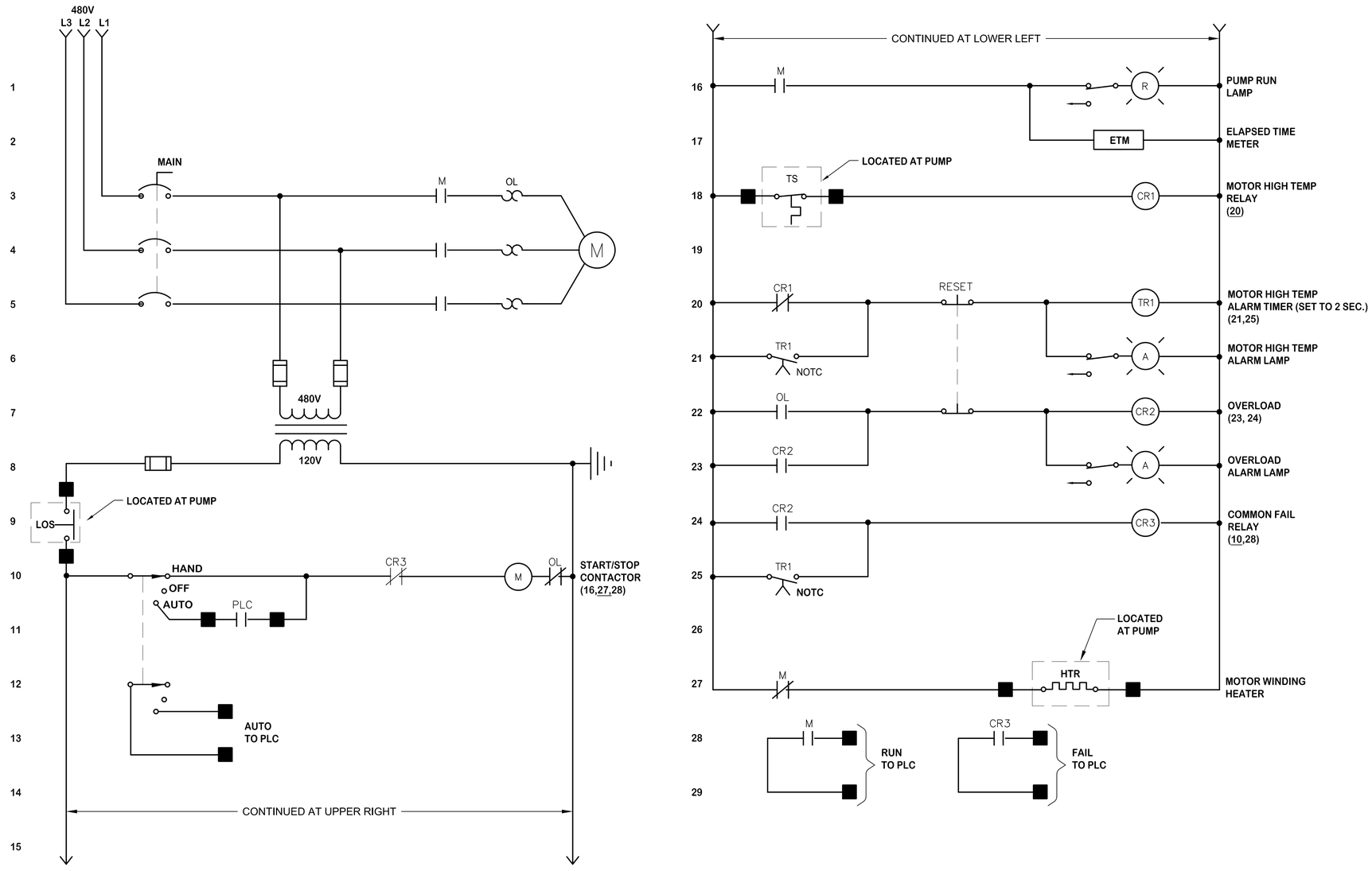
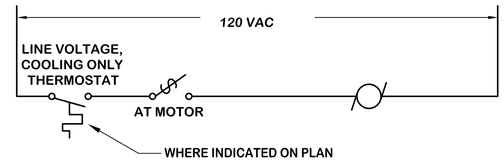
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

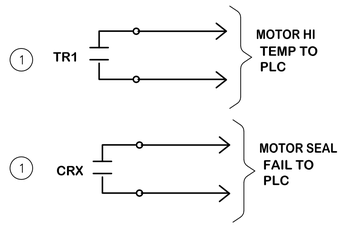
CONTROL DIAGRAMS SOFTSTARTER

DRAWING NO. GE-27A
SHEET NO. 321A OF 387A
CLIENT JOB NO. 2744





TYPICAL SUPPLY/EXHAUST FAN



NOTES

1. *THESE SIGNALS TO BE HARDWIRED TO PLC IN ADDITION TO COMMON FAIL IF MOTOR EQUIPPED WITH THESE SIGNALS. IF SIGNALS CAN BE TRANSMITTED VIA ETHERNET TO PLC THEN HARDWIRED SIGNALS NOT REQUIRED.*
2. *CHECK P&ID'S FOR FIELD DEVICE INTERLOCKS.*

TYPICAL FVNR CONTROL DIAGRAM

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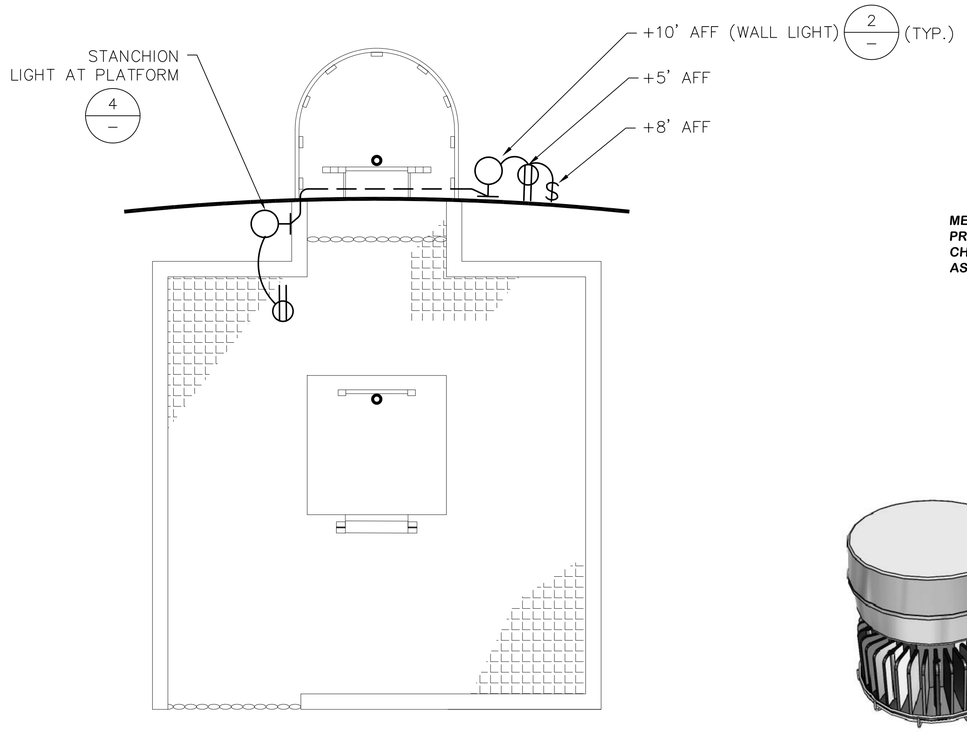
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

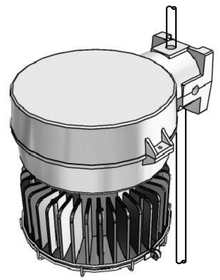
CONTROL DIAGRAMS FVNR

DRAWING NO. GE-28
SHEET NO. 322 OF 387
CLIENT JOB NO. 2744

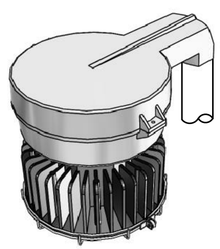


1 — ROOF/HATCH DETAIL

NTS



WALL MOUNT (+10' AFF)

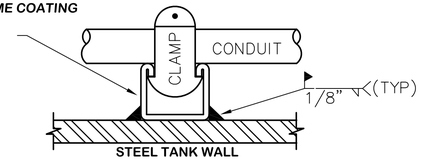


STANCHION MOUNT (TOP PLATFORM)

2 — AREA LIGHTS (A)

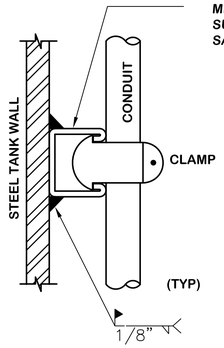
NTS

METAL U-CHANNEL. UNISTRUT P1000, SIMILAR PRODUCT BY SUPERSTRUT OR EQUAL. METAL CHANNEL SHALL BE PAINTED WITH SAME COATING AS TANK EXTERIOR.



PLAN VIEW

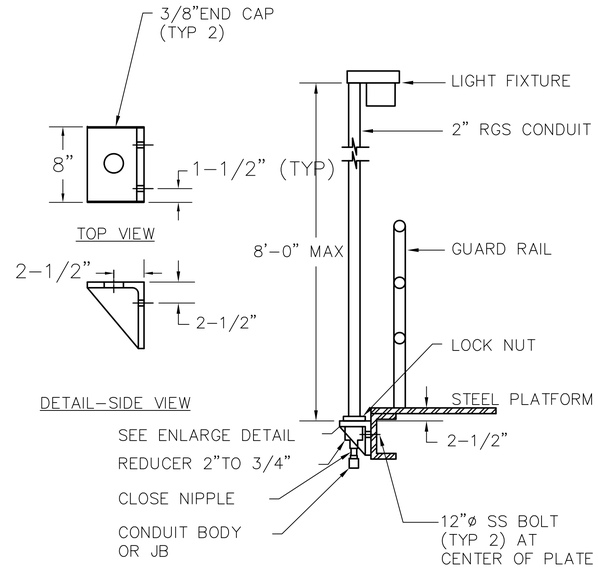
METAL U-CHANNEL. UNISTRUT P1000, SIMILAR PRODUCT BY SUPERSTRUT OR EQUAL. METAL CHANNEL SHALL BE PAINTED WITH SAME COATING AS TANK EXTERIOR.



SIDE VIEW

3 — CONDUIT MOUNTING

NTS



4 — FIXTURE MOUNTING ON PLATFORM

NTS

MORAES/PHAM & ASSOCIATES
CONSULTING ELECTRICAL ENGINEERS
2131 PALOMAR AIRPORT RD., STE. 120
CARLSBAD CA. 92011
(760) 431-7177

REGISTERED PROFESSIONAL ENGINEER — JACKY O'CALLAGHAN — No. E19832 Exp. 3/31/18 — ELECTRICAL — STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED

SCALE	NONE
DATE	06/16/2017
PROJECT NO.	112.FPUD.0002
DESIGNED BY	TAA
DRAWN BY	AH
CHECKED BY	TAA

Infrastructure ENGINEERING CORPORATION
14271 Danielson Street
Poway, California 92064
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www.iecorporation.com

DATE

Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

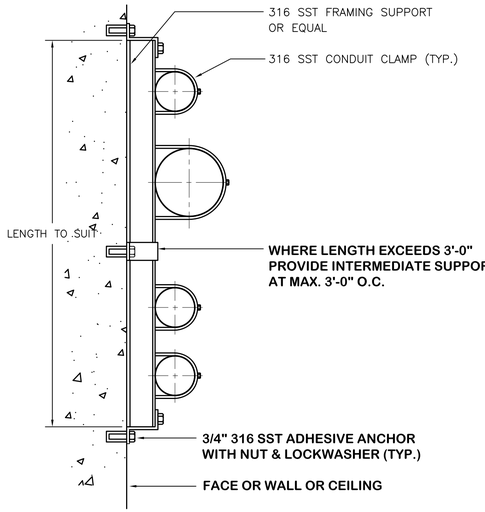
JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

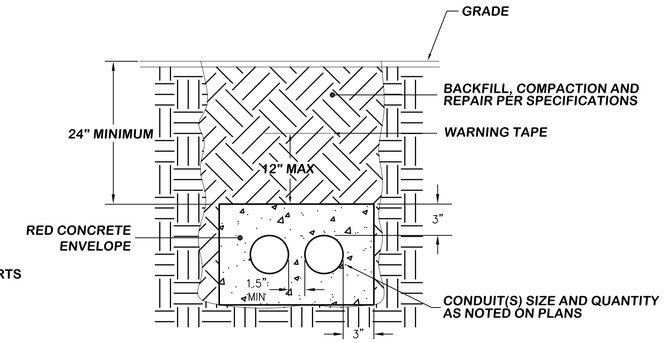
DETAILS 1

DRAWING NO.	GE-29
SHEET NO.	323 OF 387
CLIENT JOB NO.	2744

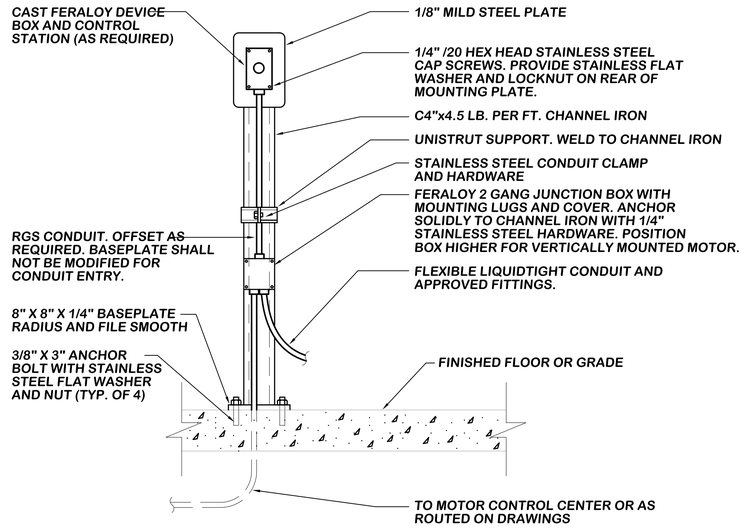


5 — WALL MOUNTED CONDUIT
NOT TO SCALE

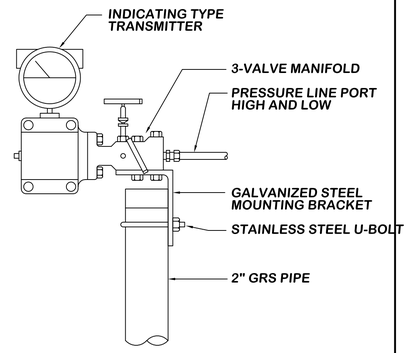
1. SIMILAR FOR CEILING MOUNT



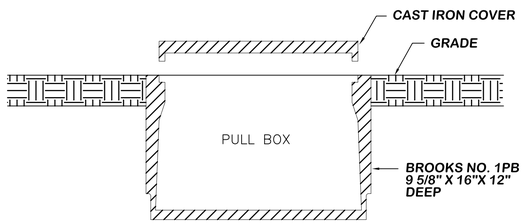
6 — CONCRETE ENCASED CONDUIT
NOT TO SCALE



1. ENTIRE CONTROL STATION PEDESTAL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION AND WELDING. ALL EDGES AND CORNERS SHALL BE ROUNDED OFF EVENLY AND FILED SMOOTH BEFORE GALVANIZING.
2. CONTRACTOR SHALL ADJUST LAYOUT AS REQUIRED TO SUIT EQUIPMENT ACTUALLY FURNISHED.
3. LIQUIDTIGHT CONDUIT SHALL NOT EXCEED 24" WITHOUT APPROVED SUPPORTS. CONNECTORS SHALL BE AS MANUFACTURED BY ETP OR APPLETON.
4. HEX HEAD HARDWARE SHALL BE USED THROUGHOUT, SLOTTED HEAD SCREWS SHALL NOT BE ACCEPTABLE. 1/4" SHALL BE CONSIDERED MINIMUM.
5 TOP MOUNTING PLATE SHALL BE SIZED TO SUIT.

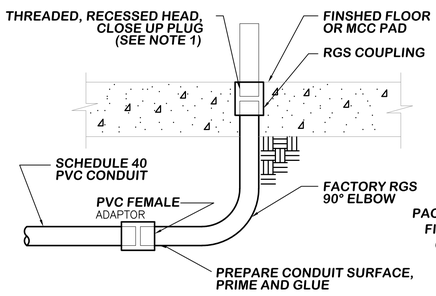


8 — TRANSMITTER MOUNTING
NOT TO SCALE



1. ALL PULLBOXES SHALL BE PRECISELY LOCATED FLUSH WITH FINISHED GRADE.
2. CONDUITS ENTERING PULLBOX SHALL BE PERMANENTLY LABELED WITH STAMPED BRASS TAGS INDICATING ORIGIN AND DESTINATION. CONDUITS SHALL TERMINATE WITH MALE ADAPTORS AND INSULATING BUSHINGS. CONDUITS SHALL BE PRECISELY LOCATED. LENGTH ENTERING PULLBOX HOUSING SHALL BE 2" MAXIMUM. BUSHINGS SHALL BE THERMOSETTING PHENOLIC AS MANUFACTURED BY OZ GEDNEY, TYPE A. KNOCKOUTS USED SHALL BE NEATLY FILLED WITH NON-SHRINK GROUT.
3. PULLBOX SIZE SHALL BE CONSIDERED ABSOLUTE MINIMUM. SIZE TO MATCH CONDUITS PER NEC.
4. ALL PULLBOXES TO BE WATER PROOF. ALL CONDUITS TO BE SEALED.

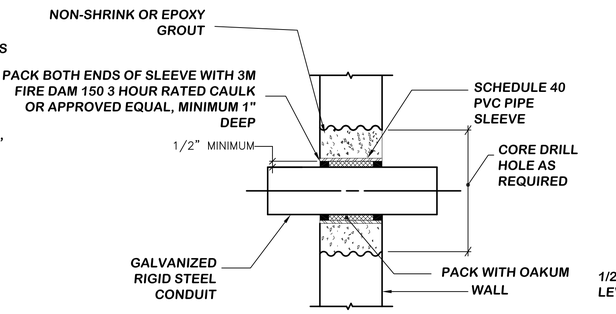
9 — PULLBOX TYPICAL DETAIL
NOT TO SCALE



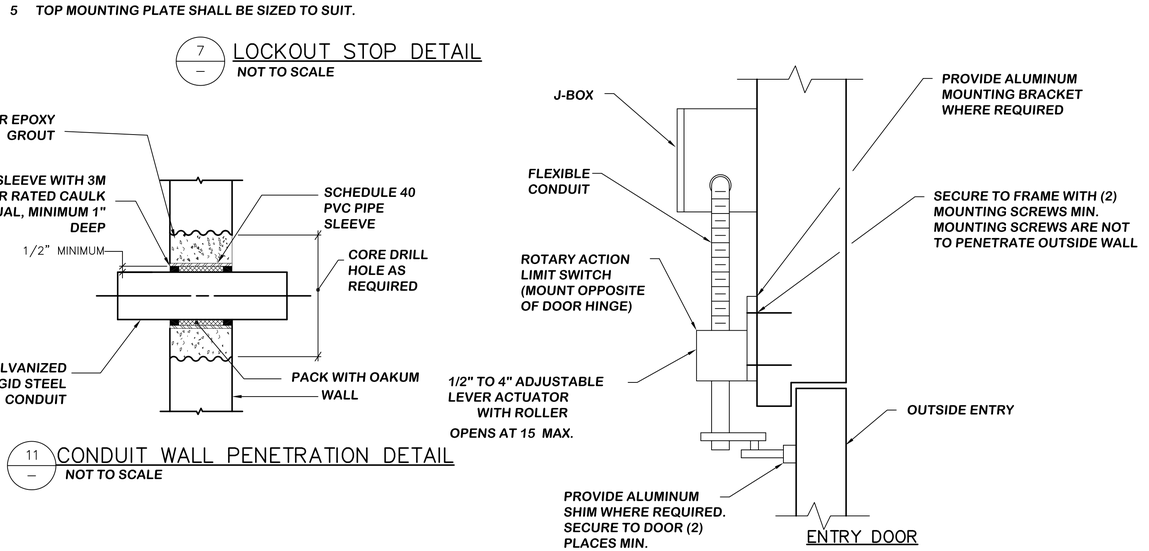
10 — FLUSH CONDUIT TERMINATION
NOT TO SCALE

NOTES:

1. IN MCC AND WALL MOUNTED ENCLOSURES CONDUIT SHALL EXTEND TWO INCHES ABOVE FINISHED SURFACE. THREADED PLUG SHALL BE TREATED WITH ANTI SEIZE COMPOUND AND SHALL BE MADE UP TIGHT. PLASTIC PLUGS SHALL NOT BE USED.



11 — CONDUIT WALL PENETRATION DETAIL
NOT TO SCALE



12 — DOOR INTRUSION SWITCH
ACTIVATE SWITCH WHEN DOOR OPENS

1. USE ON ROLLUP DOORS. WIRE DOOR OPEN STATUS TO NEAREST SCADA CONTROL PANEL.

7 — LOCKOUT STOP DETAIL
NOT TO SCALE

MORAES/PHAM & ASSOCIATES
CONSULTING ELECTRICAL ENGINEERS
2131 PALOMAR AIRPORT RD., STE. 120
CARLSBAD CA. 92011 (760) 431-7177

REGISTERED PROFESSIONAL ENGINEER — No. E19832 Exp. 3/31/18 — ELECTRICAL — STATE OF CALIFORNIA

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Fallbrook Public Utility District
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FALLBROOK, CA 92028

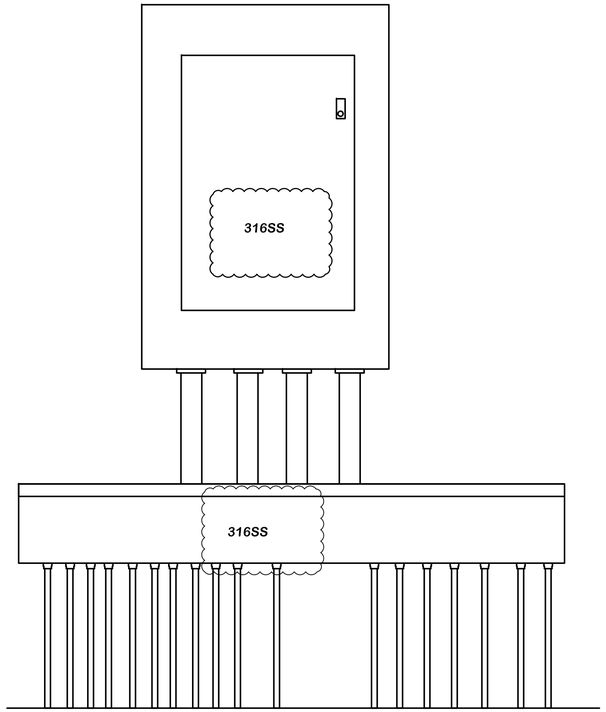
APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

DETAILS 2

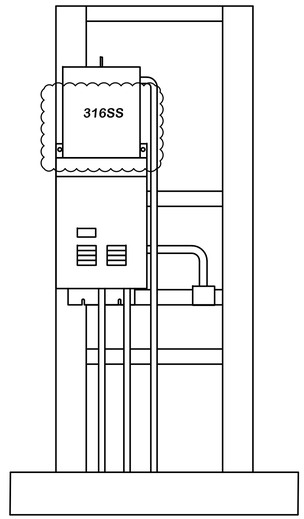
DRAWING NO. GE-30
SHEET NO. 324 OF 387
CLIENT JOB NO. 2744



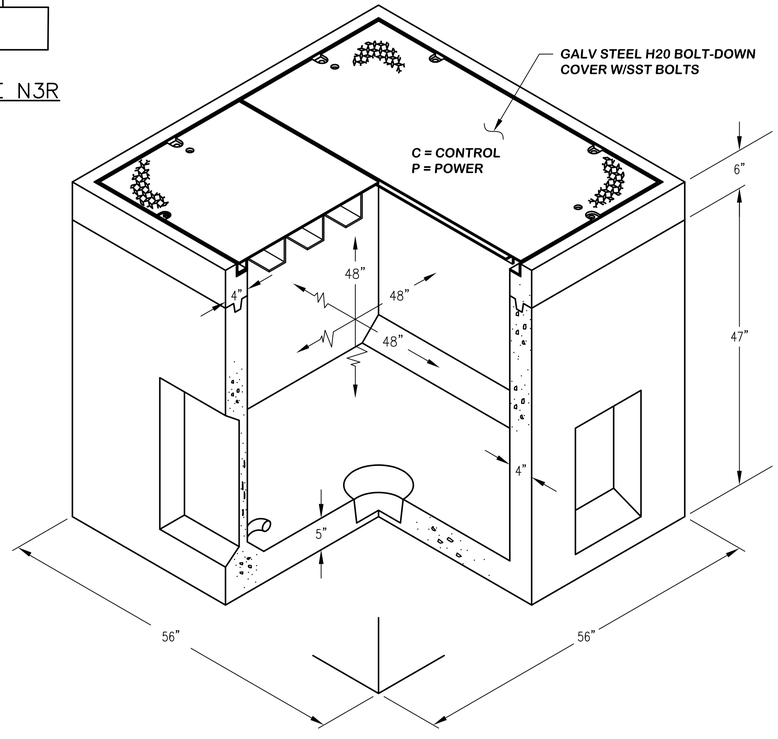
13 – PANELBOARD WIREWAY
NOT TO SCALE

NOTES:

1. INSTALL 6 IN X 6IN METAL WIREWAY.
2. INSTALL FIELD CONDUITS INTO BOTTTOM OF WIREWAY.
3. CONSOLIDATE FIELD WIRING INTO LARGER CONDUITS FOR ENTRY INTO PANELBOARD.
4. ALL FITTINGS TO BE WATERTIGHT.



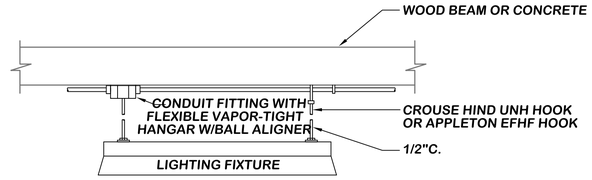
14 – MINI–POWER ZONE N3R
NOT TO SCALE



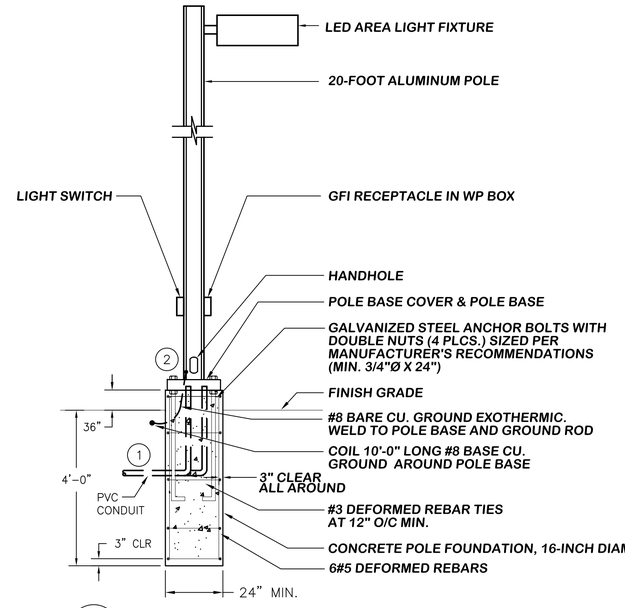
15 – 4'x4' CONCRETE PULLBOX
NOT TO SCALE

NOTES:

1. SHEET MEMBRANE ON OUTSIDE.
2. SEAL ALL CONDUITS WITH PUTTY.
3. GROUT CONDUIT PENETRATIONS.
4. PULLBOX TO BE WATERTIGHT.



16 – FIXTURE MOUNTING DETAIL
NOT TO SCALE



17 – LUMINARIE MOUNTING DETAIL
NOT TO SCALE

NOTES:

1. (2)1"CONDUITS PER POLE. ONE FOR POWER PER PLANS AND ONE TO CLOSEST NETWORK SWITCH. COORDINATE
2. WITH CLIENT FOR LOCATIONS.

CONDUITS TO EXTEND ABOVE BASE TO WITHIN ONE INCH OF HANDHOLE.

MORAES/PHAM & ASSOCIATES
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	ADDENDUM D	6/28/19	TAA

SCALE NONE
DATE 06/16/2017
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T 858.413.2400 F 858.413.2440
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DATE

FPUD Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

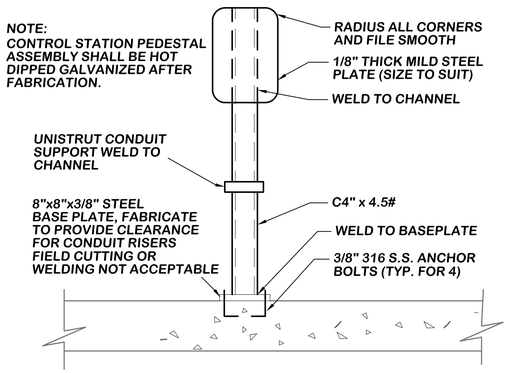
APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

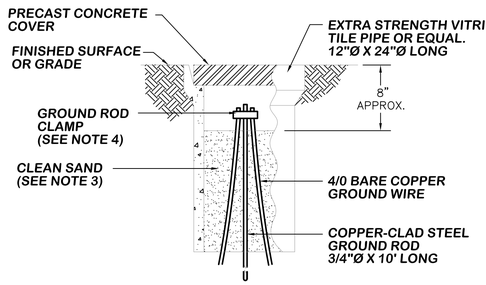
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

DETAILS 3

DRAWING NO. GE-31
SHEET NO. 325 OF 387
CLIENT JOB NO. 2744



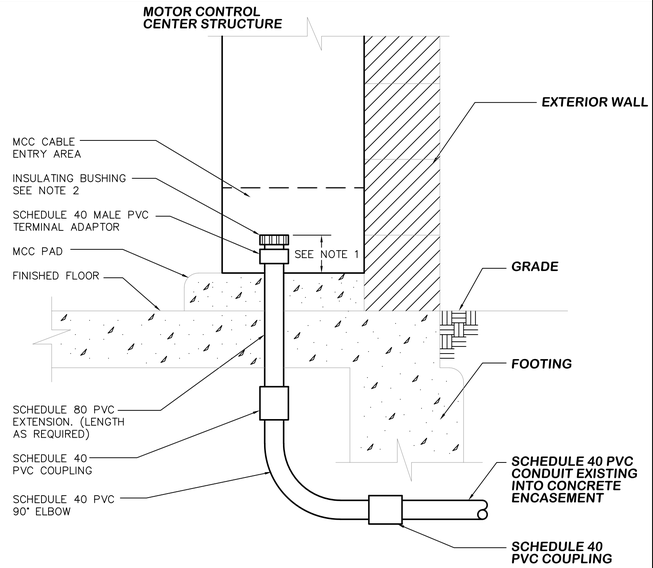
18 — STANCHION
NOT TO SCALE



19 — GROUND ROD TEST WELL DETAIL
NOT TO SCALE

NOTES:

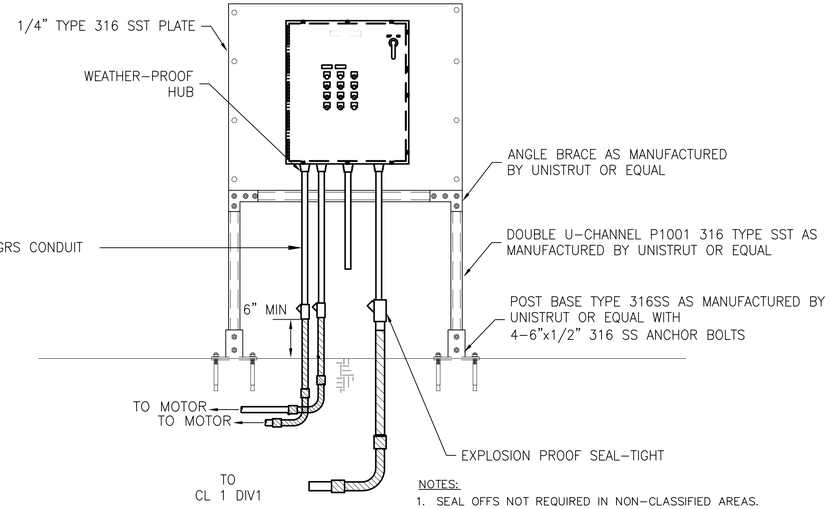
1. TYPICAL FOR ALL DRIVEN GROUND RODS.
2. CORROSION/OXIDATION INHIBITING COMPOUND SHALL BE USED THROUGHOUT ON JOINTS AND TERMINATIONS. THOMAS AND BETTS COPPER SHIELD OR APPROVED EQUAL.
3. TEST WELL SHALL BE ARRANGED AND CONSTRUCTED TO FREELY DRAIN RAINWATER. PEA GRAVEL SHALL BE GENEROUSLY ADDED BELOW SAND TO INCREASE PERCOLATION.
4. ALL CLAMPS, FITTINGS AND MATERIALS SHALL BE OF THE HIGHEST GRADE. HARDWARE SHALL BE 316 STAINLESS STEEL. "STAMPED" COPPER GROUND ROD CLAMPS SHALL NOT BE USED.



20 — TYPICAL MOTOR CONTROL CENTER CONDUIT ENTRY DETAIL

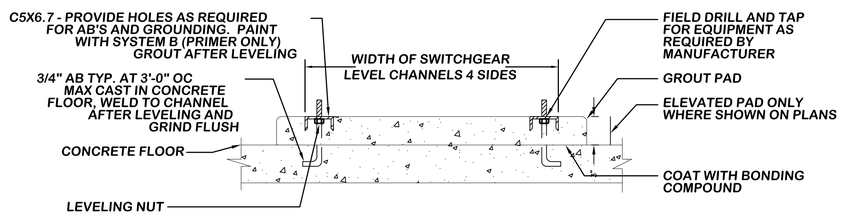
NOTES:

1. ALL CONDUITS ENTERING MCC SHALL TURN UP PLUMB AND SHALL TERMINATE AT EQUAL LENGTHS. CONDUITS SHALL BE ADEQUATELY SUPPORTED TO REDUCE SHIFTING DURING CONCRETE POUR. CONDUITS SHALL BE ARRANGED IN ROWS AND SHALL BE EVENLY SPACED AND POSITIONED FOR EASY ACCESS AND CABLE PULLING.
2. ALL CONDUITS ENTERING CABINET SHALL BE FURNISHED COMPLETE WITH INSULATING BUSHINGS. BUSHINGS SHALL BE OZ/GEDNEY TYPE A. RIGID GALVANIZED STEEL CONDUITS ENTERING CABINET SHALL BE FURNISHED WITH GROUNDING TYPE BUSHINGS OZ/GEDNEY TYPE BLG OR APPROVED EQUAL. GROUNDING BUSHINGS SHALL BE SUITABLY BONDED PER N.E.C. REQUIREMENTS.
3. ALL CONDUIT RUNS SHALL CONTAIN A NYLON MEASURING TAPE AS MANUFACTURED BY IDEAL OR APPROVED EQUAL. TAPE SHALL BE OF SUFFICIENT LENGTH AND SHALL BE NEATLY WRAPPED AND SECURED AT EACH END FOR FUTURE ACCESS.
4. ALL CONDUCTORS EXITING CONDUITS SHALL BE NEATLY TRAINED AND HARNESSED. CABLE TIES, MOUNTING BASES AND STANDOFFS SHALL BE USED THROUGHOUT JOB AND SHALL BE AS MANUFACTURED BY THOMAS AND BETTS OR APPROVED EQUAL. ADHESIVE TYPE MOUNTING BASES SHALL NOT BE USED.



NOTES:
1. SEAL OFFS NOT REQUIRED IN NON-CLASSIFIED AREAS.

21 — CONTROL PANEL MOUNTING
NOT TO SCALE



22 — TYPICAL SWITCHGEAR AND MCC FOUNDATION DETAIL
N.T.S.

MORAES/PHAM & ASSOCIATES
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NO.	DESCRIPTION	DATE	APPROVED

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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DATE

FRD Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

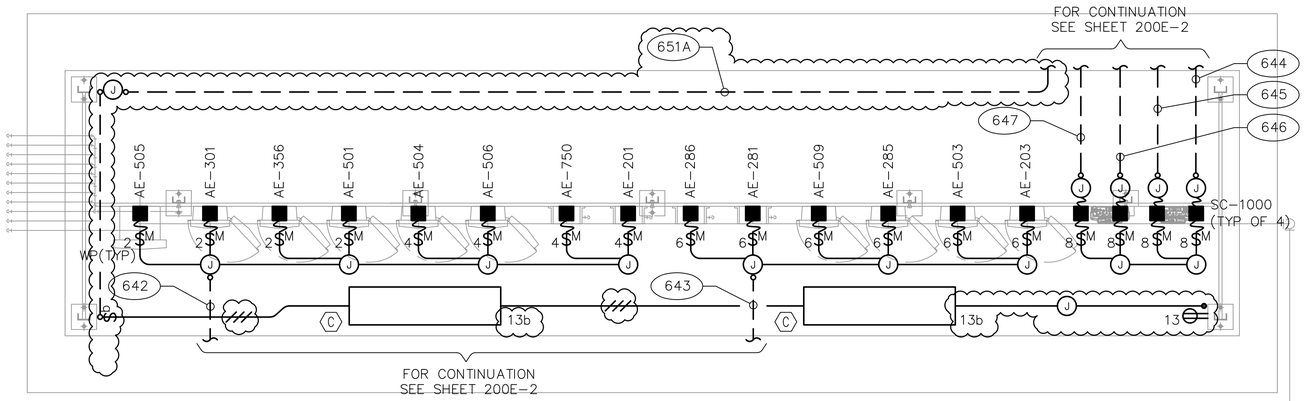
APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

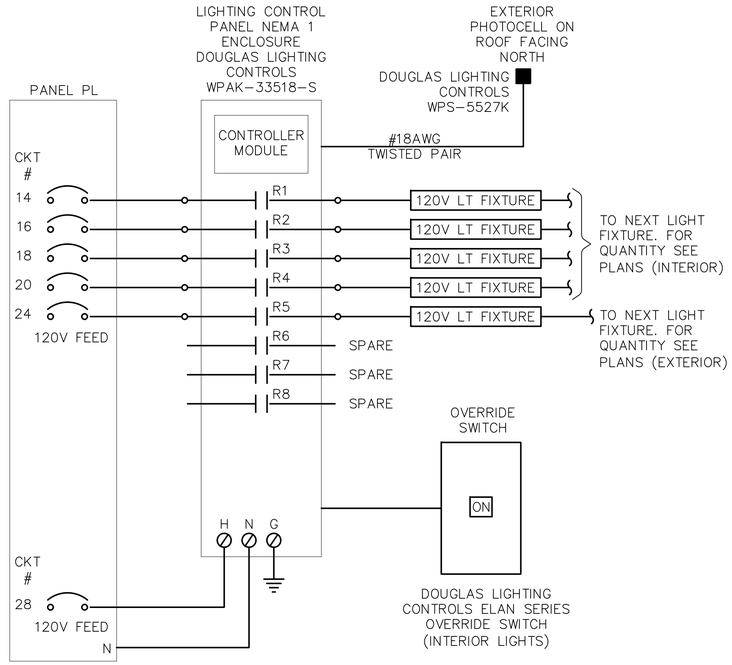
DETAILS 4

DRAWING NO. GE-32
SHEET NO. 326 OF 387
CLIENT JOB NO. 2744

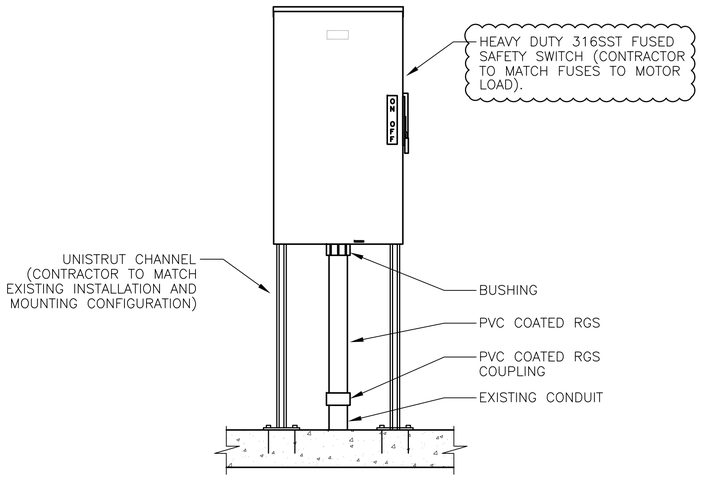


23 — SAMPLE PANEL ELECTRICAL PLAN
SCALE: 1/2" = 1'-0"

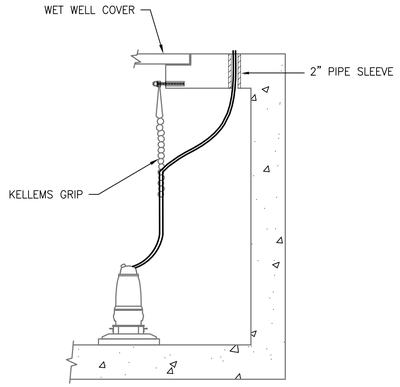
GRAPHIC SCALE
0 1' 2' 4'
SCALE: 1/2"=1'-0"



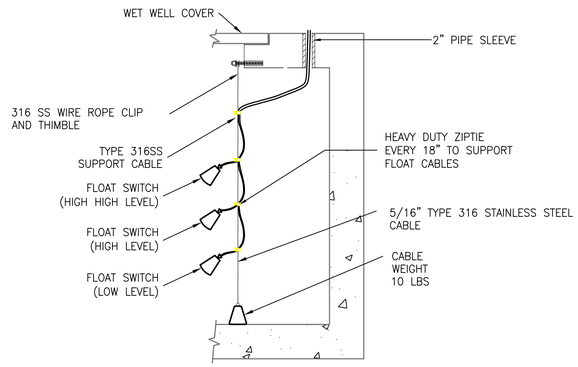
24 — LIGHTING CONTROL DIAGRAM



25 — TYPICAL FUSIBLE SAFETY SWITCH MOUNTING SUPPORT



26 — PUMP POWER/SIGNAL CABLE SUPPORT
NOT TO SCALE



NOTES:

1. FLOAT ASSEMBLY MUST BE REMOVABLE FROM TOP WITHOUT ENTERING WELL.
2. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.

27 — FLOAT MOUNTING DETAIL
NOT TO SCALE

MORAES/PHAM & ASSOCIATES
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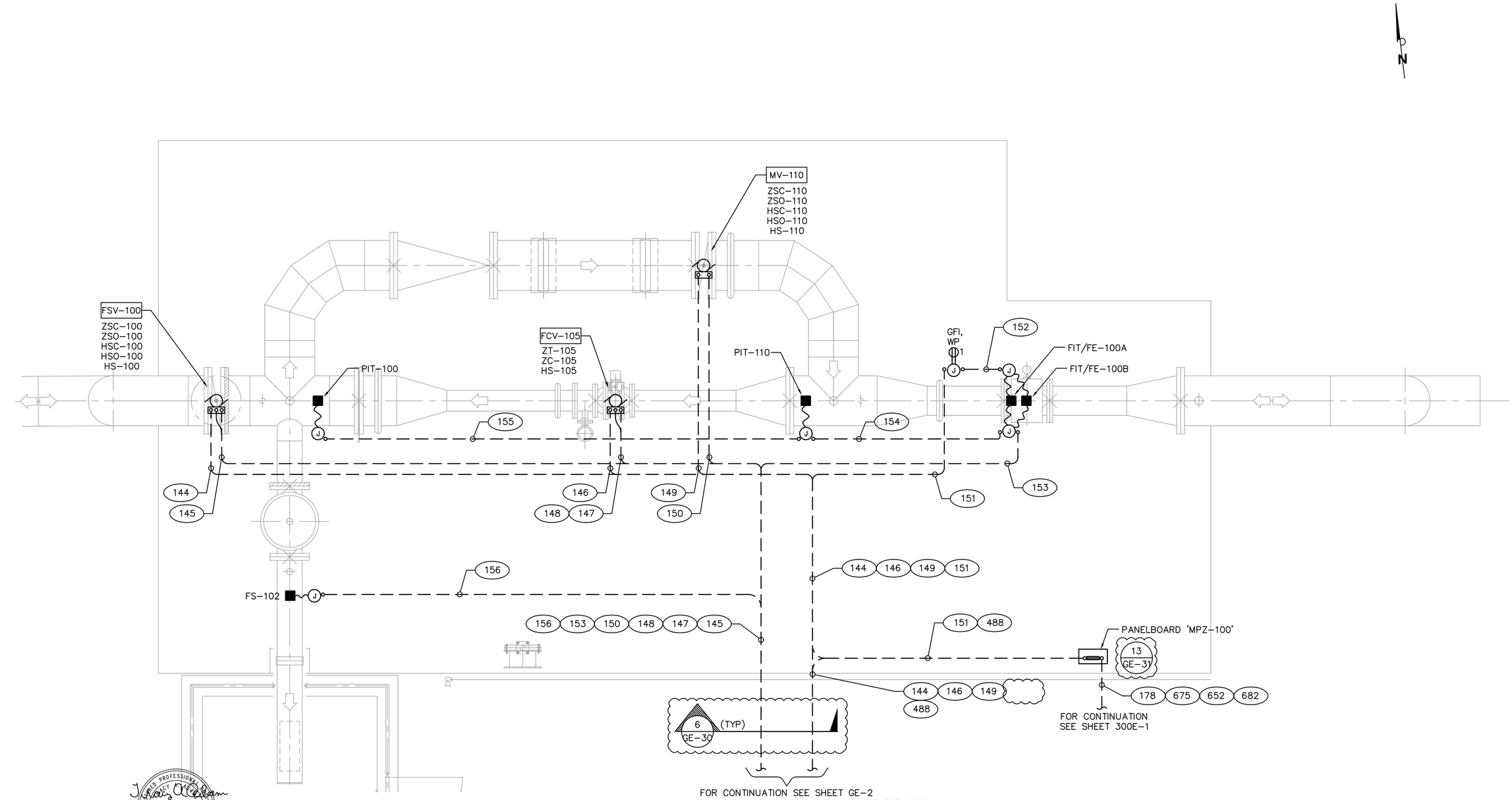
JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

DETAILS 5

DRAWING NO. GE-33
SHEET NO. 327 OF 387
CLIENT JOB NO. 2744



SMCUP-FCF POWER AND SIGNAL PLAN

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

GRAPHIC SCALE
0 1' 2' 4'
SCALE: 1/2"=1'–0"

MORAES/PHAM & ASSOCIATES
CONSULTING ELECTRICAL ENGINEERS
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CARLSBAD CA. 92011 (760) 431–7177

REGISTERED PROFESSIONAL ENGINEER
No. E19832
Exp. 3/31/18
STATE OF CALIFORNIA ELECTRICAL

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA

SCALE	AS SHOWN
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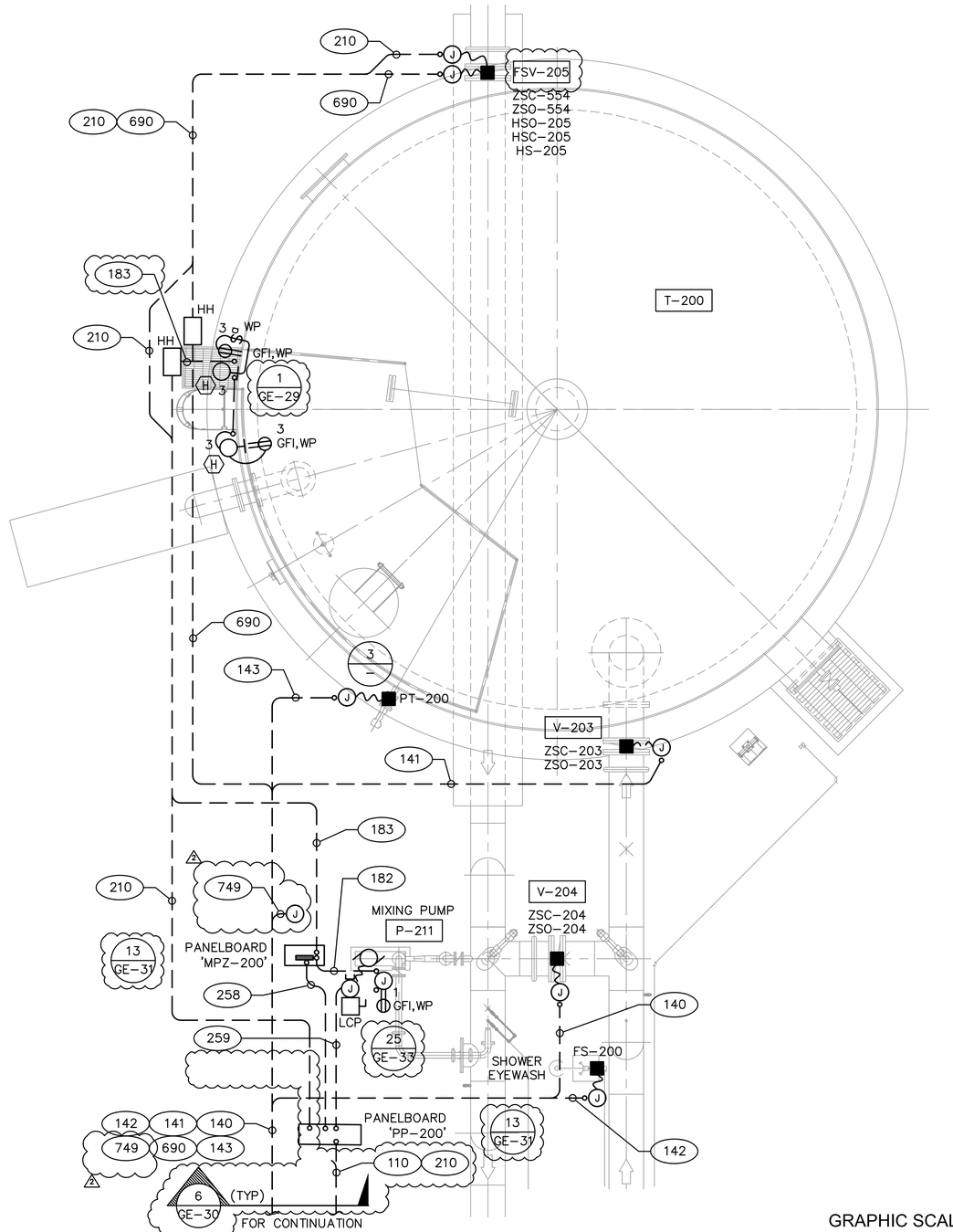
JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 100 - RETURN FCF POWER AND SIGNAL

DRAWING NO.	100E-1
SHEET NO.	328 OF 387
CLIENT JOB NO.	2744



EQUALIZATION TANK AREA ELECTRICAL PLAN

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

GRAPHIC SCALE
0 2' 4' 8'
SCALE: 1/4"=1'-0"

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2131 PALOMAR AIRPORT RD., STE. 120
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REGISTERED PROFESSIONAL ENGINEER — No. E19832 Exp. 3/31/18 — ELECTRICAL — STATE OF CALIFORNIA

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA
2	BID ADDENDUM MODIFICATION	5/22/19	TA

SCALE	AS SHOWN
DATE	06/16/2017
PROJECT NO.	112.FPUD.0002
DESIGNED BY	TAA
DRAWN BY	AH
CHECKED BY	TAA

Infrastructure ENGINEERING CORPORATION
14271 Danielson Street
Poway, California 92064
T 858.413.2400 F 858.413.2440
www.iecorporation.com

DATE

Fallbrook Public Utility District

990 E. MISSION RD
FALLBROOK, CA 92028

APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 200 - EQUALIZATION TANK ELECTRICAL PLAN

DRAWING NO. 200E-1
SHEET NO. 329 OF 387
CLIENT JOB NO. 2744

FOR CONTINUATION
SEE SHEET GE-2

6 GE-30 (TYP)

584 619 609 523 521 519 594 546 541 568 566 564 732 636
506 504 611 531 526 525 551 549 596 576 571 570 730 638
511 510 508 534 592 590 556 555 553 621 634 602 728 740
588 586 516 540 538 536 600 598 561 743 736 734 738

653 654 655 514 529 544 559 574 742

FOR ADDITIONAL WORK IN
THIS AREA SEE SHEET 200E-3

CONTROL PANEL
CP-200

659
658

MINI POWER
ZONE 'MPZ-201'

PANELBOARD 'DP1'

489

13 GE-31 MINI POWER
ZONE 'MPZ-202'

639
641
651

643 642
648

1 GE-33

642

643

651A

649

648

FCV-284

650

FIT-284

639

640

722
657
656
663
664
660
661
721

BLOWER
ME-292

BLOWER
ME-291

25 GE-33

MV-290

641

GFI, WP
11

641

640 644 645 646
649 650 647

644 645 646 647

GFI, WP
11

#10

651

#10

SURFACE MOUNT TO
UNDERSIDE OF PLATFORM (TYP)

638

V-281

V-282

13a

GFI, WP
11

MOUNT ON GUARD
RAIL POST AT TOP
OF PLATFORM (TYP)

GRAPHIC SCALE
0 2' 4' 8' 12'
SCALE: 3/16"=1'-0"

IRON AND MANGANESE FILTRATION POWER AND SIGNAL PLAN

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

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Exp. 3/31/18
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STATE OF CALIFORNIA

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SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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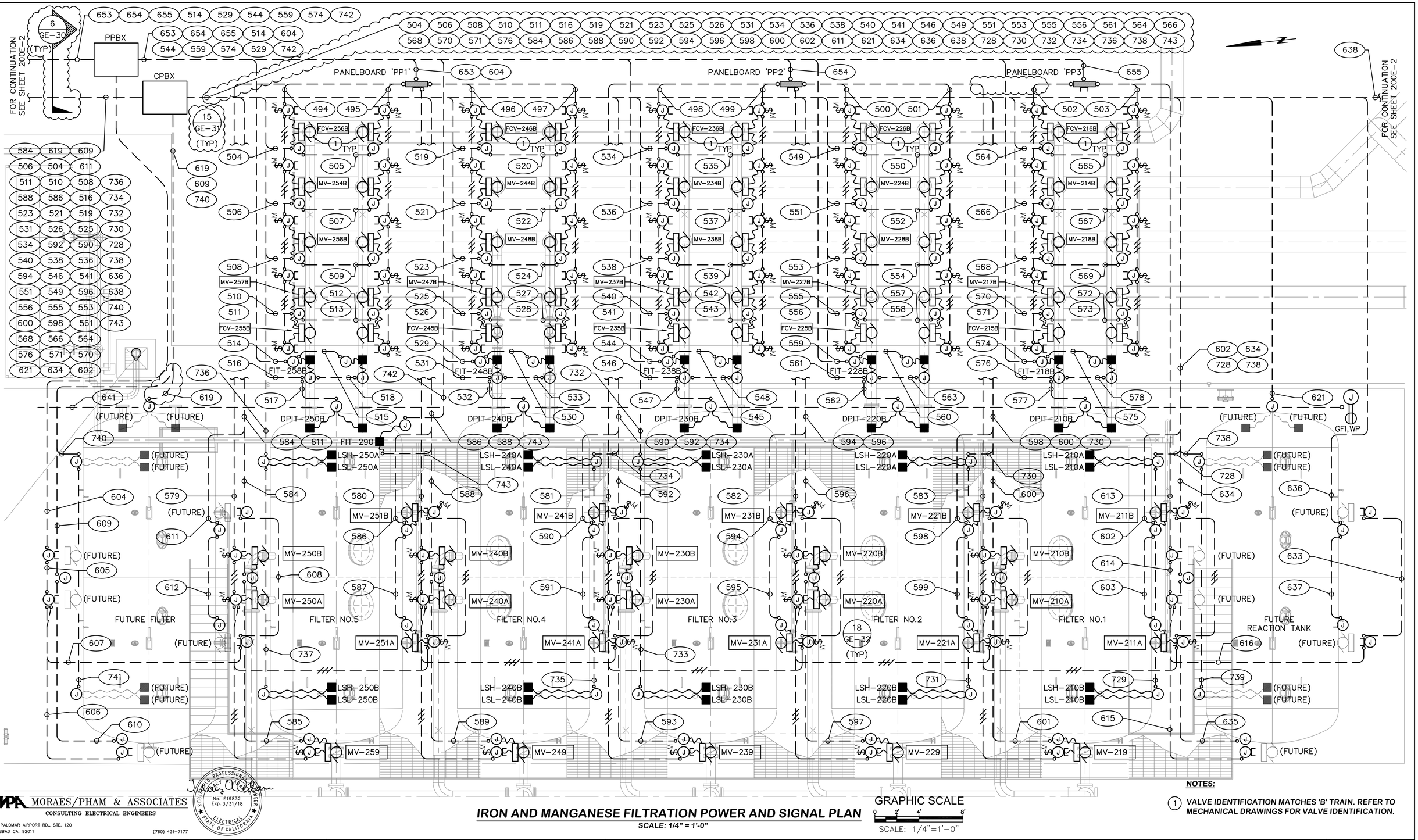
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 200 - IRON AND MANGANESE FILTRATION POWER AND SIGNAL PLAN

DRAWING NO. 200E-2
SHEET NO. 330 OF 387
CLIENT JOB NO. 2744



NOTES:

1. *VALVE IDENTIFICATION MATCHES 'B' TRAIN. REFER TO MECHANICAL DRAWINGS FOR VALVE IDENTIFICATION.*

IRON AND MANGANESE FILTRATION POWER AND SIGNAL PLAN

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

GRAPHIC SCALE 0 2' 4' 8'

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

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NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA

SCALE *AS SHOWN*
DATE *06/16/2017*
PROJECT NO. *112.FPUD.0002*
DESIGNED BY *TAA*
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CHECKED BY *TAA*

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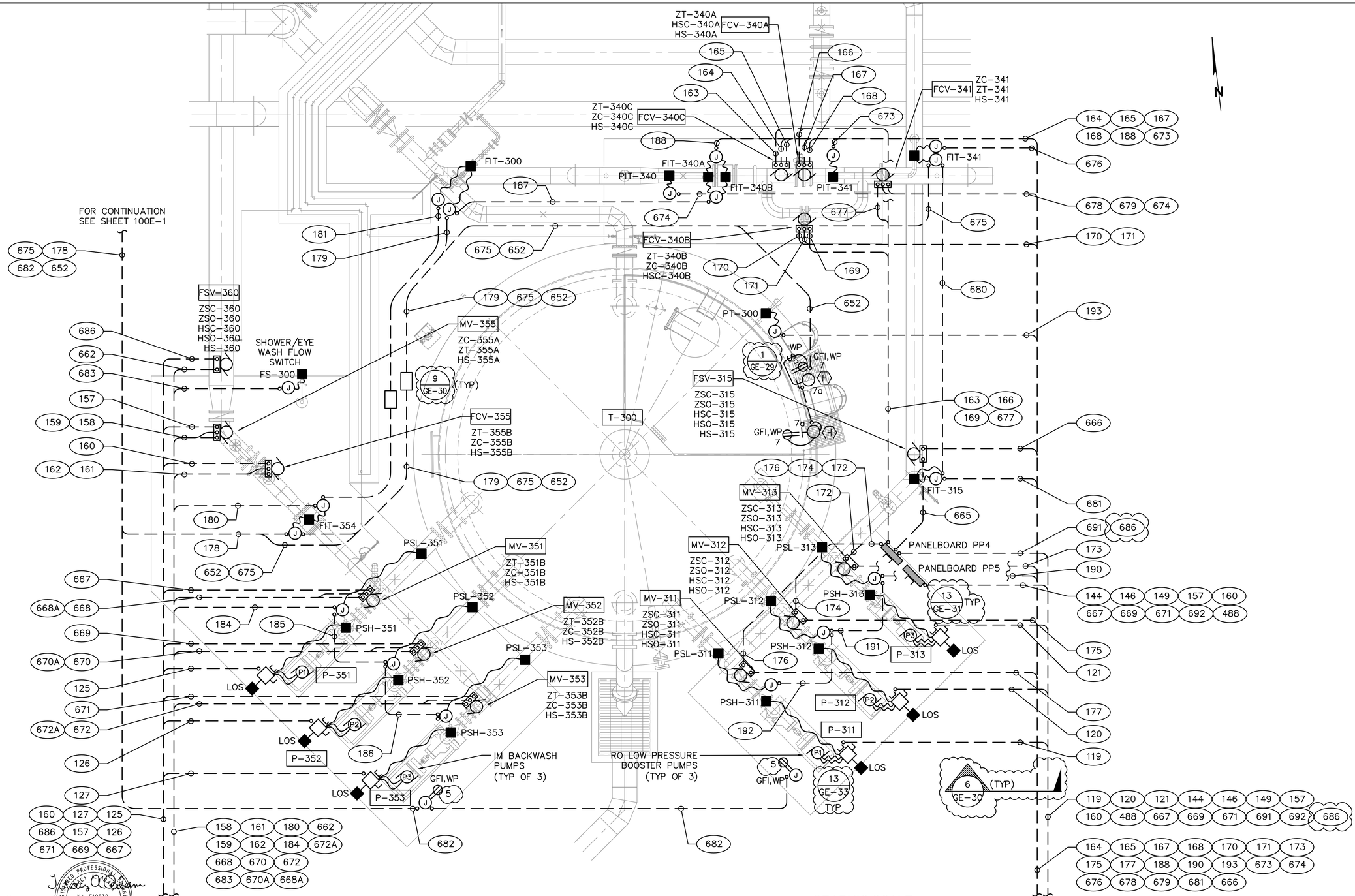
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 200 - IRON AND MANGANESE FILTRATION AREA POWER AND SIGNAL PLAN

DRAWING NO. *200E-3*
SHEET NO. *331* OF *387*
CLIENT JOB NO. *2744*



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Exp. 3/31/18
ELECTRICAL
STATE OF CALIFORNIA

RO FEED TANK AND BOOSTER PS POWER AND SIGNAL PLAN

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

GRAPHIC SCALE
0 2' 4' 8'
SCALE: 1/4"=1'-0"

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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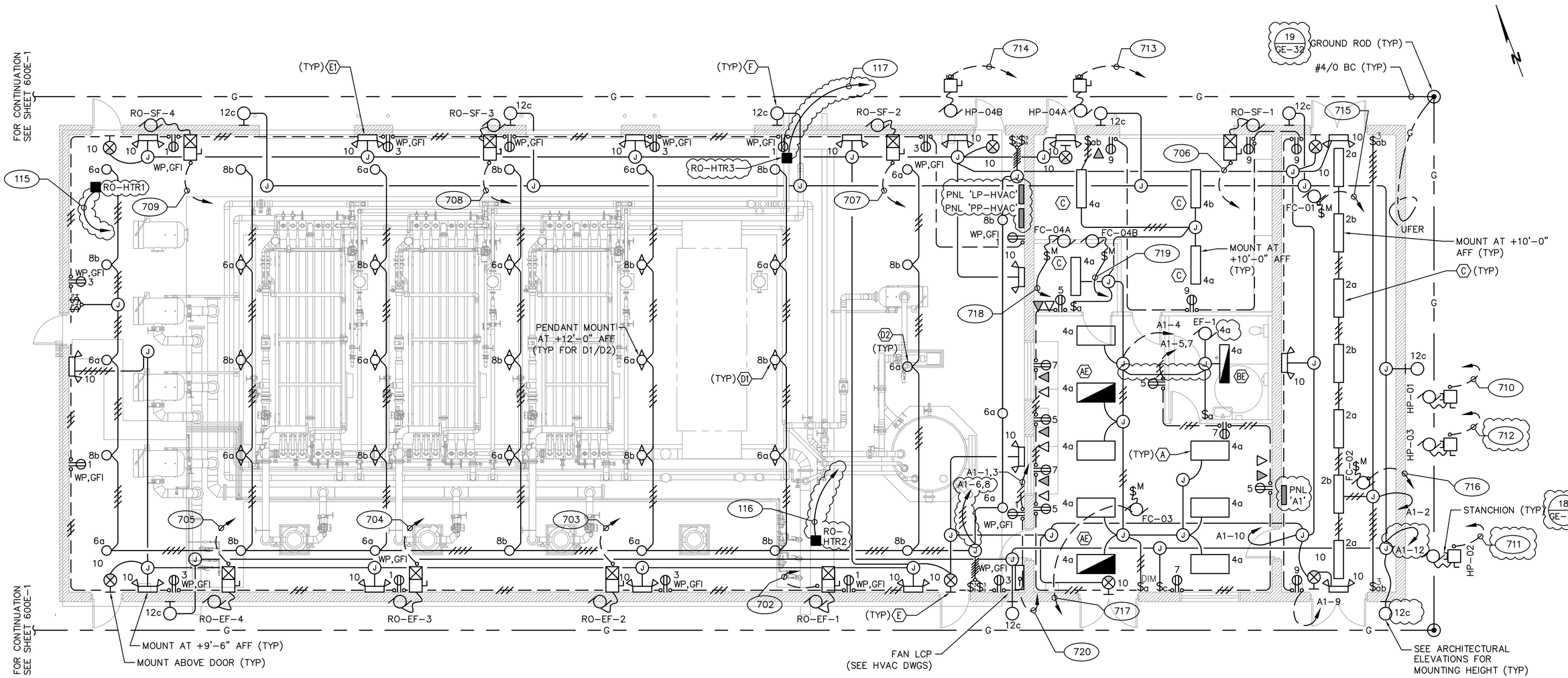
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 300 - RO FEED TANK AND BOOSTER PS POWER AND SIGNAL PLAN

DRAWING NO. 300E-1
SHEET NO. 332 OF 387
CLIENT JOB NO. 2744



RO BUILDING LIGHTING PLAN

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

GRAPHIC SCALE

0 2' 4' 8' 12'

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

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NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA

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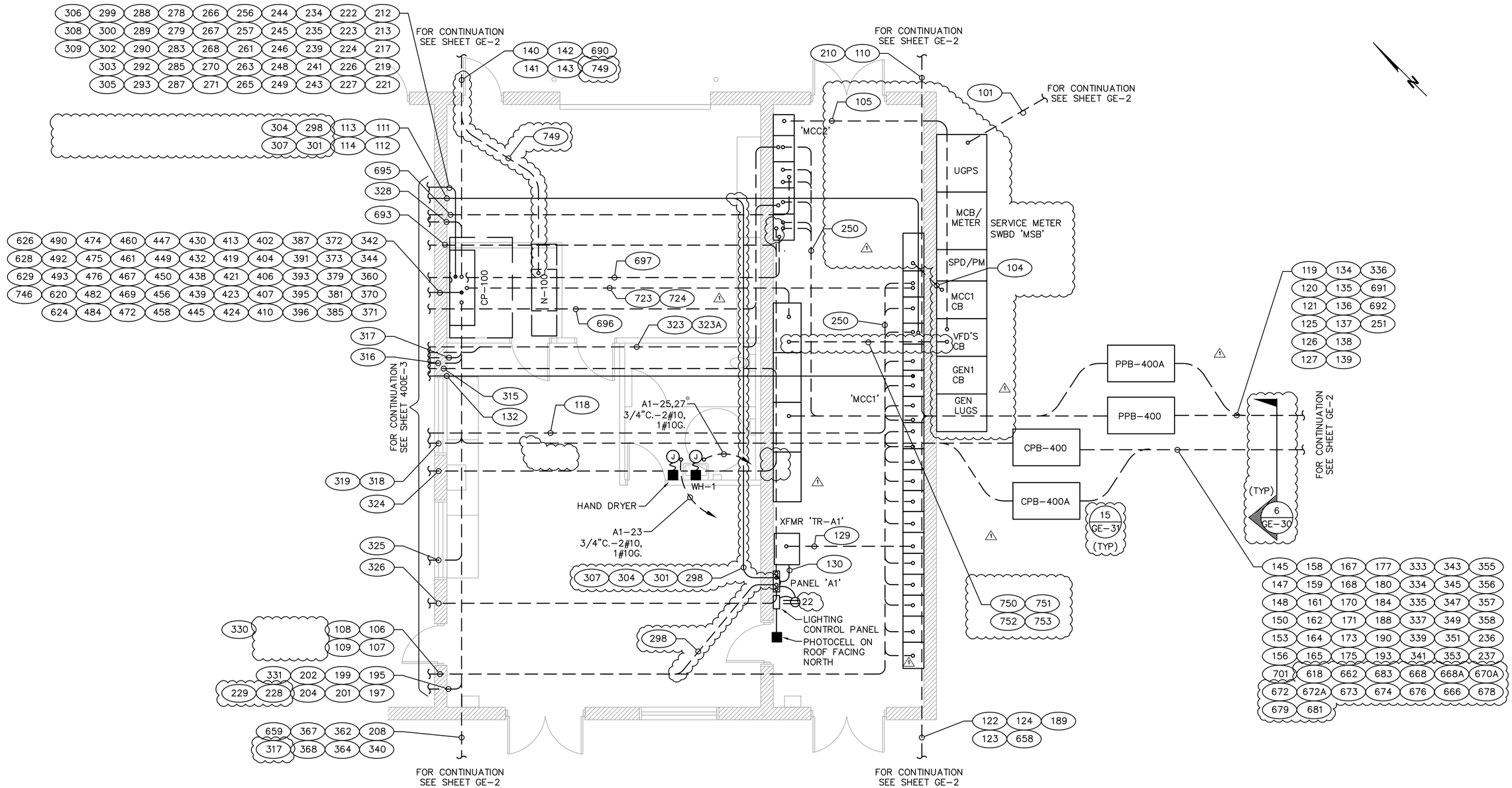
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 400 - RO BUILDING LIGHTING PLAN

DRAWING NO.	400E-1
SHEET NO.	333 OF 387
CLIENT JOB NO.	2744



RO BUILDING PARTIAL POWER AND SIGNAL PLAN

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

GRAPHIC SCALE
0 2' 4' 8'
SCALE: 1/4"=1'-0"

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	ADDENDUM D	6/24/19	TAA
1	BID ADDENDUM	5/14/19	TA

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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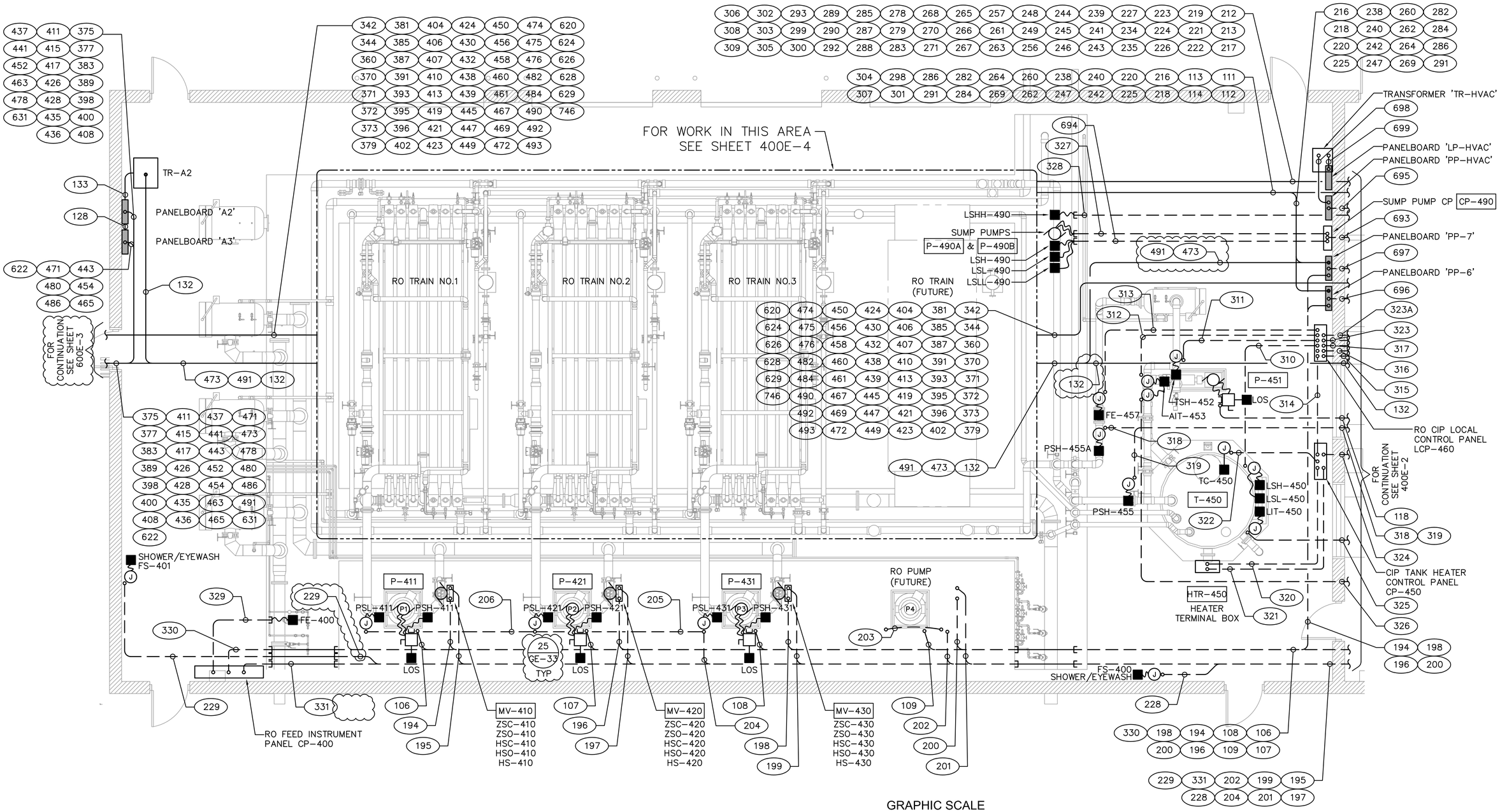
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 400 - RO BUILDING PARTIAL POWER AND SIGNAL PLAN

DRAWING NO. 400E-2
SHEET NO. 334 OF 387
CLIENT JOB NO. 2744



RO BUILDING PARTIAL POWER AND SIGNAL PLAN

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

GRAPHIC SCALE 0 2' 4' 8'

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

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ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 400 - RO BUILDING
PARTIAL POWER AND SIGNAL PLAN

DRAWING NO. 400E-3
SHEET NO. 335 OF 387
CLIENT JOB NO. 2744

RO BUILDING PARTIAL POWER AND SIGNAL PLAN

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

GRAPHIC SCALE
0 1' 2' 4'
SCALE: 1/2"=1'-0"

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NO.	DESCRIPTION	DATE	APPROVED
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SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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990 E. MISSION RD
FALLBROOK, CA 92028

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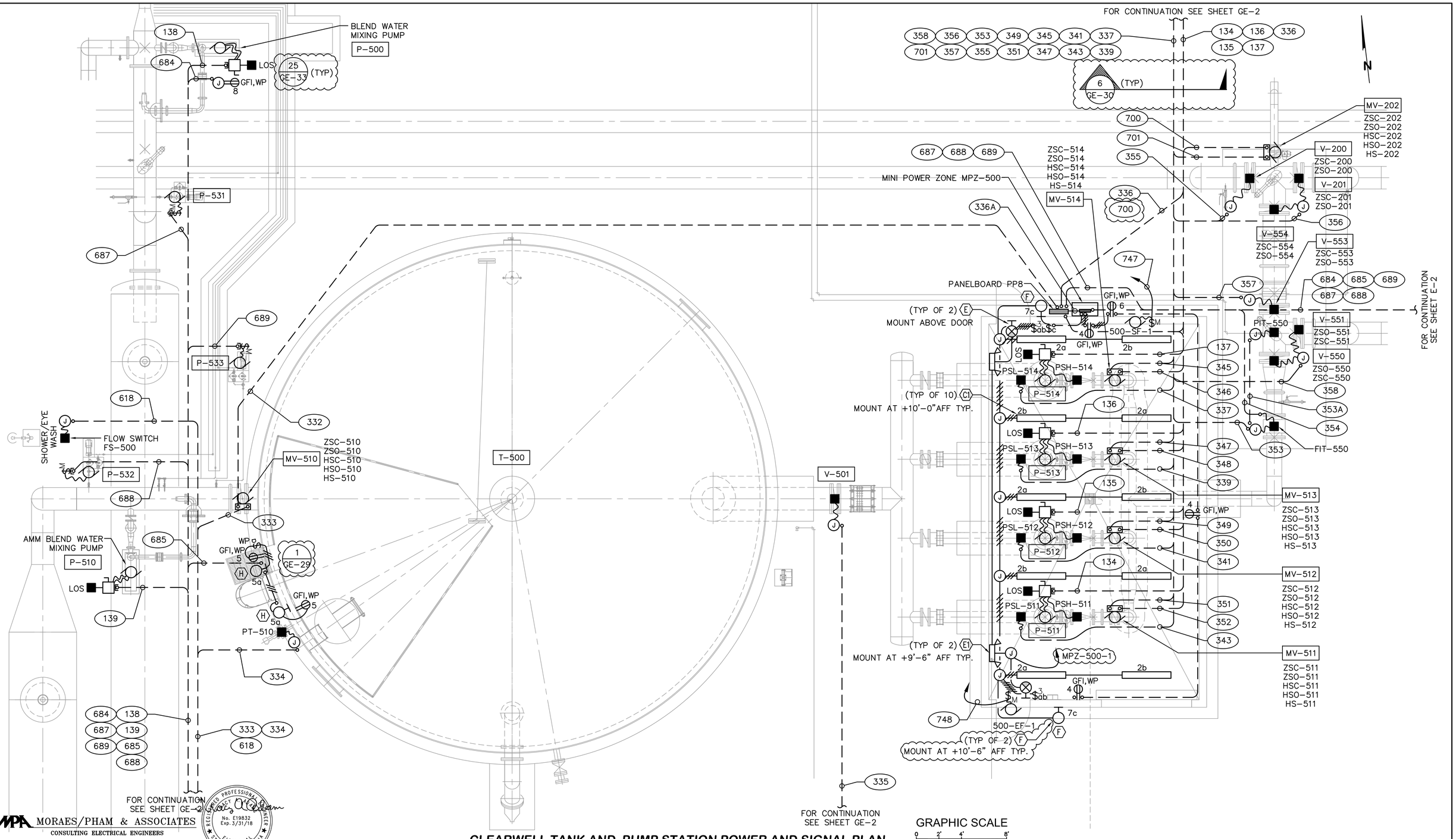
JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 400 - RO BUILDING PLAN PARTIAL POWER AND SIGNAL

DRAWING NO. 400E-4
SHEET NO. 336 OF 387
CLIENT JOB NO. 2744



CLEARWELL TANK AND PUMP STATION POWER AND SIGNAL PLAN

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

GRAPHIC SCALE
0 2' 4' 8'
SCALE: 1/4"=1'-0"

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DATE 06/16/2017
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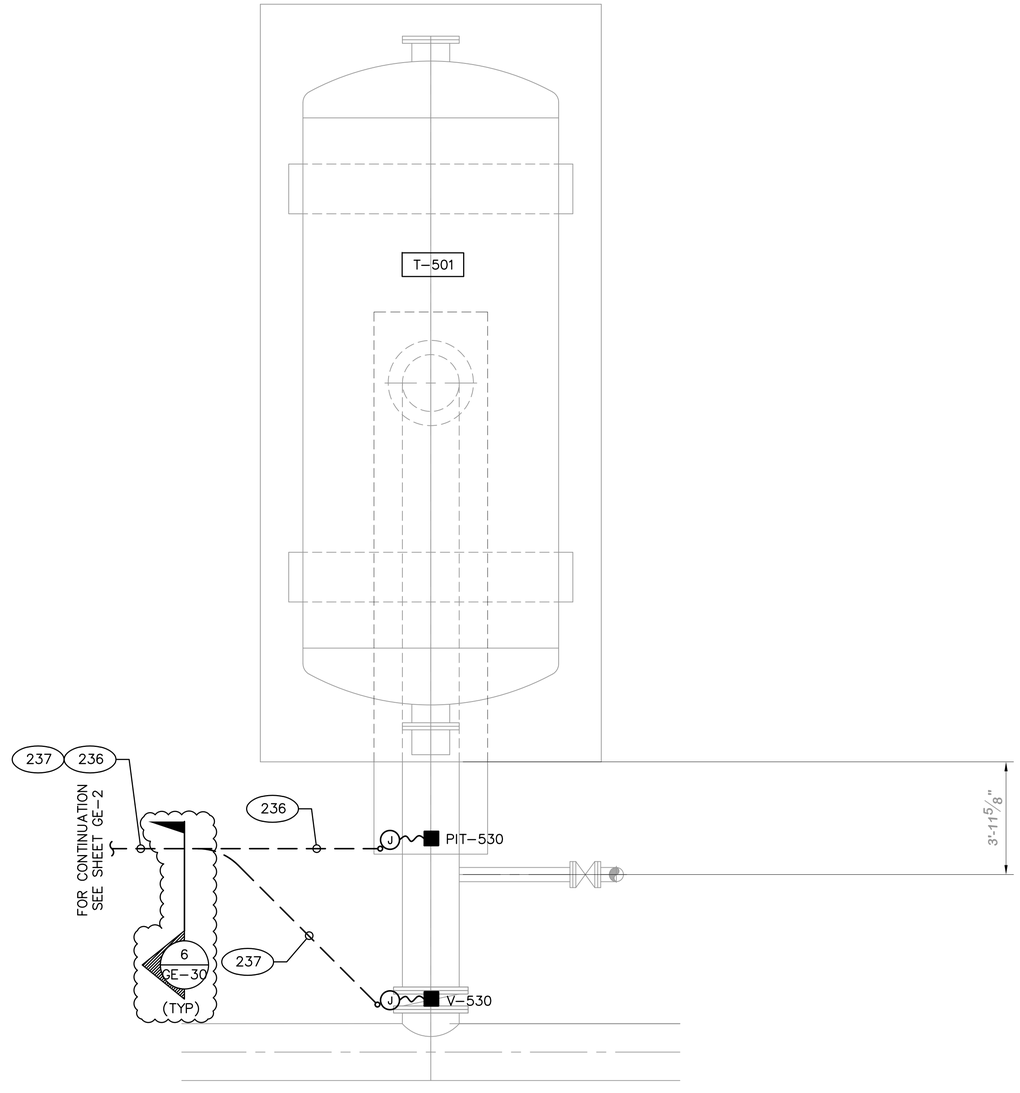
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 500 - CLEARWELL TANK AND PS POWER AND SIGNAL PLAN

DRAWING NO. 500E-1
SHEET NO. 337 OF 387
CLIENT JOB NO. 2744



GRAPHIC SCALE

0 1' 2' 4' 6'

SCALE: 3/8"=1'–0"

SURGE TANK ELECTRICAL PLAN

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

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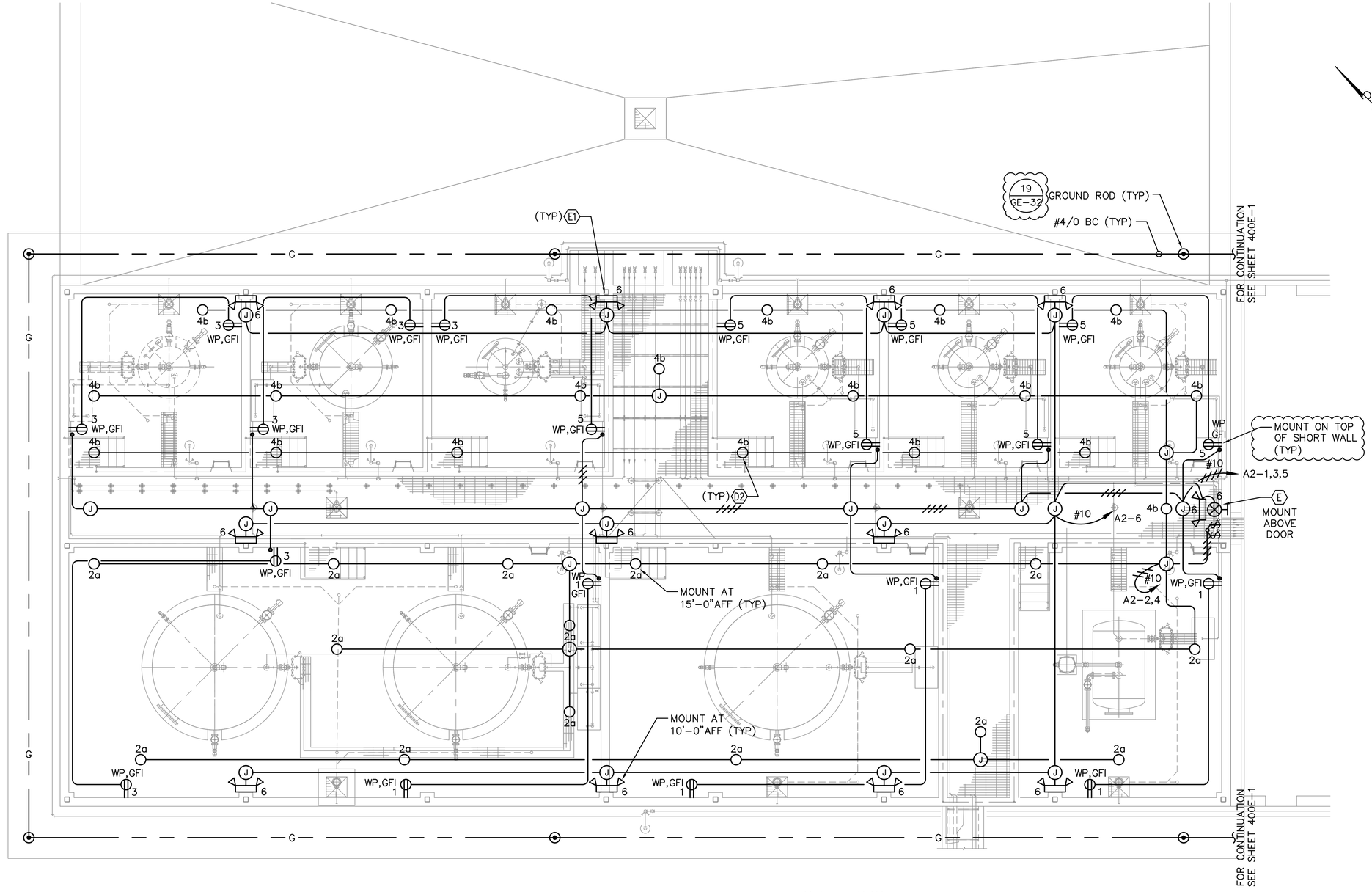
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 500 - SURGE TANK ELECTRICAL PLAN

DRAWING NO.	500E-2
SHEET NO.	338 OF 387
CLIENT JOB NO.	2744



CHEMICAL FACILITIES LIGHTING PLAN

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

GRAPHIC SCALE

0 2' 4' 8' 12'

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

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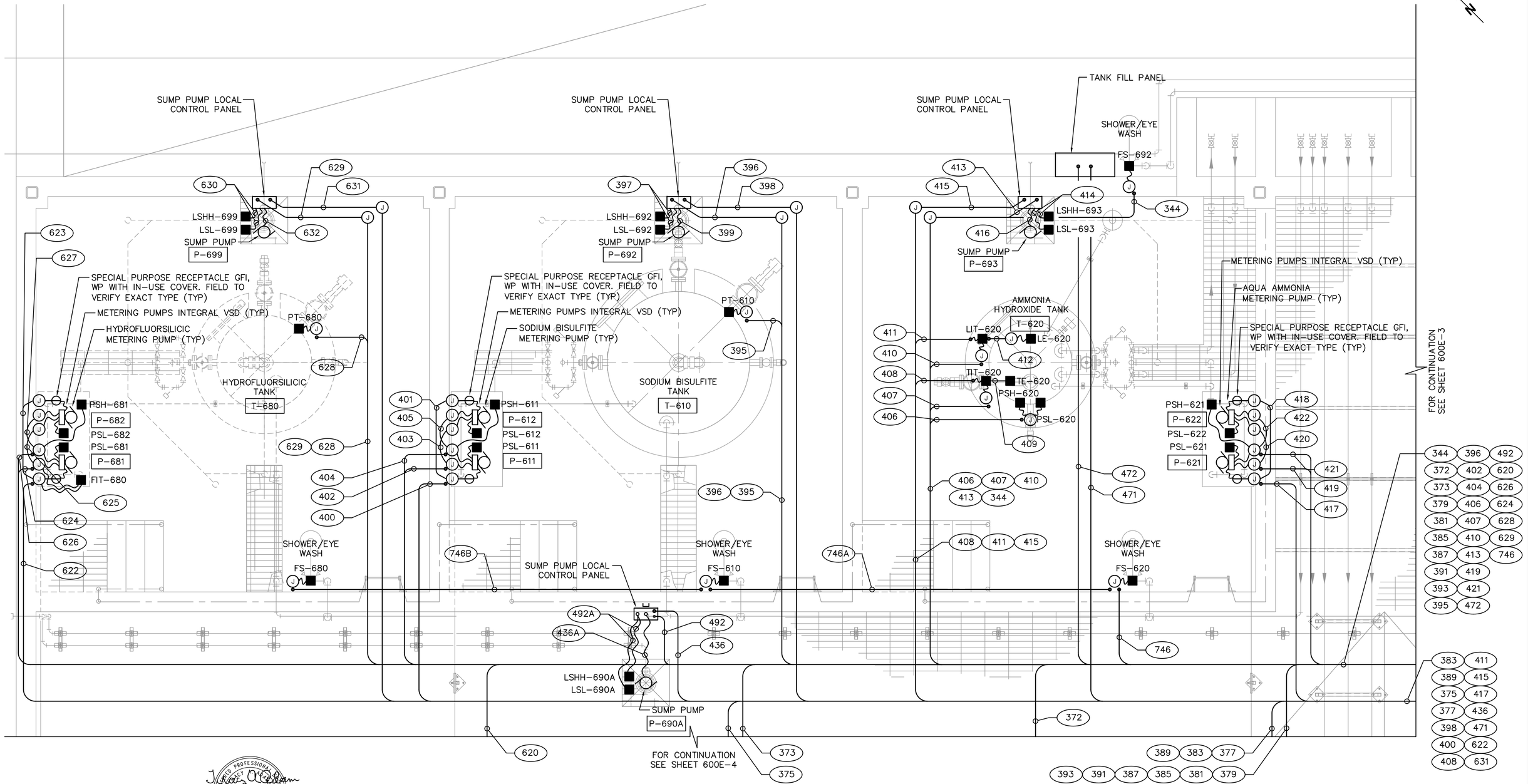
ASSISTANT GENERAL MANAGER

DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 600 - CHEMICAL FACILITIES LIGHTING PLAN

DRAWING NO.	600E-1
SHEET NO.	339 OF 387
CLIENT JOB NO.	2744



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CHEMICAL FACILITIES POWER AND SIGNAL PLAN 1

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

GRAPHIC SCALE
0 1' 2' 4'
SCALE: 1/2"=1'–0"

NO.	DESCRIPTION	DATE	APPROVED

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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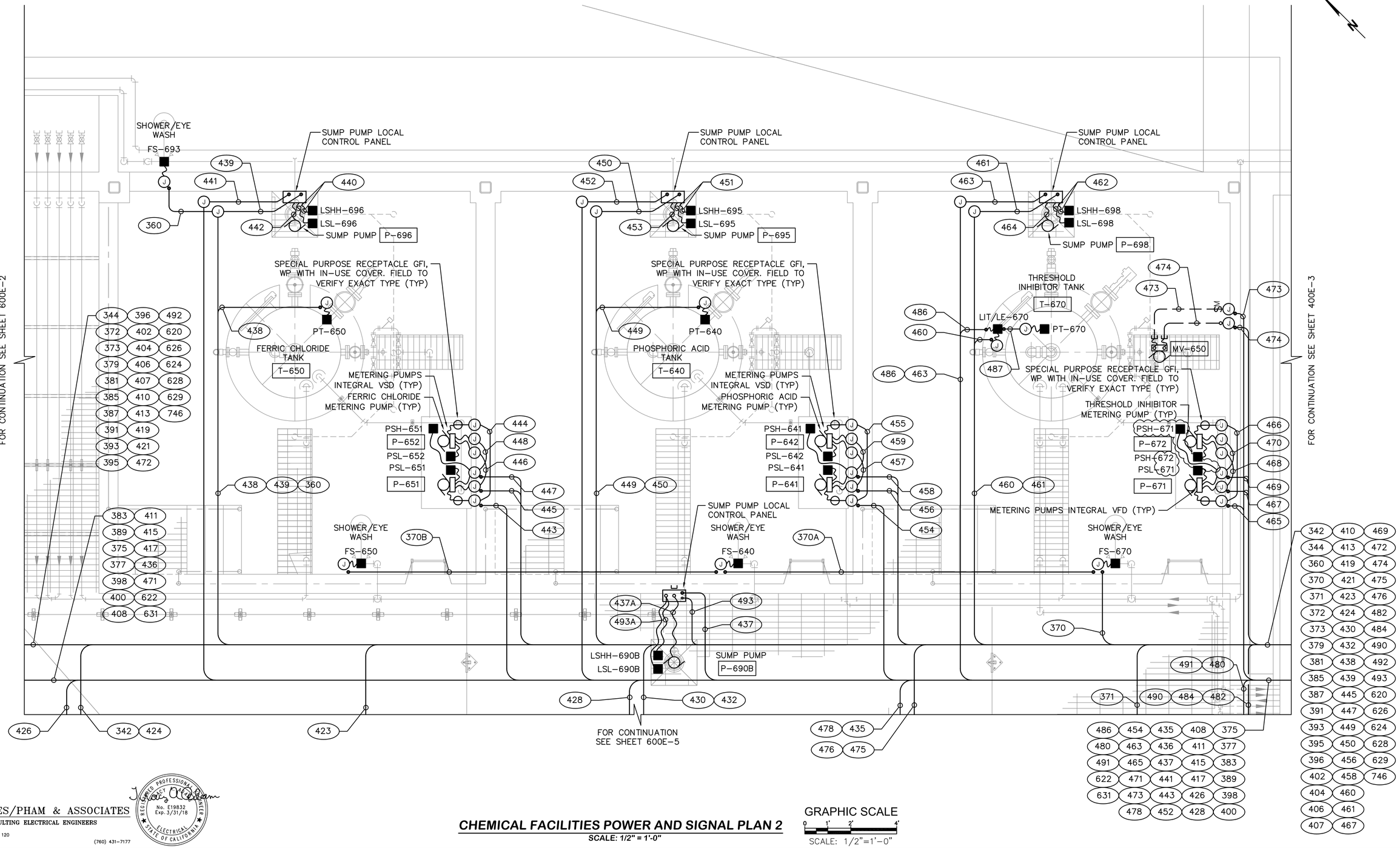
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 600 - CHEMICAL FACILITIES POWER AND SIGNAL PLAN 1

DRAWING NO. 600E-2
SHEET NO. 340 OF 387
CLIENT JOB NO. 2744



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CHEMICAL FACILITIES POWER AND SIGNAL PLAN 2

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

GRAPHIC SCALE
0 1' 2' 4'
SCALE: 1/2"=1'-0"

NO.	DESCRIPTION	DATE	APPROVED
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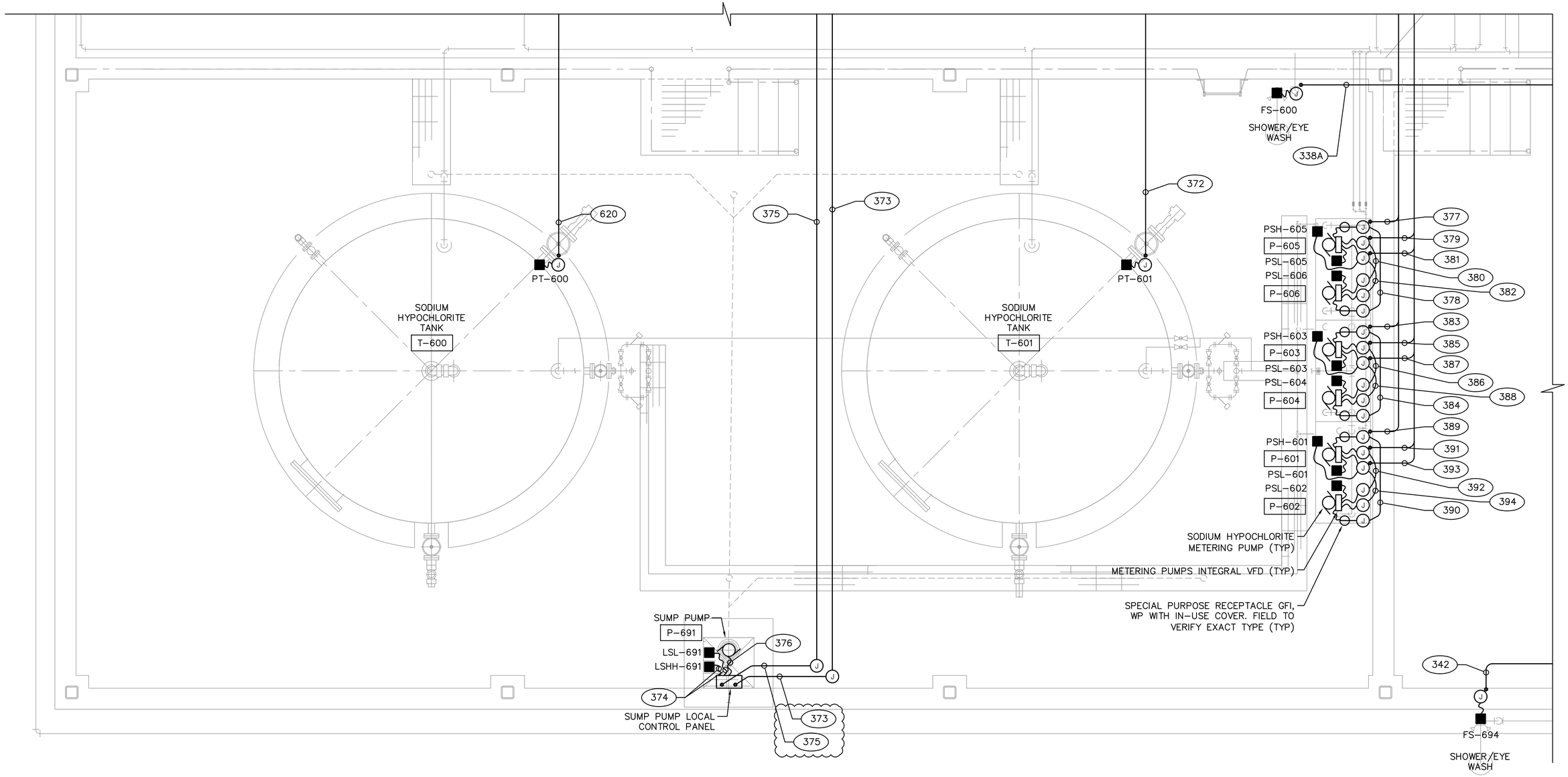
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 600 - CHEMICAL FACILITIES POWER AND SIGNAL PLAN 2

DRAWING NO. 600E-3
SHEET NO. 341 OF 387
CLIENT JOB NO. 2744

FOR CONTINUATION SEE SHEET 600E-2



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CHEMICAL FACILITIES POWER AND SIGNAL PLAN 3

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

GRAPHIC SCALE
0 1' 2' 4'
SCALE: 1/2"=1'-0"

NO.	DESCRIPTION	DATE	APPROVED
	ADDENDUM D	6/28/19	TAA

SCALE	AS SHOWN
DATE	06/16/2017
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JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 600 - CHEMICAL FACILITIES POWER AND SIGNAL PLAN 3

DRAWING NO. 600E-4
SHEET NO. 342 OF 387
CLIENT JOB NO. 2744

FOR CONTINUATION SEE SHEET 600E-3

FOR CONTINUATION SEE SHEET 600E-4

338A

FS-630
SHOWER/EYE WASH

424 342

426

423

PT-630

SODIUM HYDROXIDE TANK
T-630

PSH-631
P-631
PSL-631
PSL-632
P-632

428
430
432
431
433
429

SODIUM HYDROXIDE METERING PUMP (TYP)

METERING PUMPS INTEGRAL VFD (TYP)

SPECIAL PURPOSE RECEPTACLE GFI, WP WITH IN-USE COVER. FIELD TO VERIFY EXACT TYPE (TYP)

338

371

FS-660
SHOWER/EYE WASH

475 476
478 435
475

LIT/LE-660

435

SULFURIC ACID TANK
T-660

SULFURIC ACID METERING PUMP (TYP)

MV-660
P-661
PSH-665
PSH-666
P-662

480
482
484
483
485
481

490
491

490
491

SUMP PUMP
P-694
LSHH-694
LSL-694

427

342

426
424

425

SUMP PUMP LOCAL CONTROL PANEL

SUMP PUMP
P-697
LSHH-697
LSL-697

479

476
478

477

SUMP PUMP LOCAL CONTROL PANEL

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No. E19832
Exp. 3/31/18
ELECTRICAL
STATE OF CALIFORNIA

CHEMICAL FACILITIES POWER AND SIGNAL PLAN 3

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

GRAPHIC SCALE
0 1' 2' 4'
SCALE: 1/2"=1'-0"

NO.	DESCRIPTION	DATE	APPROVED

SCALE AS SHOWN
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
DESIGNED BY TAA
DRAWN BY AH
CHECKED BY TAA

Infrastructure ENGINEERING CORPORATION
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DATE

FPUD Fallbrook Public Utility District
990 E. MISSION RD
FALLBROOK, CA 92028

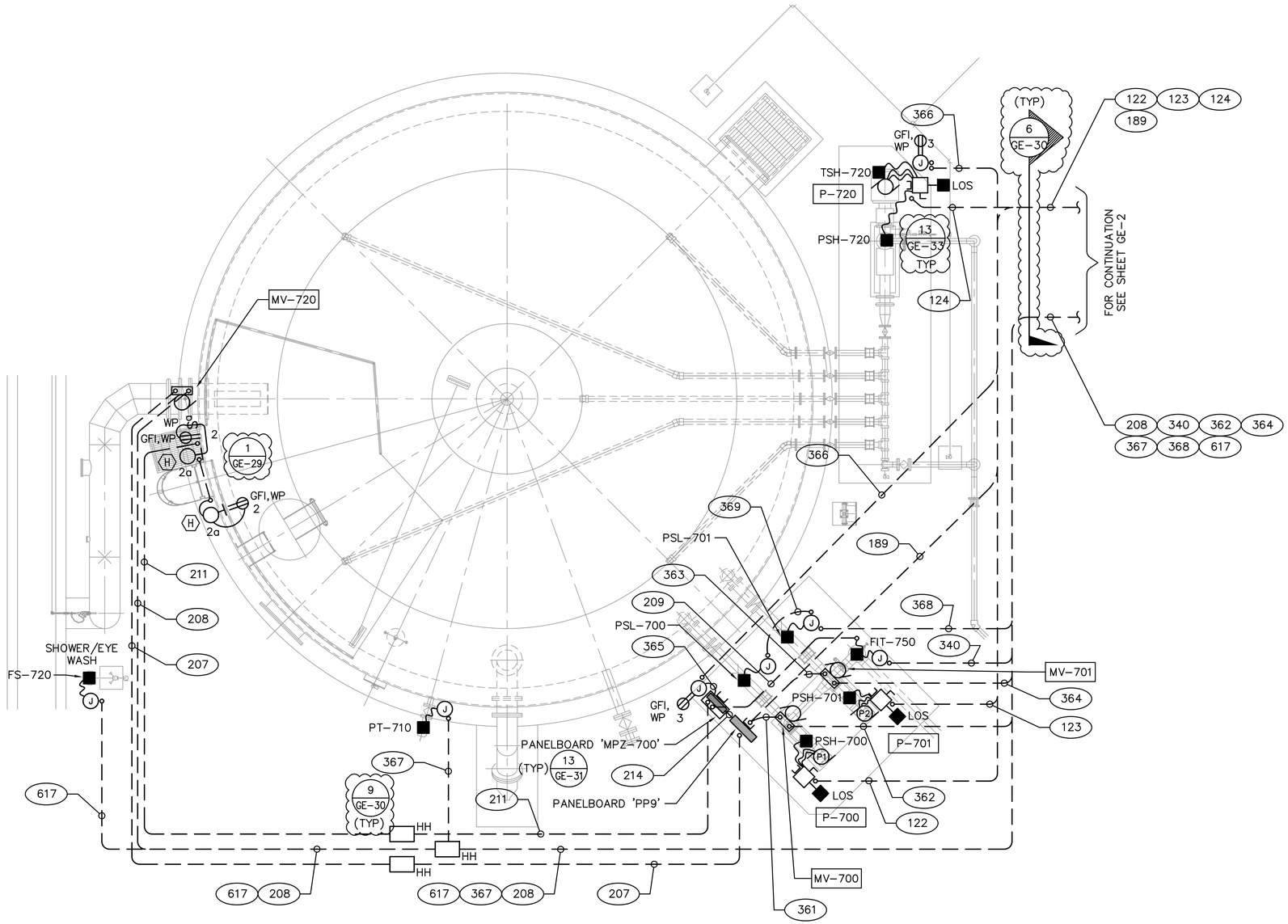
APPROVED BY:

JACK R. BEBEE, P.E.
ASSISTANT GENERAL MANAGER
DATE

SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 600 - CHEMICAL FACILITIES POWER AND SIGNAL PLAN 4

DRAWING NO. 600E-5
SHEET NO. 343 OF 387
CLIENT JOB NO. 2744



WASTE WASHWATER STORAGE ELECTRICAL PLAN

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

GRAPHIC SCALE

0 2' 4' 8'

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

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	ADDENDUM D	6/28/19	TAA

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DATE	06/16/2017
PROJECT NO.	112.FPUD.0002
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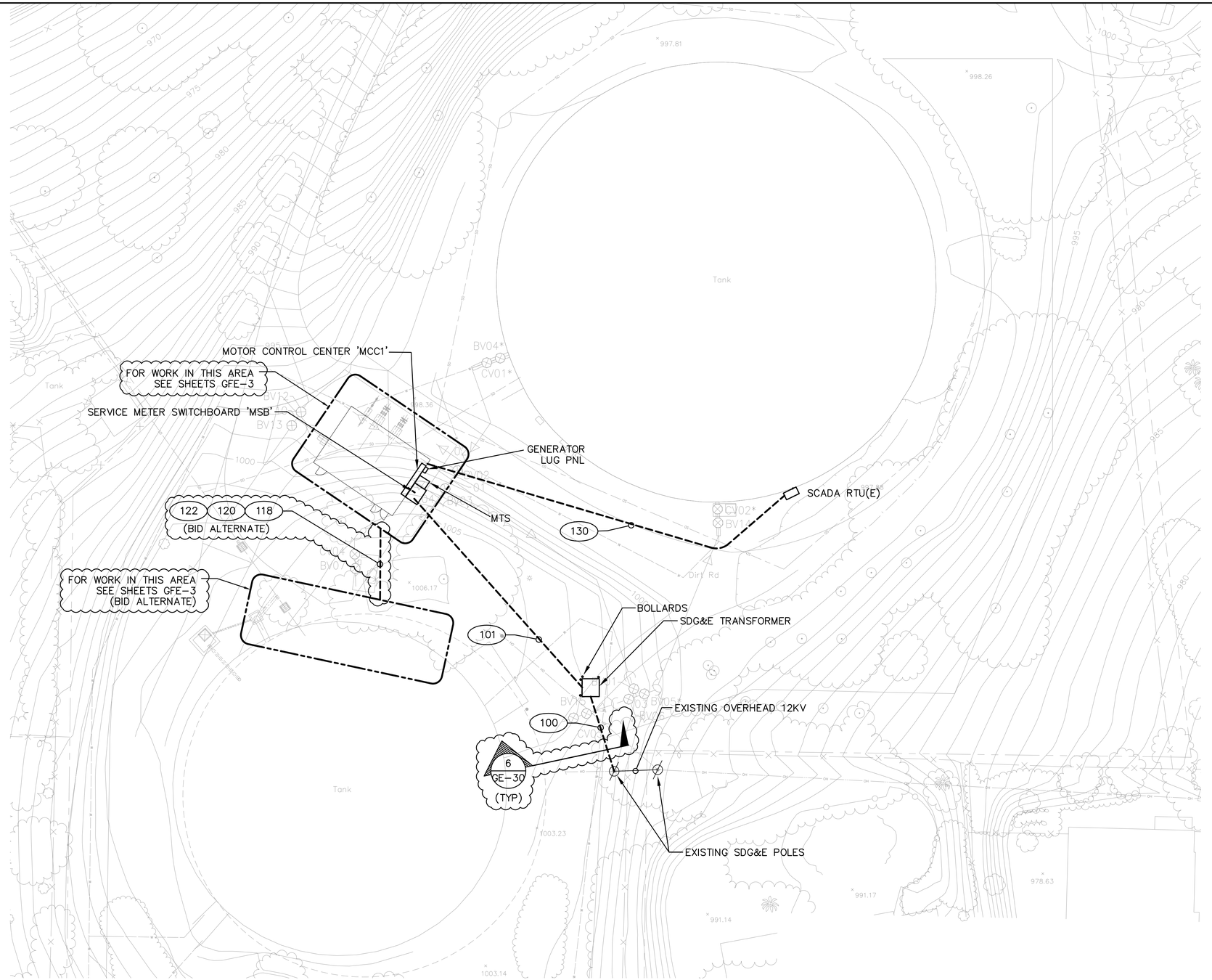
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

AREA 700 - WASTE WASHWATER STORAGE ELECTRICAL PLAN

DRAWING NO. 700E-1

SHEET NO. 344 OF 387

CLIENT JOB NO. 2744



ELECTRICAL SITE PLAN
SCALE: 1" = 20'-0"

GRAPHIC SCALE
0 20' 40'
SCALE: 1" = 20'

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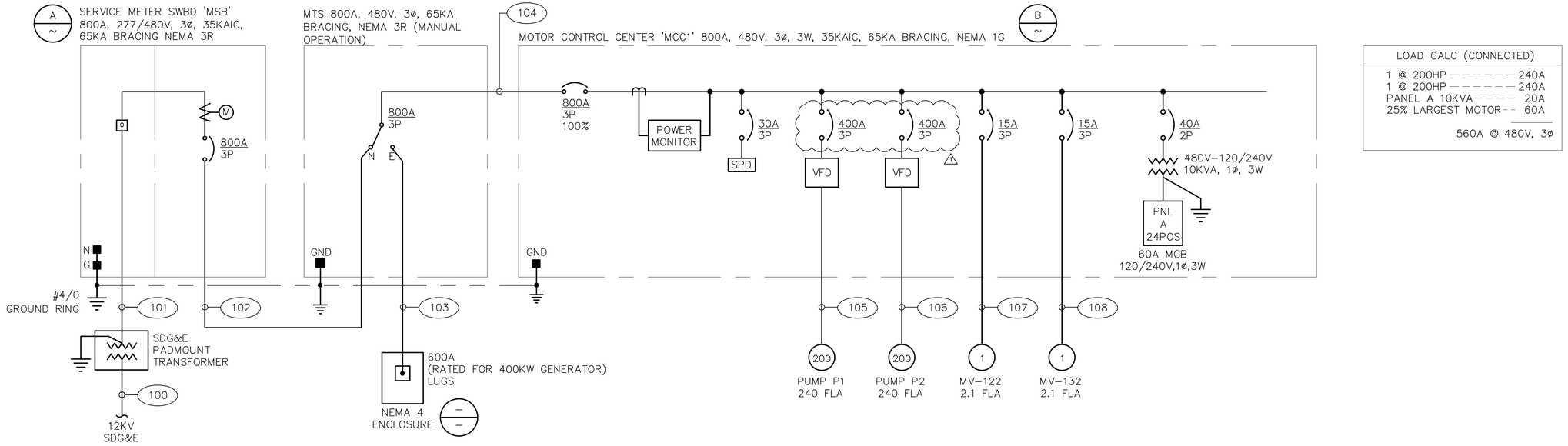
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

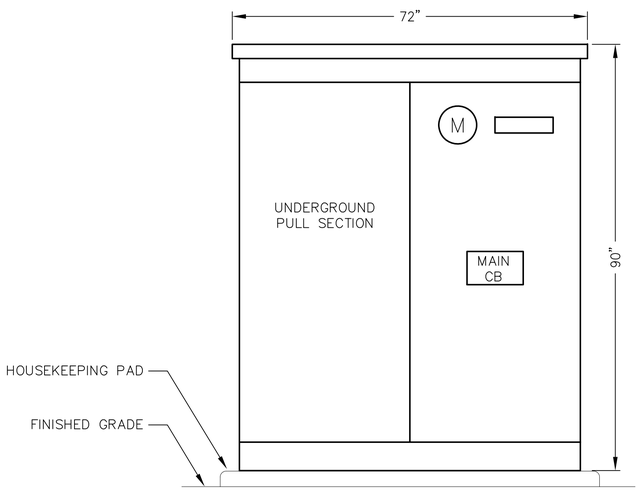
GHEEN FACILITY ELECTRICAL SITE PLAN

DRAWING NO.	GFE-1
SHEET NO.	345 OF 387
CLIENT JOB NO.	2744



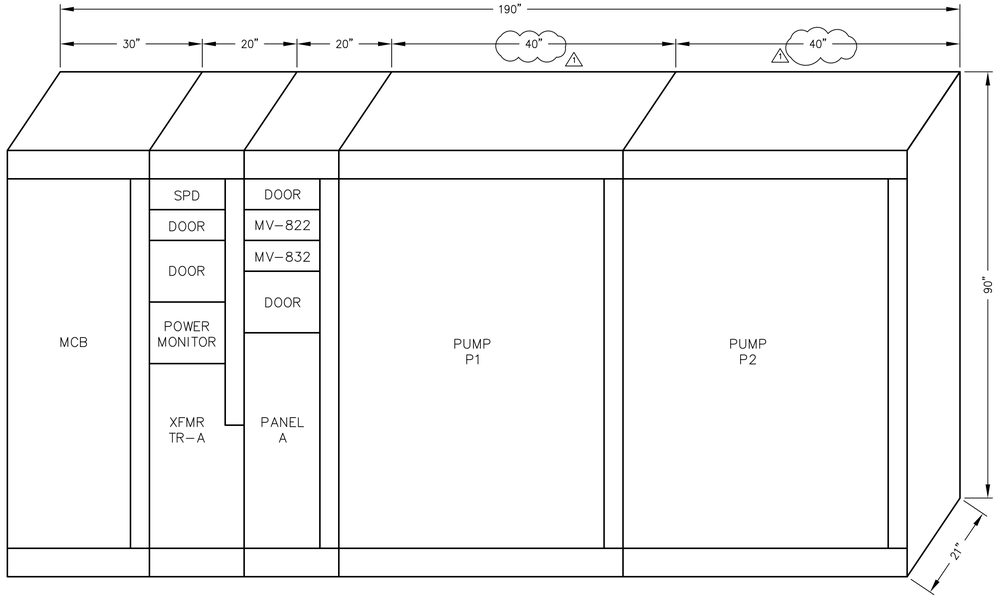
LOAD CALC (CONNECTED)	
1 @ 200HP	240A
1 @ 200HP	240A
PANEL A 10KVA	20A
25% LARGEST MOTOR	60A
	560A @ 480V, 3ø

SINGLE LINE DIAGRAM – GHEEN RESERVOIR



A – SERVICE METER SWBD 'MSB' (NEMA 3R) – GHEEN RESERVOIR

NOT TO SCALE



B – MCC1 ELEVATION (NEMA 1G) – GHEEN RESERVOIR

NOT TO SCALE

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NO.	DESCRIPTION	DATE	APPROVED
1	BID ADDENDUM	5/14/19	TA

SCALE NONE
DATE 06/16/2017
PROJECT NO. 112.FPUD.0002
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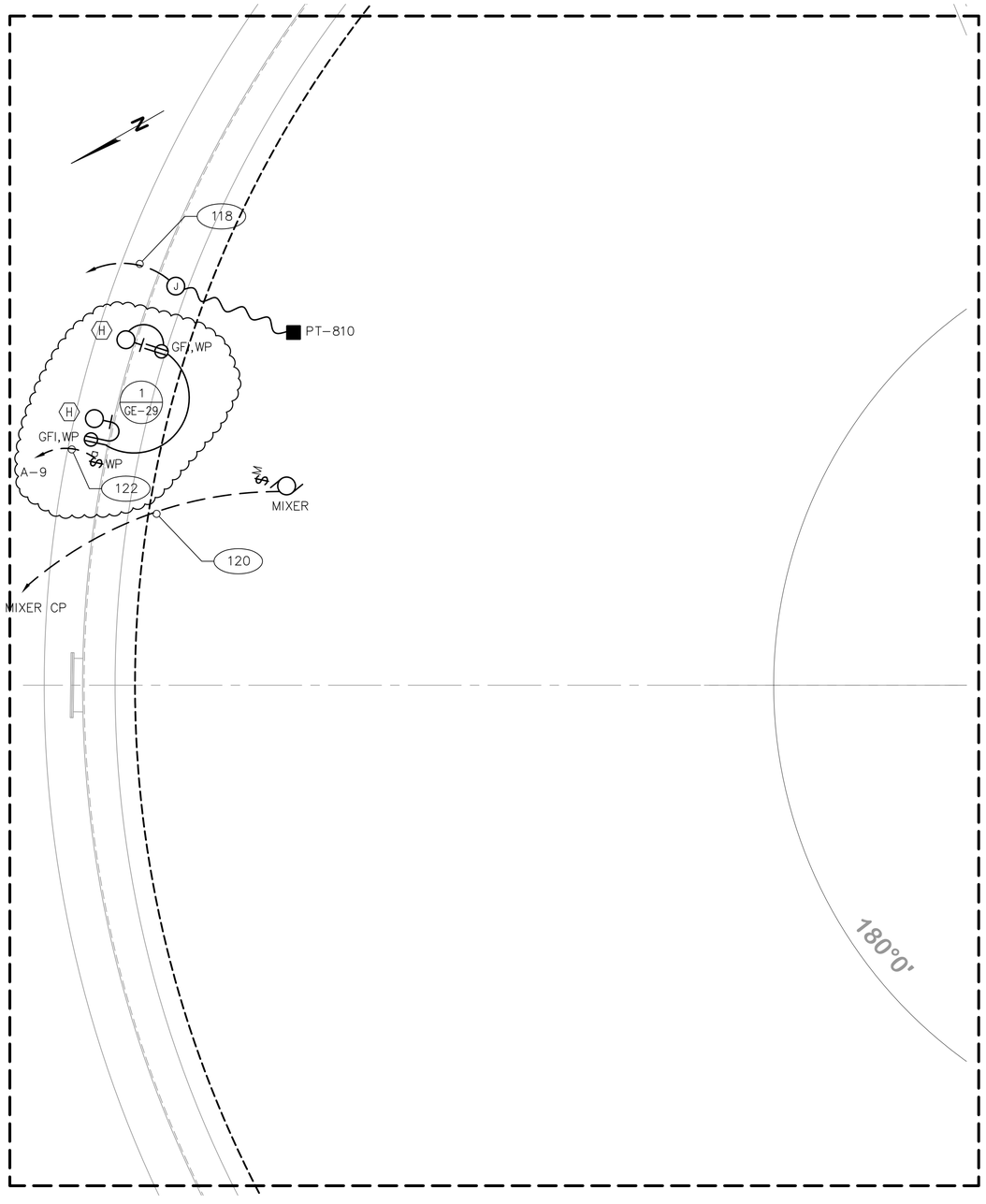
SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

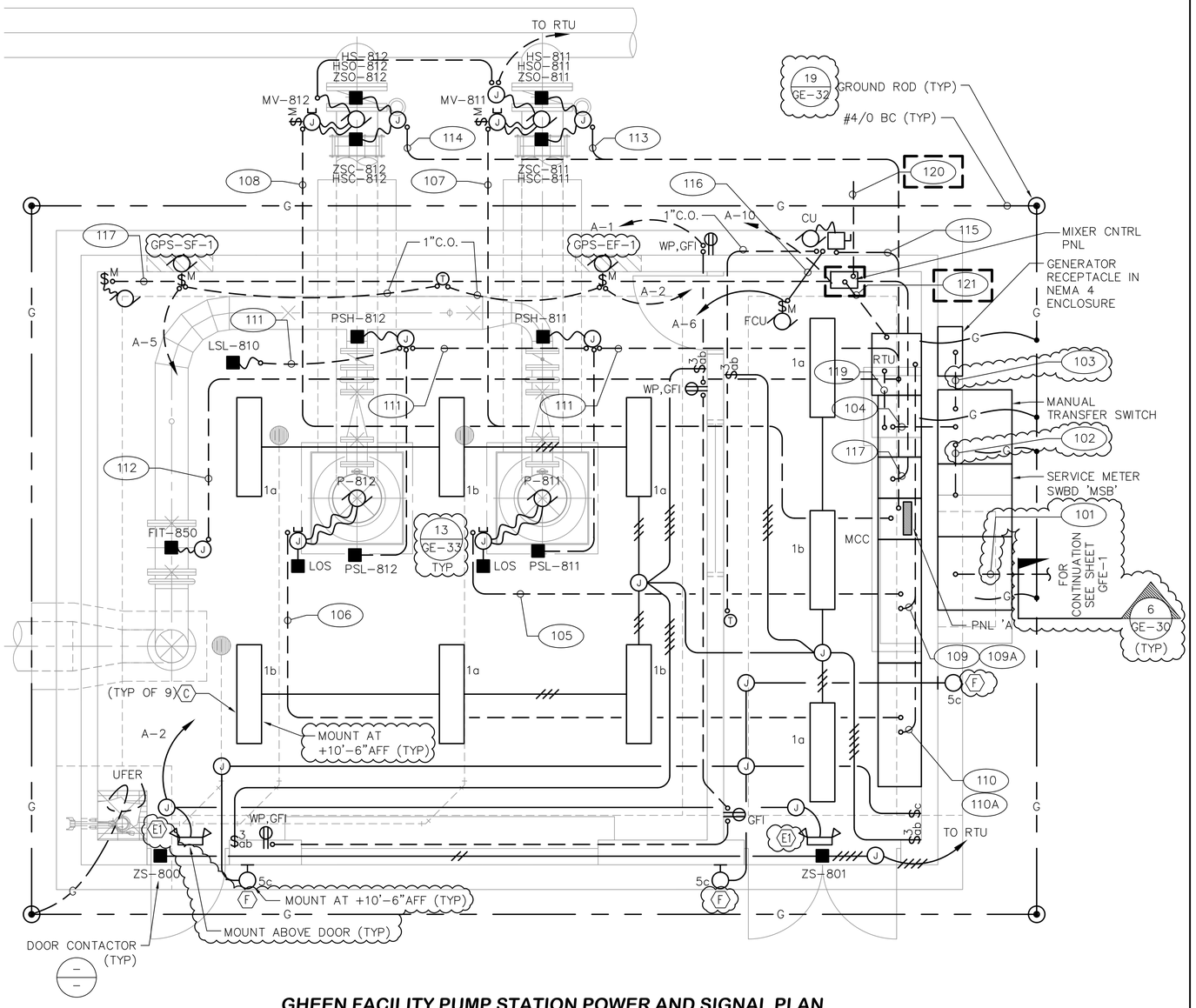
GHEEN FACILITY SINGLE LINE DIAGRAM AND ELEVATIONS

DRAWING NO. GFE-2
SHEET NO. 346 OF 387
CLIENT JOB NO. 2744



GHEEN FACILITY BID ALTERNATE STORAGE TANK POWER AND SIGNAL PLAN

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



GHEEN FACILITY PUMP STATION POWER AND SIGNAL PLAN

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

BID ALTERNATE

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SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

GHEEN FACILITY STORAGE TANK AND PUMP STATION POWER AND SIGNAL PLANS

DRAWING NO. GFE-3
SHEET NO. 347 OF 387
CLIENT JOB NO. 2744

CONDUIT NO.	CONDUIT SIZE	FROM	TO	CABLE QTY.	CABLE SIZE	CABLE GND. *	VOLTAGE		REMARKS
100	–	SDG&E 12KV POC	SDG&E PAD MOUNTED XFMR	–	–	–	–	POWER	PER SDG&E WORK ORDER
101	–	SDG&E XFMR	SERVICE METER SWBD 'MSB'	–	–	–	–	POWER	PER SDG&E WORK ORDER
102	4"(2)	SERVICE METER SWBD 'MSB'	MTS	6	900KCM	2/0	480	POWER	–
103	3"(2)	GENERATOR LUGS	MTS	6	500KCM	1/0	480	POWER	–
104	4"(2)	MTS	MCC1	6	900KCM	2/0	480	POWER	–
105	2-1/2"	MCC1	P-811	3	350KCM	#4	480	POWER	–
	1"			6	#14	#14	120	POWER	MTR HTR. TSH, LOS
106	2-1/2"	MCC1	P-812	3	350KCM	#4	480	POWER	–
	1"			6	#14	#14	120	POWER	MTR HTR. TSH, LOS
107	1"	MCC1	MV-811	3	#12	#14	480	POWER	–
108	1"	MCC1	MV-812	3	#12	#14	480	POWER	–
109	1"	P1 VFD	RTU	8	#14	#14	120	CONTROL	–
109A	1"	P1 VFD	RTU	2	#18TSP	#14	24	SIGNAL	–
110	1"	P2 VFD	RTU	8	#14	#14	120	CONTROL	–
110A	1"	P2 VFD	RTU	2	#18TSP	#14	24	SIGNAL	–
111	1"	RTU	P-811, P-812, LSL-811	10	#14	#14	–	CONTROL	PSL-811,PSH-811,PSL-812,PSH-812
112	3/4"(2)	RTU	FIT-850	2	#14	#14	120	POWER	UPS BACKUP
				1	#18TSP	#14	24	SIGNAL	
113	1"	RTU	MV-811	10	#14	#14	120	CONTROL	–
114	1"	RTU	MV-812	10	#14	#14	120	CONTROL	–
115	–	LP-A	COOLING UNIT	3	#12	#14	208	POWER	–
116	–	COOLING UNIT	FAN COIL UNIT	3	#12	#14	208	–	–
117	1"	LP-A	EF-800,SF-800	2	#12	#14	120	–	–
118	1"	RTU	PT-810	1	#18TSP	#14	24	SIGNAL	–
119	3/4"	RTU	POWER MONITOR	1	#18TSP	#14	24	SIGNAL	–
120	1"	MIXER CP	TANK MIXER	2	#12	#14	120	POWER	BID ALTERNATE
121	3/4"	MIXER CP	RTU	2	#14	#14	120	CONTROL	BID ALTERNATE
130	1"	PS RTU	RESERVOIR RTU (E)	1	CAT5E	#14	24	COMM	–
122	1"	LP-A	TANK LTS/REC	2	#10	#10	120	POWER	BID ALTERNATE
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–

*-ONE GROUND CONDUCTOR PER CONDUIT

MOUNTING MCC

120/240V VOLT 1ø PHASE 3W WIRE

PANEL 'A'

10,000 A.I.C. SYM.

MAIN 60 BUS 100

LOCATION	WATTAGE ØA	WATTAGE ØB	REC	LTG	POLE	BKR	CKT NO.	ØA ØB	CKT NO.	BKR	POLE	LTG	REC	WATTAGE ØA	WATTAGE ØB	LOCATION
RECEPTACLES	720		4		1	20	1		2	20	1					EXHAUST FAN
EMERGENCY LIGHTS		400		2	1	20	3		4	20	1				360	RTU
SUPPLY FAN					1	20	5		6	20	1					FAN COIL UNIT
EXTERIOR LIGHTING					1	20	7		8	20	1					INTERIOR LIGHTS
TANK LTS/REC	500		2	2	1	20	9		10							MIXER CP (ALT BID)
							11		12							
							13		14							
							15		16							
							17		18							
							19		20							
							21		22							
							23		24							
	720	400	WATTS/LINE											0	360	

ØA= 720 ØB= 760

TOTAL WATTS= 1480 AMPS/LINE= 6.2 LCL AMPS=

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SANTA MARGARITA CONJUNCTIVE USE PROJECT FACILITIES

GHEEN ELECTRICAL SCHEDULES 1

DRAWING NO. GFE-4
SHEET NO. 348 OF 387
CLIENT JOB NO. 2744