DOCUMENT 00 91 02 – ADDENDUM NO. 2

PROJECT: A1/A2 Reservoirs and B/C Booster Pump Station Project

CIP NO.: GW-0112

FROM: District Engineer
Marina Coast Water District
11 Reservation Road
Marina, CA 93933

ISSUED: January 20, 2021

TO: **Prospective Bidders**

This Addendum forms a part of the Bidding Documents and will be incorporated into Contract Documents. Insofar as the Specifications or Drawings or both are inconsistent, this Addendum governs. Acknowledge receipt of the Addendum by inserting its number in Document 00410 – Bid Form. **FAILURE TO DO SO WILL SUBJECT BID TO DISQUALIFICATION**.

PART 1 – BIDDER INFORMATION ITEMS

A. The Bid Date remains unchanged, 2:00 on February 24, 2021.

PART 2 - CHANGES TO PROJECT MANUAL

A. Document 00 91 01, Addendum 1, add the following line to the heading above TO:
ISSUED: January 12, 2021

B. Section 26 05 33, Conduit Schedule – Appendix A1 is replaced with the attached version.

C. Section 26 05 33, Conduit Schedule – Appendix A2 is replaced with the attached version.

D. Section 33 16 96, Reservoir Hydrodynamic Mixing System, is added to the Technical Specifications (attached).

PART 3 - CHANGES TO DRAWINGS

A. Sheet E-1:
- Add conduit P150D to conduit run from relocated Standby Generator to ATS.
- Change conduit call to Gate Operator from “P500” to “P410”
- Replace the panelboard schedule for (New) LP-1 at Booster Station B/C with the version attached.

B. Sheet E-5:
- At interior fixture Type “A” mounting detail callout “16524/GE-5” add text ”MTG HT 14’ AFF, NOMINAL”
- At exterior fixture Type “B” at rollup door, mounting detail callout “16540/GE-5” add ”MTG HT 10’ AFF, NOMINAL”

C. Sheet E-6:

- Add identification tag at 400A main circuit breaker: "(E) MAIN SERVICE CIRCUIT BREAKER".
- Add a fusible disconnect switch in the demolished feeder running from the existing 400A main service circuit breaker to the existing ATS. Indicate this disconnect switch will be part of the demolition.
- Change feeder callout for the new circuit between the existing 400A main service circuit breaker to the ATS from P500 to P551
- Replace the panelboard schedules for (E) LP-1 and (New) MLC-1 with the versions attached.
- At Booster Pump 1 and Booster Pump 2 add callout "SEE NOTE 6".
- Add Note 6 to the sheet notes reading as follows:
    - "6. PROVIDE RUN INTERLOCK BETWEEN EXISTING BOOSTER PUMP RVAT STARTERS CONTROLS TO INHIBIT SIMULTANEOUS OPERATION OF BOTH BOOSTER PUMPS. PROVIDE CONTROL LOGIC REVISIONS, AUXILIARY STARTER CONTACTS, CROSS STARTER WIRING , AND REVISED STARTER WIRING DOCUMENTATION FOR FULL IMPLEMENTATION OF THE STARTER INTERLOCKS"

D. Sheet E-8:

- Delete Conduit C506 from the conduit group also containing L505 and S505
- Add conduit "P551" from the existing ATS to the existing Station Main Breaker
- Revise tag for conduit S550 to N550 in the group also containing conduits P550, C550, and L550
- Add standard detail 16131/GE-3 and indicate "TYP" to conduit S501 routed on the wall of the Chlorination Building
- Change device tag for "LE/LIT-500" to "LIT-500" and add homerun/circuit callout "4, MLC-1".

E. Sheet E-10:

- At antenna location on reservoir roof (Designated with "NOTE 1") add identification callout "ANTENNA MAST – SEE DETAIL 16450/GE-4"
- Add ground rod symbol at base of reservoir at antenna mast mounting location. Add conduit run to ground rod location and indicate "ANTENNA GROUND PER DETAIL 13401/GI-3"
- Add the following sentence to the end of Note 1: "FIELD COORDINATE WITH DISTRICT FOR FINAL ANTENNA INSTALLATION LOCATION, ORIENTATION, AND MAST HEIGHT.

F. Sheet I-2:

- Change I/O callouts at top of sheet for B/C Booster MCP as follows:
    - "FIT-100" to "FI-100"
    - "LIT-110" to "LI-110"
    - "LIT-120" to "LI-120"

G. Sheet I-3:

- Change I/O callouts at top of sheet for B/C Booster MCP as follows:
    - Add I/O callout "HS-230B" to "ALARM RESET" discrete output tag
    - Change "FIT-200" to "FI-200"

H. Sheet I-4:

- Change I/O callouts at top of sheet for B/C Booster MCP as follows:
    - Add I/O callout "HS-330B" to "ALARM RESET" discrete output tag
    - Change "FIT-300" to "FI-300"

I. Sheet I-5:
- Change I/O callouts at top of sheet for B/C Booster MCP as follows:
  - "TIT-400" to "TI-400"
  - "ZSH_112" to "ZAH-112"
  - "ZSH-122" to "ZAH-122"

J. Sheet I-6:
- Change I/O callouts at top of sheet for B/C Booster MCP as follows:
  - "LIT-500" to "LI-500"
  - "FIT-501" to "FI-501"
  - "FIT-500" to "FI-500"
  - "AIT-500" to "AI-500"
- Insert an additional ISA instrument symbol underneath "FIT-500" with tag "FE-500"; the two ISA circles shall touch.
- Insert an additional ISA instrument symbol underneath "AIT-500" with tag "AE-500"; the two ISA circles shall touch.

K. Sheets E-3, E-4, S-3, S-4, S-5, S-6 and S-11 are reissued with corrections (attached).

PART 4 – QUESTIONS RECEIVED

Q1 Can you clarify where the different types of fences go on the project?
A1 The fence around the new tank/pump station yard is a steel picket fence (1,146-ft long, with 3 rolling gates and 1 pedestrian gate). All of the other fences and gates are chain link (new gate at the SW corner of the tank yard, fence repairs at the north end of the tank yard, new rolling gate on the driveway.

Q2 Is a mixing system required in the new tanks?
A2 Yes. The specification for the mixing system is included in this addendum.

END OF DOCUMENT

Project: Marina Coast Water District, Res A1/A2 & Booster Station
TJCAA #: 119038
By: HT/PJG
Date: 1/4/2021, Revised 1/19/21 (Addendum 2)
Revision: 100%

Fill Legend
(X)TYPE-USE
X = Quantity
TYPE = Conductor Type
USE = Usage (see right)

Usage Types
Blank = Load
N = Neutral
G = Ground
C = Control
S = Spare

CONDUIT SCHEDULE

Conduit Tag	Size [in.]	Fill	From	To	Comments
C001A	3/4	(2)#14-C, (1)#12-G	ZSH-001A	Main Control Panel (MCP)	
C001B	3/4	(2)#14-C, (1)#12-G	ZSH-001B	Main Control Panel (MCP)	
C001C	3/4	(2)#14-C, (1)#12-G	ZSH-001C	Main Control Panel (MCP)	
C010	3/4	(2)#14-C, (1)#12-G	PSLL-010	Main Control Panel (MCP)	
C111	3/4	(6)#14-C, (1)#12-G	ZSH-111, ZSH-112	Main Control Panel (MCP)	2 spares
C112	3/4	(6)#14-C, (1)#12-G	ZSH-121, ZSH-122	Main Control Panel (MCP)	2 spares
C210	3/4	(16)#14-C, (1)#12-G	P210 -75 HP Pump	Motor Control Center (MCC)	
C220	3/4	(16)#14-C, (1)#12-G	P220 -75 HP Pump	Motor Control Center (MCC)	
C230	3/4	(16)#14-C, (1)#12-G	P230 -75 HP Pump	Motor Control Center (MCC)	
C310	3/4	(16)#14-C, (1)#12-G	P310 -150 HP Pump	Motor Control Center (MCC)	
C320	3/4	(16)#14-C, (1)#12-G	P320 -150 HP Pump	Motor Control Center (MCC)	
C330	1	(16)#14-C, (1)#12-G	P330 -150 HP Pump	Motor Control Center (MCC)	
C340	1	(16)#14-C, (1)#12-G	P340 -150 HP Pump	Motor Control Center (MCC)	
C400A	1	(2)#14-C, (1)#12-G	Fan Control Panel (FCP-1)	Room Thermostat	
C400	1	(4)#14-C, (1)#12-G	Fan Control Panel (FCP-1)	Main Control Panel (MCP)	
C110	1	(6)#14-C, (1)#12-G	Service Switchboard	Motor Control Center	Spare Conductors
C130	1	(10)#14, (1)#12-G	ATS	Main Control Panel (MCP)	ATS position monitoring
C150A	1	(8)#14-C, (1)#12-G	ATS	Generator	ATS Generator Call and Monitoring
C150B	3/4	(16)#14-C, (1)#12-G	Standby Generator	Main Control Panel (MCP)	Generator Status and Network
L010	3/4	(4)#12, (1)#12-G	Main Control Panel (MCP)	Lighting Panel (LP-1)	
L100	3/4	(2)#12, (1)#12-G	FIT-100	Lighting Panel (LP-1)	
L101	3/4	(2)#12, (1)#12-G	AIT-101	Lighting Panel (LP-1)	
L111	3/4	(4)#12, (1)#12-G	Res A1: LIT and Receptacle	Lighting Panel (LP-1)	
L112	3/4	(4)#12, (1)#12-G	Res A1: LIT and Receptacle	Lighting Panel (LP-1)	
L150A	3/4	(2)#12, (1)#12-G	Standby Generator	Lighting Panel (LP-1)	240Vac, 1P Generator Space Heater
L150B	3/4	(6)#12, (1)#12-G	Standby Generator	Lighting Panel (LP-1)	120Vac Battery Charger, Light, Receptacle
L160	3/4	(4)#12, (1)#12-G	Site Lighting West Side	Lighting Panel (LP-1)	Daisy chain circuits at poles where req'd
L170	3/4	(6)#12, (1)#12-G	Site Lighting East Side and Future Irrigation Controller	Lighting Panel (LP-1)	Daisy chain circuits at poles where req'd
L180	3/4	(4)#12, (1)#12-G	Site Lighting North Side	Lighting Panel (LP-1)	Daisy chain circuits at poles where req'd
L200	3/4	(2)#12, (1)#12-G	FIT-200	Lighting Panel (LP-1)	
L300	3/4	(2)#12, (1)#12-G	FIT-300	Lighting Panel (LP-1)	

Conduit Tag	Size [in.]	Fill	From	To	Comments
L400A	1	(2)#12, (1)#8-G	Fan Control Panel (FCP-1)	Roof Fan 1	
L400B	3/4	(2)#12, (1)#8-G	Fan Control Panel (FCP-1)	Roof Fan 2	
L400C	1 1/4	(2)#12, (1)#8-G	Fan Control Panel (FCP-1)	Roof Fan 3	
L400	3/4	(3)#10, (1)#10-N, (1)#12-G	Lighting Panel (LP-1)	Fan Control Panel	
N002A	3/4	(1)Cat6-C	CCTV1	Main Control Panel (MCP)	Power over Ethernet
N002B	3/4	(1)Cat6-C	CCTV2	Main Control Panel (MCP)	Power over Ethernet
N002C	3/4	(1)Cat6-C	CCTV3	Main Control Panel (MCP)	Power over Ethernet
N002D	3/4	(1)Cat6-C	CCTV4	Main Control Panel (MCP)	Power over Ethernet
N002E	3/4	(1)Cat6-C	CCTV5	Main Control Panel (MCP)	Power over Ethernet
N011	3/4	(4)Cat6-C	Motor Control Center (MCC)	Main Control Panel (MCP)	Ethernet from MCC to MCP
N150	3/4	(1)Cat6-C	Standby Generator	Main Control Panel (MCP)	Generator Status and Network
P210	3/4	(3)#1, (1)#6-G	Motor Control Center (MCC)	P210 -75 HP Pump	
P220	1 1/4	(3)#1, (1)#6-G	Motor Control Center (MCC)	P220 -75 HP Pump	
P230	1 1/4	(3)#1, (1)#6-G	Motor Control Center (MCC)	P230 -75 HP Pump	
P310	2	(3)#4/0, (1)#2-G	Motor Control Center (MCC)	P310 -150 HP Pump	
P320	2	(3)#4/0, (1)#2-G	Motor Control Center (MCC)	P320 -150 HP Pump	
P330	2	(3)#4/0, (1)#2-G	Motor Control Center (MCC)	P330 -150 HP Pump	
P340	2	Pull Rope	Motor Control Center (MCC)	P340 -150 HP Pump	FUTURE (CONDUIT ONLY)
P410	2	(3)#10, (1)#8-G	Motor Control Center (MCC)	Slide Gate Operator Motor	
P110A	4	(3)#500KCMIL, (1)#3/0-G	Service Switchboard	ATS	
P110B	4	(3)#500KCMIL, (1)#3/0-G	Service Switchboard	ATS	
P110C	4	(3)#500KCMIL, (1)#3/0-G	Service Switchboard	ATS	
P110D	4	Pull Rope	Service Switchboard	ATS	Spare
P130A	4	(3)#500KCMIL, (1)#3/0-G	ATS	Motor Control Center (MCC)	
P130B	4	(3)#500KCMIL, (1)#3/0-G	ATS	Motor Control Center (MCC)	
P130C	4	(3)#500KCMIL, (1)#3/0-G	ATS	Motor Control Center (MCC)	
P150A	4	(3)#500KCMIL, (1)#3/0-G	Standby Generator	ATS	
P150B	4	(3)#500KCMIL, (1)#3/0-G	Standby Generator	ATS	
P150C	4	(3)#500KCMIL, (1)#3/0-G	Standby Generator	ATS	
P150D	4	Pull Rope	Standby Generator	ATS	Spare
S003	2	(2)TSP-C, (1)#12-G	Antenna Mast	Main Control Panel (MCP)	or as required by radio system
S100	1	(1)TSP-C	FIT-100	Main Control Panel (MCP)	
S101A	3/4	MFGR CABLE	AIT-101	AE-101	
S101	3/4	(1)TSP-C	AIT-101	Main Control Panel (MCP)	
S111	1	(2)TSP-C	LIT-110	Main Control Panel (MCP)	1 Spare
S112	1	(2)TSP-C	LIT-120	Main Control Panel (MCP)	1 Spare
S200	3/4	(1)TSP-C	FIT-200	Main Control Panel (MCP)	
S300	3/4	(1)TSP-C	FIT-300	Main Control Panel (MCP)	
S400	3/4	(1)TSP-C	TIT-400	Main Control Panel (MCP)	Room temp
S410A	1	Pull Rope	Slide Gate Operator Accessory Board	Keypad	Provide conductors for key pad power nad control as required by gate system supplier
S410	1 1/4	(2)TSP-C	Main Control Panel (MCP)	Slide Gate Operator Accessory Board	

Conduit Tag	Size [in.]	Fill	From	To	Comments
U001A	5	Pull Rope	PG&E Riser Pole (90563)	PG&E Transformer	Route through PG&E handhole and below grade vault per plans. Provide conduit riser up pole per PG&E Standards Primary Conductors by PG&E
U001B	5	Pull Rope	PG&E Riser Pole (90563)	PG&E Transformer	Route through PG&E handhole and below grade vault per plans. Provide conduit riser up pole per PG&E Standards (SPARE)
U100A	5	Pull Rope	PG&E Transformer	Service Switchboard	Secondary Conductors by PG&E
U100B	5	Pull Rope	PG&E Transformer	Service Switchboard	Secondary Conductors by PG&E
U100C	5	Pull Rope	PG&E Transformer	Service Switchboard	Secondary Conductors by PG&E
U100D	5	Pull Rope	PG&E Transformer	Service Switchboard	Secondary Conductors by PG&E
U100E	5	Pull Rope	PG&E Transformer	Service Switchboard	Secondary Conductors by PG&E
X150	1	Pull Rope	Standby Generator	Main Control Panel (MCP)	Spare

Project: Marina Coast Water District, F-Booster/Chlorination Building
TJCAA #: 119038
By: HT/PJG
Date: 1/4/2021
Revision: 100%

Fill Legend
(X)TYPE-USE
X = Quantity
TYPE = Conductor Type
USE = Usage (see right)

Usage Types
Blank = Load
N = Neutral
G = Ground
C = Control
S = Spare

CONDUIT SCHEDULE

Conduit Tag	Size [in.]	Fill	From	To	Comments
C502	3/4	(4)#14-C, (1)#12-G	Altitude Valve Solenoid	Chlorination Panel LCP-7A	
C540	1	(24)#14-C, (1)#12-G	Chlorination Bldg Control J-box	Chlorination Panel LCP-7A	metering pump controls
C510	3/4	(8)#14-C, (1)#12-G	Metering Pump P510	Chlorination Bldg Control J-box	4 Spares
C520	3/4	(8)#14-C, (1)#12-G	Metering Pump P520	Chlorination Bldg Control J-box	4 Spares
C530	3/4	(8)#14-C, (1)#12-G	Metering Pump P530	Chlorination Bldg Control J-box	4 Spares
C550	1	(10)#14-C, (1)#12-G	Standby Generator	Chlorination Panel LCP-7A	Generator Status points
L505	3/4	(2)#12, (1)#12-G	Zone A Flow FIT500	MLC-1 Panelboard	
L510	3/4	(3)#12, (1)#12-G	MLC-1 Panelboard	Metering Pump P510	
L520	3/4	(3)#12, (1)#12-G	MLC-1 Panelboard	Metering Pump P520	
L530	3/4	(3)#12, (1)#12-G	MLC-1 Panelboard	Metering Pump P530	
L550	3/4	(10)#12, (1)#12-G	Standby Generator	MCC Ltg Panel (LP-1)	Gen Skid Aux. Loads, reuse ex. ckts
N500	3/4	(1)Cat6-C	RTU -7 (LCP-7)	LCP-7A	
P500	3/4	(3)#8, (1)#8-G	Feeder Breaker Panel 4P	MLC-1 Panelboard	
P550	3	(3)#600KCMIL, (1)#1/0-G	Standby Generator	ATS	
P551	3	(3)#600KCMIL, (1)#1/0-G	Service Switchboard	ATS	Existing Service Switchboard
S501A	3/4	MFGR CABLE	Hypo Tank LE500	Hypo Tank LIT500	
S501	3/4	(1)TSP-C	Hypo Tank LIT500	Chlorination Bldg Signal J-box	
S503	2 1/2	(10)TSP-C	Chlorination Bldg Signal J-box	Chlorination Panel LCP-7A	
S505	3/4	(1)TSP-C	Zone A Flow FIT500	Chlorination Panel LCP-7A	
S510	1 1/4	(3)TSP-C	Metering Pump P510	Chlorination Bldg Signal J-box	1 Spare
S520	1 1/4	(3)TSP-C	Metering Pump P520	Chlorination Bldg Signal J-box	1 Spare
S530	1 1/4	(3)TSP-C	Metering Pump P530	Chlorination Bldg Signal J-box	1 Spare
N550	3/4	(1)Cat6-C	Standby Generator	Chlorination Panel LCP-7A	Generator network monitoring

SECTION 33 16 96

RESERVOIR HYDRODYNAMIC MIXING SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Hydrodynamic Mixing System (HMS) is defined as a supplemental system installed within a potable water storage reservoir which passively utilizes the energy provided by the inlet water supply (via pumped or gravity head) and generates a sufficient inlet momentum to achieve a complete homogeneous blending of the water volume within the reservoir with the inlet supply flow. Determination of Complete Homogeneous Blending shall be defined by the modeling requirements and supporting hydraulic analysis as conducted by each individual manufacturer for their specific system configuration as defined within these specifications. System submittals not providing this validation shall not be considered as a viable Hydrodynamic Mixing System (HMS) and shall not be accepted as an equivalent to this system specification.

B. The specifications in this section include all components of the Reservoir Hydrodynamic Mixing System (HMS) consisting of a bi-directional flow manifold equipped with variable orifice duckbill inlet nozzles and outlet flow check valves that are NSF61 certified. The HMS manufacturer shall be responsible for designing the system in accordance with the hydrodynamic criteria defined within these specifications and submit design calculations verifying compliance in accordance with the submittal requirements. The following is a description of the Hydrodynamic Mixing System.

1.02 REFERENCED STANDARDS

A. American National Standards Institute (ANSI)

1. B16.1 – Cast Iron Pipe Flanges and Flanged Fittings
2. B16.5 – Pipe Flanges and Flanged Fittings
3. B36.10 – American National Standard Weights and Dimensions of Welded and Seamless Wrought Steel Pipe

B. American Society for Testing and Materials (ASTM)

1. A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
2. A234 – Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
3. A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
4. A351 – Standard Specification for Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts
5. A536 – Standard Specification for Ductile Iron Castings
6. C110 – Ductile Iron and Gray-Iron Fittings, 3 In. through 48 In. for Water
7. D1330 – Standard Specification for Rubber-Sheet Gaskets

8. D1784 – PVC/CPVC Pipe Compounds
9. D1785 – PVC Pipe, Schedules 40, 80 & 120
10. D2466 – PVC Solvent Cement
11. D2855 – PVC Solvent Joints
12. D3261 – Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Fittings
13. D3915 – PVC Pipe Fitting Compounds

C. American Iron and Steel Institute (AISI)
1. AISI 304 – 304 Stainless Steel Plate
2. AISI 316 – 316 Stainless Steel Plate
3. AISI 1040 – Carbon Steel Plate

D. American Water Works Association (AWWA)
1. C104 – Cement-Mortar Lining of Ductile Iron Pipe and fittings for Water
2. C110 – Ductile-Iron and Gray-Iron Fittings, 3 In. through 48 In. for Water
3. C115 – Flange Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges
4. C200 - AWWA Standard for Steel Water Pipe 6" and Larger
5. C207 – Standard for Steel Pipe Flanges for Waterworks Service – Size 4 In. to 144 In.
6. C220 – AWWA Standard for Stainless Steel Pipe, 4" and Larger
7. C900 – AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. for Water Distribution
8. C905 – AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In Through 48 In. for Water Transmission and Distribution
9. C906 – AWWA Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 63 In. for Water Distribution

E. American Water Works Association Research Foundation (AwwaRF)
1. Project No. E20-J08 – Physical Modeling of Mixing in Water Storage Tanks (Forthcoming)

F. National Sanitation Foundation (NSF)
1. NSF Standard 14 – Plastic Piping System Components and Related Materials
2. NSF Standard 61 – Drinking Water System Components – Health Effects

1.03 SUBMITTALS

A. Contractor shall provide submittals for review and approval by the Engineer in accordance with Section 01 30 00.

B. Contractor submittals shall include the following:
1. Independent CFD Modeling Validation
   a. The mixing system designer/supplier must supply data or report from at least one project where an independent company conducted CFD modeling on their mixing system design and the modeling results verified the design achieved complete mixing.

2. Full Scale Tracer Study Validation
    a. The mixing system designer/supplier must supply data or report from at least one project where a full scale tracer study using calcium chloride was conducted on a circular reservoir and the tracer study results verified the mixing system design achieved complete mixing.
    b. The mixing system designer/supplier must supply data or report from at least one project where a full scale tracer study using calcium chloride was conducted on an elevated tank and the tracer study results verified the mixing system design achieved complete mixing.
3. Tideflex Inlet Nozzle and Waterflex Outlet Valve Testing and Validation
    a. Verification of independent hydraulic testing to determine headloss and jet velocity characteristics on a minimum of eight (8) sizes of duckbill valves ranging from 2" through 48". The testing must include multiple constructions (stiffness) within each size and must have been conducted for free discharge (discharge to atmosphere) and submerged conditions.
    b. Verification of Independent Laboratory Testing for Manufacturing Consistency - the duckbill valve manufacturer shall provide summary documentation of a report conducted by an Independent Laboratory for hydraulic testing where multiple duckbill valves (at least four) of the same size and construction (stiffness) were tested to validate the submitted headloss characteristics and to prove the repeatability and consistency of the manufacturing process to produce the same hydraulic characteristics.
    c. Report of independent testing that studied the flow distribution characteristics of duckbill valves installed on multiport manifolds. The manufacturer must have been in the business of manufacturing duckbill valves at the time the report was published.
    d. Verification of Finite Element Analysis (FEA) of duckbill valves. The duckbill valve manufacturer shall provide summary documentation of Finite Element Analysis modeling on representative duckbill nozzle sizes to determine deflection, stress and strain characteristics under various load conditions. Modeling must have been done for flowing conditions (positive differential pressure) and reverse differential pressure.
    e. Verification of independent hydraulic testing to determine headloss characteristics on a minimum of three (3) sizes of perforated disc/elastomeric membrane check valves ranging from 6" through 36". Testing must have been conducted with and without the membrane installed. At least two (2) sizes shall have tested two (2) different membrane thicknesses.
    f. Verification of Finite Element Analysis (FEA) modeling on a perforated disc/elastomeric membrane check valve to determine stress and deflection characteristics under reverse differential pressure.
4. Validation of Long-term performance
    a. The mixing system designer/supplier must supply at least one inspection report showing proper operation of, and no deterioration of, the duckbill valves after being in service in a water storage tank mixing application for a minimum of 10 years.
5. NSF61 Certification
    a. Copy of the NSF61 Certified listing for the valves used in the Hydraulic Mixing System (HMS).
    b. The valves themselves must be NSF61 certified, not just the elastomer used in construction of the valves. NSF61 approved/certified materials will not be accepted in lieu of valve certification.

c. The NSF61 Certification for the valves must be for a minimum volume of 2,000 gallons. Valves with NSF61 Certification for minimum volume of greater than 2,000 gallons are not acceptable.

6. Test Report on Elastomer Exposure to Chlorine and Chloramine
   a. Copy of test report from an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine per the ASTM D471-98 "Standard Test Method for Rubber Property – Effect of Liquids."
7. System Installation Drawings
   a. The duckbill valve manufacturer shall be responsible for providing engineering installation drawings of the complete manifold piping system as supplied by the manufacturer. These drawings shall include plan view piping arrangement, sections and elevations as required, support bracket installation details, duckbill nozzle orientation details, and all dimensions required for locating the system within the specified dimensions of the tank.
   b. Six (6) sets of plans shall be provided to the Engineer for review and approval.
   c. Drawings shall be a minimum of 11 x 17 inches and provided in digital PDF format.
   d. Two (2) sets of final fabrication and installation drawings shall be included with the shipment of the manifold piping equipment.
8. Design Calculations
   a. All Design Calculations, curves, and reference information listed below must originate and be submitted by the duckbill valve manufacturer. Calculations, curves, and reference information provided by contractors relating to the HMS are not allowed. The duckbill valve manufacturer MUST include within the submittal package the following design calculations, curves, and reference information:
      1) Calculations showing the fill time required, under isothermal conditions, for the HMS system to achieve complete mix of the reservoir volume at minimum, average and peak fill rates. Complete mixing defined as 95% homogenous solution. The theory and equations used in calculating the mixing times must be from a published AWWA reference manual or paper. The reference document(s) must be submitted with the equations and calculations.
      2) Calculations showing the water level drawdown required to achieve complete mixing on the fill cycles at minimum, average, and peak flow rates.
      3) Calculations of average storage tank water age for both fill-then-draw, and simultaneous fill and draw scenarios. Theory used in calculating water age must be submitted with the calculations.
      4) A representative Computational Fluid Dynamics (CFD) model evaluation of the proposed HMS system configuration applied within a reservoir of similar geometry. Model output documentation shall include all design variables applied for the simulation, plot of the 3-D geometry showing the mesh definition, velocity magnitude vector and contour plots at different cross-sections throughout the water volume, simulated tracer animations showing the spatial and temporal distribution of inlet water in real time during the fill cycle.
      5) Hydraulic calculations showing the resulting jet velocities of each inlet nozzle at minimum, average, and peak fill rates.
      6) Hydraulic calculations showing the flow distribution among all inlet ports at minimum, average, and peak fill rates.

7) Manifold hydraulic calculations showing the total headloss of the HMS at minimum, average, and peak fill and draw rates. Headloss shall include all minor losses and headloss of nozzles and outlet check valves.
8) Hydraulic curves showing thrust vs. flow for the inlet nozzles.
9) Hydraulic curves for each outlet check valves showing headloss vs. flow.
10) Calculations showing the terminal rise height of the jets that discharge at an angle above horizontal. The terminal rise height shall be calculated assuming 10ºF and 20ºF colder inlet water and calculated at minimum, average and peak fill rates. The theory and equations used to calculate the terminal rise height shall be included.
11) Hydraulic curves for each inlet nozzle of Densimetric Froude number vs. flow
12) If the calculations and supporting data provided do not show compliance with the hydrodynamic requirements of the system as interpreted by the Engineer or Owner then the submittal shall be rejected.

1.04 INSTALLATION, OPERATION AND MAINTENANCE MANUALS

A. After final approval of the submittals by the Engineer, the HMS valve manufacturer shall provide one (1) Digital copy of the Installation, Operation and Maintenance (IOM) Manual for the mixing system. Hard copies of the IOM manual can be requested and will be made available at a fee.

B. The IOM manual shall include the following information as a minimum:
1. A Cover page listing project specifics
2. Table of contents
3. Completed sections for the following: equipment list, shipment and storage instructions, assembly and installation instructions, safety notice, operating instructions, troubleshooting guide, and spare parts list.
4. Copy of hydraulic, mixing, and water age design calculations for the mixing system and all associates supporting curves and calculations.
5. Copy of complete set of the installation plans.
6. Copies of valve IOMs, NSF61 Certification listing, chlorine/chloramine exposure test report.
7. All validation documentation.
8. Component specification sheets for any specialized items supplied with the system.

PART 2 - MATERIALS

2.01 MANUFACTURER

A. The complete Hydrodynamic Mixing System shall be supplied by the variable orifice nozzle manufacturer to maintain single source responsibility for the system. The complete system shall be defined as all piping and appurtenances within the tank downstream of the tank penetration. Appurtenances include pipe, fittings, horizontal and vertical pipe supports, expansion joints, variable orifice duckbill check valves, and any other equipment specified within this section of the specifications.
1. The approved manufacturer for this system to be included within the Base Bid shall be manufactured by Red Valve Company/Tideflex Technologies, Pittsburgh, PA 15220.

2. Local Equipment Supplier is Misco Water (925) 225-1900.

B. All modeling and hydraulic and mixing calculations pertaining to the HMS shall originate from the duckbill valve manufacturer. Modeling and calculations provided by parties other than the duckbill valve manufacturer are not allowed.

C. Manufacturer's and/or contractors submitting an alternative to the named Red Valve/Tideflex Technologies mixing system shall be responsible for obtaining any and all proprietary rights, license fees, royalties, technology licenses, and/or permissions required to provide such a system.

2.02 TIDEFLEX VARIABLE ORIFICE DUCKBILL INLET NOZZLES

A. Inlet ports/nozzles shall be duckbill-style check valves that allow fluid to enter the reservoir during fill cycles and prevent flow in the reverse direction through the nozzle during draw periods. Inlet ports/nozzles may not be fixed-diameter ports or pipes.

B. The flange drilling shall conform to ANSI B16.1 Class 125/ANSI B16.5, Class 150 standards. The duckbill valve shall be furnished with stainless steel 316 back-up rings for installation.

C. The duckbill valves shall be NSF61 Certified. NSF61 approved/Certified materials will not be accepted in lieu of valve certification.

D. Inlet ports/nozzles shall have a variable diameter vs. flow hydraulic profile that provides a non-linear jet velocity vs. flow characteristic and a linear headloss vs. flow characteristic. The hydraulic characteristics of the duckbill valves shall be defined by "Hydraulic Code".

E. The inlet ports/nozzles shall discharge an elliptically shaped jet. The nozzle must have been modeled by an independent laboratory using Laser Induced Fluorescence (LIF).

F. Manufacturer shall have conducted independent hydraulic testing to determine headloss and jet velocity characteristics on a minimum of eight (8) sizes of duckbill valves ranging from 2" through 48". The testing must include multiple constructions (stiffness) within each size and must have been conducted for free discharge (discharge to atmosphere) and submerged conditions.

G. Manufacturer shall have conducted an independent hydraulic test where multiple valves (at least four) of the same size and construction (stiffness) were tested to validate the submitted headloss characteristics and to prove the repeatability of the manufacturing process to produce the same hydraulic characteristics.

H. Manufacturer shall have conducted independent hydraulic testing to study the flow distribution characteristics of duckbill valves installed on multiport manifolds.

I. Manufacturer to have conducted Finite Element Analysis (FEA) on various duckbill valves to determine deflection, stress, and strain characteristics under various load conditions. Modeling must have been done for flowing conditions (positive differential pressure) and reverse differential pressure.

J. Manufacturer must have conducted in-house backpressure testing on duckbill valves ranging from ¾" to 48".

K. Manufacturer shall have at least fifteen (15) years experience in the manufacturing of "duckbill" style elastomeric valves.

L. Manufacturer must have duckbill valves installed on manifold piping systems in at least 100 distribution system reservoirs.

M. Manufacturer must have representative inspection videos showing the duckbill valves discharging water into the reservoir during an initial fill (unsubmerged). Manufacturer must also have representative underwater inspection videos showing the operation of the valves when submerged. Representative videos can be submitted upon request from the engineer.

N. The duckbill style nozzles shall be one-piece elastomer matrix with internal fabric reinforcing designed to produce the required discharge velocity and minimum headloss requirements as stipulated in the Submittals section. The flange portion shall be an integral portion of the nozzle with fabric reinforcing spanning across the joint between the flange and nozzle body.

O. The elastomer used in construction of the duckbill valves must have been tested by an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine per the ASTM D471-98 "Standard Test Method for Rubber Property – Effect of Liquids."

P. The manufacturer's name, plant location, serial number and product part number which designates nozzle size, material and construction specifications shall be bonded onto the surface of the nozzle.

2.03 WATERFLEX OUTLET CHECK VALVES

A. The outlet flow valves shall be perforated disc type with elastomeric membrane.

B. The valves shall be NSF61 Certified. NSF61 approved/Certified materials will not be accepted in lieu of valve certification.

C. The perforated disc shall be fabricated of stainless steel 304 plate with or without welded support gussets depending on maximum backpressure. The disc shall be flanged and drilled to mate with ANSI B16.1, Class 125/ANSI B16.5 Class 150 flanges. The disc shall have three (3) tapped holes used for fastening the membrane and support rod to the disc with stainless steel 304 bolts, nuts, and lock washers. The top of the disc shall be tapped and supplied with lifting eyebolt for installation.

D. The membrane shall be circular, one piece rubber construction with fabric reinforcement. The diameter of the membrane shall allow adequate clearance between the membrane O.D. and the pipe I.D. The membrane shall be vulcanized with a specified convex radius to produce a compression set to allow the membrane to seal against the perforated disc at low reverse differential pressure.

E. The support rod shall be stainless steel 304 and drilled with three (3) longitudinal holes to allow fastening of rod to membrane and perforated disc.

F. When line pressure inside the valve exceeds the backpressure outside the valve, the line pressure forces the membrane to open, allowing flow to pass through the perforations in the disc. When backpressure exceeds the line pressure, the membrane seats on the perforated disc preventing backflow.

G. The valve allows flow out of the reservoir during draw cycles and prevents flow into the reservoir during fill cycles.

H. The elastomer used in construction of the membrane must have been tested by an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine per the ASTM D471-98 "Standard Test Method for Rubber Property – Effect of Liquids."

I. The manufacturer's name, plant location, serial number and product part number which designates membrane size, material and construction specifications shall be bonded onto the surface of the membrane.

2.04 CARBON STEEL PIPE AND FITTINGS

A. Carbon steel pipe and fittings shall conform to the associated standards listed in Section 2.0: Reference Standards.

B. Dimensions for carbon steel fittings shall conform to AWWA C110, unless otherwise specified.

C. Pipe and fittings shall be Schedule Standard wall thickness conforming to ANSI B36.10-1985.

D. All flanges shall be carbon steel ring flanges conforming to AWWA C207 Class D, unless otherwise specified on the drawings. Flange drilling pattern shall be in accordance with ANSI B16.1/B16.5 standards.

E. Ring flanges shall be continuously welded on both sides.

F. Welding of carbon steel pipe and fittings shall be in accordance with the Reference standards.

G. All butt welds shall be fully penetrated with gas shielding to the interior and exterior of the joint.

H. Welded cross-sections shall have a thickness equal to or greater than the welded material.

I. Field welding of carbon steel pipe and fittings will not be allowed unless approved by the Engineer.

J. All welded joints shall be free of sharp edges and burrs.

K. Coating of the inside of carbon steel pipe and fittings is not required, unless otherwise specified.

L. Coating of the outside of carbon steel pipe and fittings shall be performed in the field, by the contractor, following installation of the manifold piping system. Surface preparation and coating procedures shall be in accordance with standards listed in Coatings specification.

2.05 FLANGE GASKETS

A. Flange gaskets shall be full-faced and shall be in accordance with ASTM D1330.

B. Flange gasket drilling pattern shall conform to ANSI B16.1/B16.5.

C. Flange gaskets shall be 1/8" thick.

D. Gasket material shall be EPDM.

2.06 FASTENERS

A. Hex head bolts and nuts shall be stainless steel 304 conforming to ANSI/ASME B18.2.1 and ANSI/ASME B18.2.2.

B. Plastic insulating sleeve/washers shall be utilized to isolate dissimilar bolt and flange metals where required.

2.07 PIPE SUPPORTS

A. For flanged pipe in carbon steel tanks, the pipe supports shall be carbon steel with a stainless steel 304 U-bolt in accordance with the associated standards.

B. The pipe supports shall consist of four components:

1. For carbon steel supports, a top-works weldment that consists of structural channel and angle iron. The angle iron has predrilled holes for the U-bolt. The TMS piping shall rest on the angle iron and the U-bolt is used to retain the TMS pipe.
2. For stainless steel supports, a top-works weldment that consists of structural angle iron with predrilled holes for the U-bolt. The TMS piping shall rest on the angle iron and the U-bolt is used to retain the TMS pipe. All-thread rod shall be welded to the bottom of the angle iron and shall thread into the hex nut of the base plate weldment. The top-works weldment can be rotated into or out of the hex nut to provide height adjustability.
3. U-bolt with four hex nuts.
4. An 1/8" thick EPDM strip with a length equivalent to the circumference of the pipe. The strip shall be placed between the pipe and the angle iron and U-bolt.

C. For steel tanks, the channel of the top-works weldment shall be field fit and modified to the required length. The channel shall then be field welded to the base plate.

D. For steel tanks, the base plate shall be field welded to the tank floor or shell. The location of the base plate shall avoid welded joints in the floor/shell plates.

E. Plastic insulating sleeve/washers shall be utilized to isolate dissimilar metals where required.

2.08 COATINGS

A. Following installation of the manifold system, all carbon steel and ductile iron pipe, fittings, bolted connections, pipe supports, and appurtenances shall be coated according to the interior tank paint specification as specified by the Engineer.

B. Surface preparation and coating procedures shall be provided by the Engineer and the coating supplier.

C. Tideflex and Waterflex Valves shall not be coated. The valves shall either be masked or be mounted after coating of the tank and piping. Contractor to ensure masking materials are removed after coating.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE, AND MATERIAL HANDLING

A. Individual nozzles and outlet valves shall be packaged separately from the piping equipment.

B. All flanges shall be protected by using plastic inserts or plank wood, pipe sections are to be fully supported to prevent pipe deflection or damage to fittings or connections.

C. All equipment shall be shipped on pallets capable of fully supporting the pipe sections across their entire length. Pallets should be accessible for fork lift transport or strap and hoist means without causing any load to the pipe equipment.

D. All stainless steel components shall be stored separately away from any carbon steel components or other materials that could stain or deface the stainless steel finish from run-off of oxidized ferrous materials.

E. All pipe equipment should be covered and stored in areas free from contact with construction site sediment erosion to prevent accumulation of materials within the pipe and fittings.

F. Duckbill nozzles should be protected from contact with rigid objects during handling and storage. The contractor shall be responsible for replacing any duckbill nozzles or elastomeric components that are damaged after arrival on the site through installation and start-up of the system.

3.02 INSTALLATION

A. Installation of the manifold system shall be in accordance with the installation plans and guidelines provided by the HMS manufacturer, and as specified in the installation section of the IOM manual, and the requirements defined in these specifications.

3.03 INSTALLATION INSPECTION AND START-UP TESTING PROCEDURES

A. The HMS manufacturer's authorized representative shall provide one (1) day inspection to verify that the system has been installed in accordance with the design specifications and installation drawings. It is recommended the flow testing described below is conducted the same day once the representative confirms proper installation of the system.

B. The inspection representative shall provide signed inspection documents confirming the date of the inspection and approval of the installation.

C. Start-Up Flow Testing

1. Following installation of the complete manifold piping system, the contractor shall open the upstream isolation valve to allow flow into the tank through the manifold system. The isolation valve must be opened slowly to prevent surge or over-pressurization of the manifold system. The isolation valve must be fully opened to inspect the flow characteristics of the manifold system.
2. The contractor shall take videos and photos during the filling operation and submit them to the HMS manufacturer. Videos and photos are to confirm:
   a. There is no leakage in the piping system.
3. That all of the duckbill inlet nozzles are discharging flow into the tank. The only exception is for a system where the duckbill nozzles are at different elevations. If the water level is not at the elevation of higher duckbill nozzles, those may not discharge flow until the water level approaches those nozzles.

3.04 WARRANTY

A. All piping, pipe supports, expansion joints, and anchors shall be warranted by the HMS manufacturer against failure under design conditions for a period of one (1) year from the date of final installation certification.

B. Duckbill inlet nozzles and perforated disc/elastomeric membrane outlet check valves shall be warranted by the manufacturer against failure under design operating conditions for a period of one (1) year from the date of final installation certification. Elastomer components damaged as a result of maintenance activities, foreign debris, or excessive exposure to direct ultraviolet and thermal radiation shall be excluded warranted coverage.

END OF SECTION

PANELBOARD SCHEDULE

CKT NO	LOAD TYPE	USAGE	VA PHASE A	VA PHASE B	VA PHASE C	BRKR A/PLS	CKT NO	LOAD TYPE	USAGE	VA PHASE A	VA PHASE B	VA PHASE C	BRKR A/PLS
1	CL	SPARE	-'	-	-	20/1	2	NCL	PS INTERIOR LIGHTING	400	-	-	20/1
3	NCL	FE/FIT-100		100	-	20/1	4	NCL	PS INTERIOR LIGHTING	-	400	-	20/1
5	CL	RES A1 RECEPTACLE	-	-	180	20/1	6	ML	CONTROL PANEL LCP	-	-	2800	30/1
7	CL	IRRIGATION CONTROL RECPT	200	-	-	20/1	8	ML	FE/FIT-200	100	-	-	20/1
9	CL	EMERGENCY LIGHTING	-	50	-	20/1	10	CL	PS INTERIOR RECEPTACLES	-	720	-	20/1
11	CL	PS INTERIOR RECEPTACLES	-	-	720	20/1	12	CL	RES A2 RECEPTACLE	-	-	180	20/1
13	CL	GENERATOR SPACE HEATER	1500	-	-	20/1	14	CL	PS EXTERIOR LIGHTING	325	-	-	20/1
15	CL	SITE LIGHTING	-	960	-	20/1	16	CL	GEN BATTERY CHARGER	-	750	-	20/1
17	CL	GEN CONTROL PANEL	-	-	500	20/1	18	CL	RES A1 LEVEL SENSOR	-	-	200	20/1
19	CL	RES A2 LEVEL SENSOR	200	-	-	20/1	20	ML	FAN CONTROL PANEL	1000	-	-	25/3
21	CL	SITE LIGHTING	-	1200	-	20/1	22	ML	FAN CONTROL PANEL	-	1000	-	
23	CL	FE/FIT-300	-	-	100	20/1	24	ML	FAN CONTROL PANEL	-	-	1000	
25	CL	AE/AIT-100 CL2 ANALYZER UNIT	100	-	-'	20/1	26	CL	SPARE	-	-	-	20/1
27	CL	SPARE	-	-	-	20/1	28	CL	SPARE	-	-	-	20/1
29	CL	SPARE	-	-	-	20/1	30	CL	SPARE	-	-	-	20/1
31	CL	SPARE	-	-	-	20/1	32	CL	SPARE	-	-	-	20/1
33	CL	SPACE	-	-	-'	20/1	34	ML	SPACE	-	-	-'	-'
35	CL	SPACE	-'	-	-'	20/1	36	CL	SPACE	-	-	-	-'
37	CL	SPACE	-	-	-	20/1	38	CL	SPACE	-	-	-	-'
39	CL	SPACE	-	-	-	20/1	40	CL	SPACE	-	-	-	-'
41	CL	SPACE	-	-	-	20/1	41	CL	SPACE	-	-	-	-'
		PHASE VA SUBTOTALS	2000	2310	1500				PHASE VA SUBTOTALS	1825	2870	4180	
									PHASE VA TOTALS	3825	5180	5680	
									PANELBOARD VA TOTAL			14685	

CL	125% TOTAL CONTINUOUS LOADS (VA):	9856		
NCL	TOTAL NON-CONTINUOUS LOADS (VA):	900		
ML	MOTOR LOADS (VA):	5900		
	25% LARGEST MOTOR LOAD (VA):	250	1000	
	CALCULATED TOTAL LOAD (VA):	16906		
	CALCULATED TOTAL LOAD (AMPS):	47		

PANEL NO.:	LP-1
LOCATION:	Booster B/C Pump Station
VOLTAGE:	208/120V, 3Ø, 4W
BUS RATING:	225A
MAIN BREAKER:	Main Lug
SHORT CIRCUIT RATING:	22 KAIC

ABBREVIATIONS

CL - CONTINUOUS LOAD
ML - MOTOR LOAD
NCL - NON-CONTINUOUS LOAD

PANELBOARD SCHEDULE

CKT NO	LOAD TYPE	USAGE	VA PHASE A	VA PHASE B	BRKR A/PLS	CKT NO	LOAD TYPE	USAGE	VA PHASE A	VA PHASE B	BRKR A/PLS
1		Main Breaker	0	-	40/2	2	CL	LCP-7A - NOTE 1	1500	-	15/1
3			-	0		4			-		15/1
5	CL	McCrometer	100	-	15/1	6	NCL	Outlets	-	-	15/1
7			-	-	15/1	8			-	-	15/1
9	CL	SCADA - RTU #7	-	-	15/1	10	NCL	Lights	-	-	15/1
11	NCL	Control	-	-	15/1	12	NCL	Water Jacket Heater	-	-	15/1
		PHASE VA SUBTOTALS	100	0				PHASE VA SUBTOTALS	1500	0	
								PHASE VA TOTALS	1600	0	
								PANELBOARD VA TOTAL		1600	

CL	125%	TOTAL CONTINUOUS LOADS (VA):	2000		PANEL NO.:	LP-1 - Existing
NCL		TOTAL NON-CONTINUOUS LOADS (VA):	0		LOCATION:	Booster PS F Pump Station
ML		MOTOR LOADS (VA):	0		VOLTAGE:	120/240 V, 1 Phase, 3 Wire
		25% LARGEST MOTOR LOAD (VA):	0	0	BUS RATING:	100 A
		CALCULATED TOTAL LOAD (VA):	2000		MAIN BREAKER:	40 A
		CALCULATED TOTAL LOAD (AMPS):	8		SHORT CIRCUIT RATING:	65 KAIC

ABBREVIATIONS

CL - CONTINUOUS LOAD

ML - MOTOR LOAD

NCL - NON-CONTINUOUS LOAD

NOTES

1. FIELD COORDINATE WITH DISTRICT TO IDENTIFY EXISTNG SPARE BREAKER FOR SERVING LCP-7A

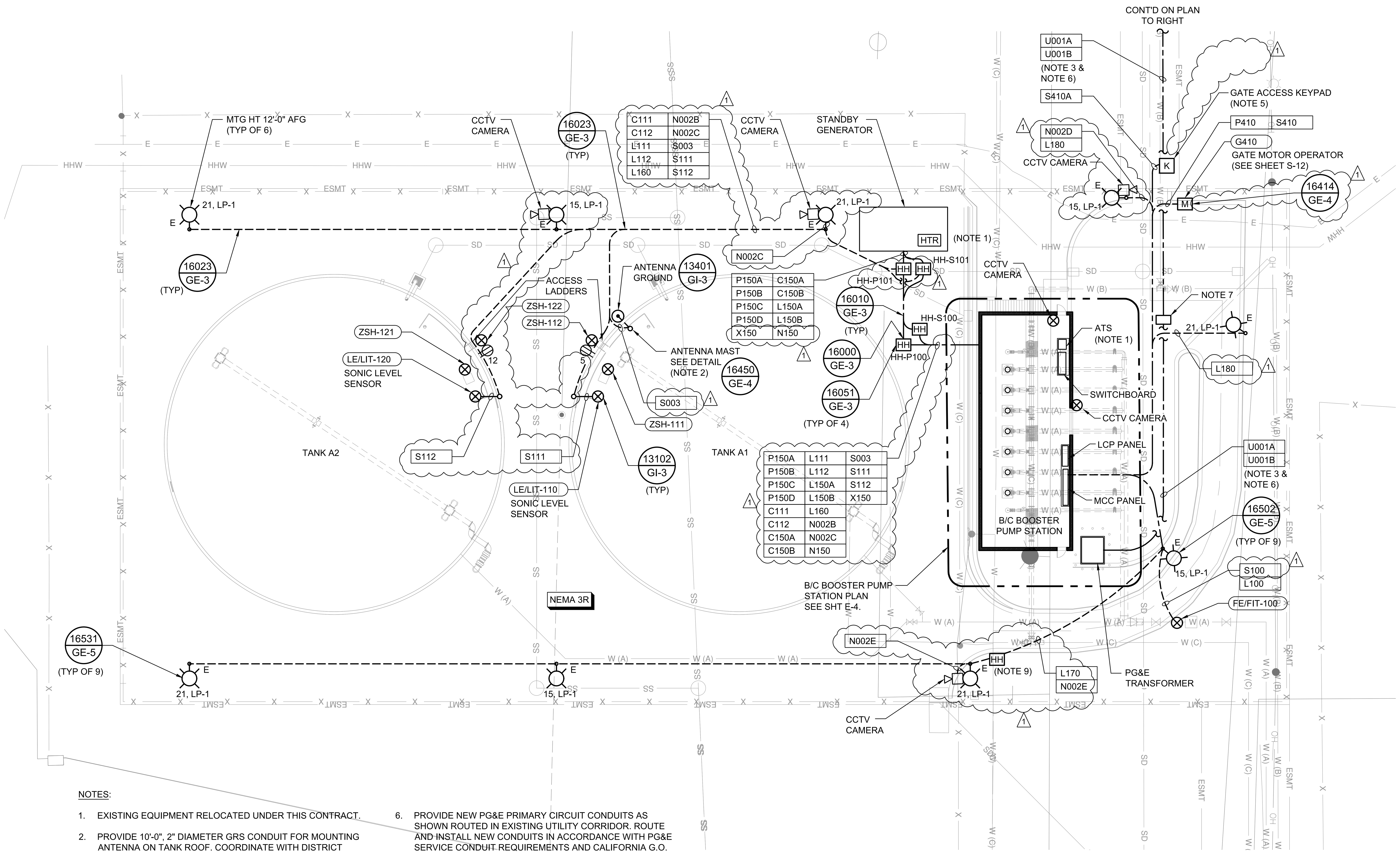
PANELBOARD SCHEDULE

CKT NO	LOAD TYPE	USAGE	VA PHASE A	VA PHASE B	VA PHASE C	BRKR A/PLS	CKT NO	LOAD TYPE	USAGE	VA PHASE A	VA PHASE B	VA PHASE C	BRKR A/PLS
1	CL	P-510, METERING PUMP 1	500	-	-	20/1	2	NCL	P-520, METERING PUMP 2	500	-	-	20/1
3	NCL	P-530, METERING PUMP 3		500	-	20/1	4	NCL	LE/LIT-500, HYPO TANK LEVEL	-	150	-	20/1
5	CL	CL BLDG QUAD RECEPTACLE	-	-	720	20/1	6	ML	SPARE	-	-	0	20/1
7	CL	CL BLDG LIGHTING	300	-	-	20/1	8	ML	FE/FIT-500, WELLFIELD FLOW	100	-	-	20/1
9	CL	VENTILATION FAN	-	500	-	20/1	10	CL	SPARE	-	0	-	20/1
11	CL	SPARE	-	-	0	20/1	12	CL	SPARE	-	-	0	20/1
		PHASE VA SUBTOTALS	800	1000	720				PHASE VA SUBTOTALS	600	150	0	
									PHASE VA TOTALS	1400	1150	720	
		** PROVIDE GFI BREAKER							PANELBOARD VA TOTAL			3270	

CL	125% TOTAL CONTINUOUS LOADS (VA):	2525		
NCL	TOTAL NON-CONTINUOUS LOADS (VA):	1150		
ML	MOTOR LOADS (VA):	100		
	25% LARGEST MOTOR LOAD (VA):	125	500	
	CALCULATED TOTAL LOAD (VA):	3900		
	CALCULATED TOTAL LOAD (AMPS):	11		

PANEL NO.: MLC-1
LOCATION: Booster F PS, Chlorination Bldg
VOLTAGE: 208/120V, 3Ø, 4W
BUS RATING: 100A
MAIN BREAKER: 25A
SHORT CIRCUIT RATING: 22 KAIC

ABBREVIATIONS
CL - CONTINUOUS LOAD
ML - MOTOR LOAD
NCL - NON-CONTINUOUS LOAD



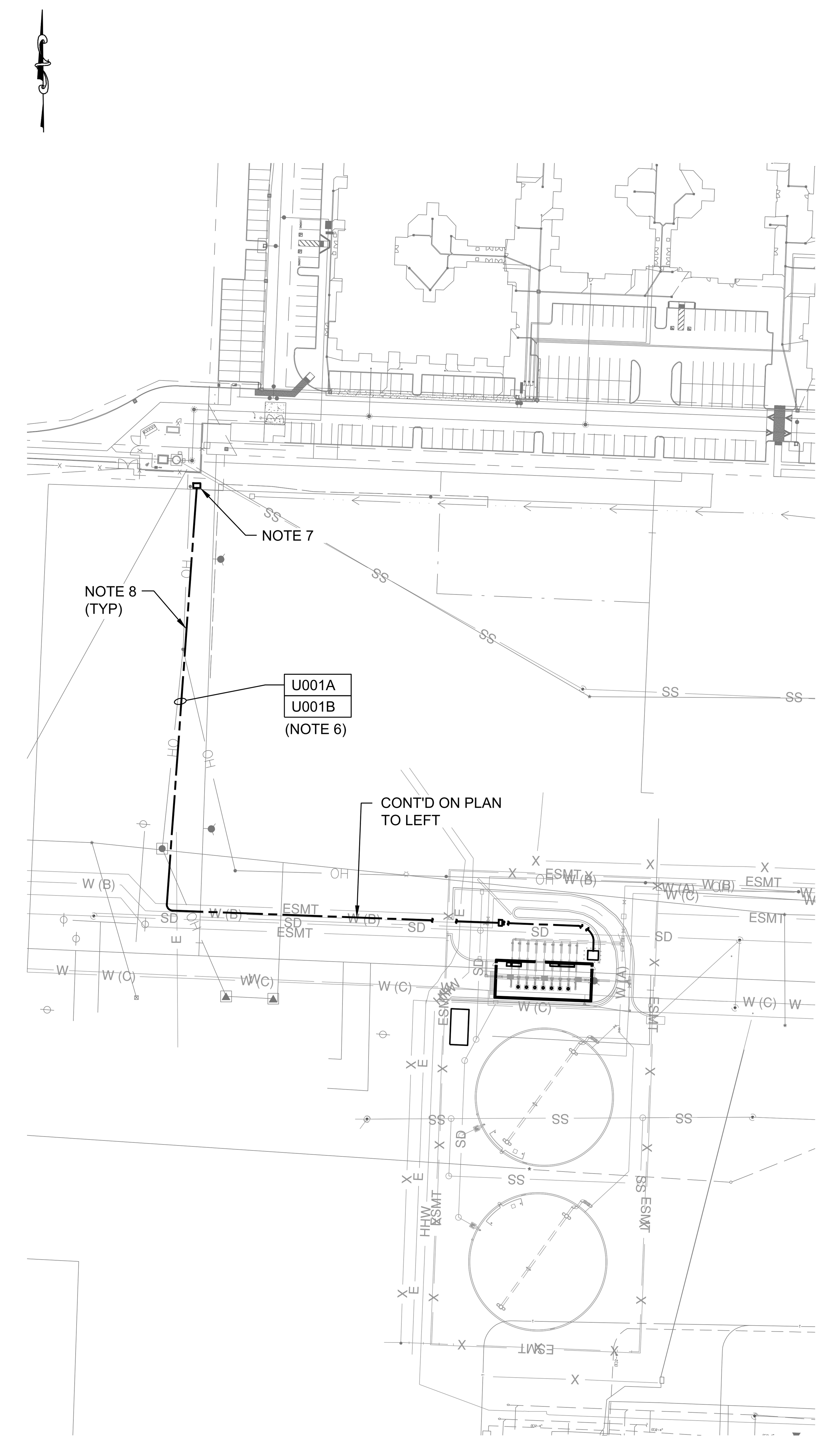
RESERVOIRS PLAN

SCALE: 1"=20'

SCALE: 1"=20'

0 20 40 60 80

SCALE IN FEET



PLAN

SCALE: 1"=80'

SCALE: 1"=80'

0 80 160 240 320

SCALE IN FEET

NOTES:

1. EXISTING EQUIPMENT RELOCATED UNDER THIS CONTRACT.
2. PROVIDE 10'-0", 2" DIAMETER GRS CONDUIT FOR MOUNTING ANTENNA ON TANK ROOF. COORDINATE WITH DISTRICT FOR FINAL ANTENNA INSTALLATION LOCATION, ORIENTATION AND MAST HEIGHT.
3. PROVIDE NEW PG&E PRIMARY CONDUITS AS SHOWN. INSTALL CONCRETE ENCASED CONDUITS AS REQUIRED BY PG&E STANDARDS AND PER DETAIL 16010/GE-3. HOWEVER, STEEL REINFORCEMENT IS NOT REQUIRED IN THE PG&E PRIMARY CONDUIT RUNS. ROUTE NEW CONDUITS IN ACCORDANCE WITH PG&E PRIMARY CONDUIT STANDARDS AND PER CALIFORNIA G.O. 128 FOR SEPARATION FROM OTHER UNDERGROUND UTILITIES.
4. PROVIDE 3 FT X 5 FT PG&E CONCRETE HANDHOLE FOR ROUTING PRIMARY CONDUITS. PROVIDE UNDERGROUND HANDHOLE IN CONFORMANCE WITH PG&E STANDARDS.
5. GATE OPERATOR AND KEYPAD PROVIDED AS A PACKAGE UNIT. COORDINATE FINAL INSTALLATION REQUIREMENTS WITH GATE SYSTEM SUPPLIER.
6. PROVIDE NEW PG&E PRIMARY CIRCUIT CONDUITS AS SHOWN ROUTED IN EXISTING UTILITY CORRIDOR. ROUTE AND INSTALL NEW CONDUITS IN ACCORDANCE WITH PG&E SERVICE CONDUIT REQUIREMENTS AND CALIFORNIA G.O. 128 FOR SEPARATION OF PRIMARY CONDUITS FROM OTHER EXISTING UTILITIES. ALL PRIMARY CONDUCTORS TO BE PROVIDED BY PG&E.
7. PROVIDE NEW 4 FT X 6 FT VAULT AT BASE OF EXISTING PG&E POLE 90563 FOR NEW SECTIONALIZING SWITCH TO BE PROVIDED BY PG&E. FURNISH AND INSTALL NEW VAULT IN CONFORMANCE WITH APPLICABLE PG&E STANDARDS AND PER PG&E SERVICE DOCUMENTATION FOR THIS PROJECT. EXTEND PRIMARY CONDUITS FROM NEW VAULT TO POLE AND PROVIDE 10-FT MINIMUM CONDUIT RISERS UP POLE. POLE RISERS SHALL BE LOCATED AS REQUIRED BY PG&E AND INSTALLED IN ACCORDANCE WITH PG&E POLE RISER STANDARDS.
8. COORDINATE INSTALLATION AND INSPECTION OF PG&E SERVICE WORK WITH PG&E.
9. PROVIDE 12" X 18" HANDHOLE. TERMINATE FEEDER CIRCUIT FOR FUTURE IRRIGATION CONTROLLER WITH 10FT OF SPARE CONDUCTOR COILED INSIDE HANDHOLE. PROVIDE WATER AND MOISTURE PROOF CAP FOR CIRCUIT. IRRIGATION CONTROLLER TO BE PROVIDED BY OTHERS

NO.	REVISION DESCRIPTION	DATE	APPR
1	ADDENDUM NO. 2	01/21	RKT

MARINA COAST WATER DISTRICT

11 RESERVATION ROAD
MARINA, CA 93933
(831) 384-6131

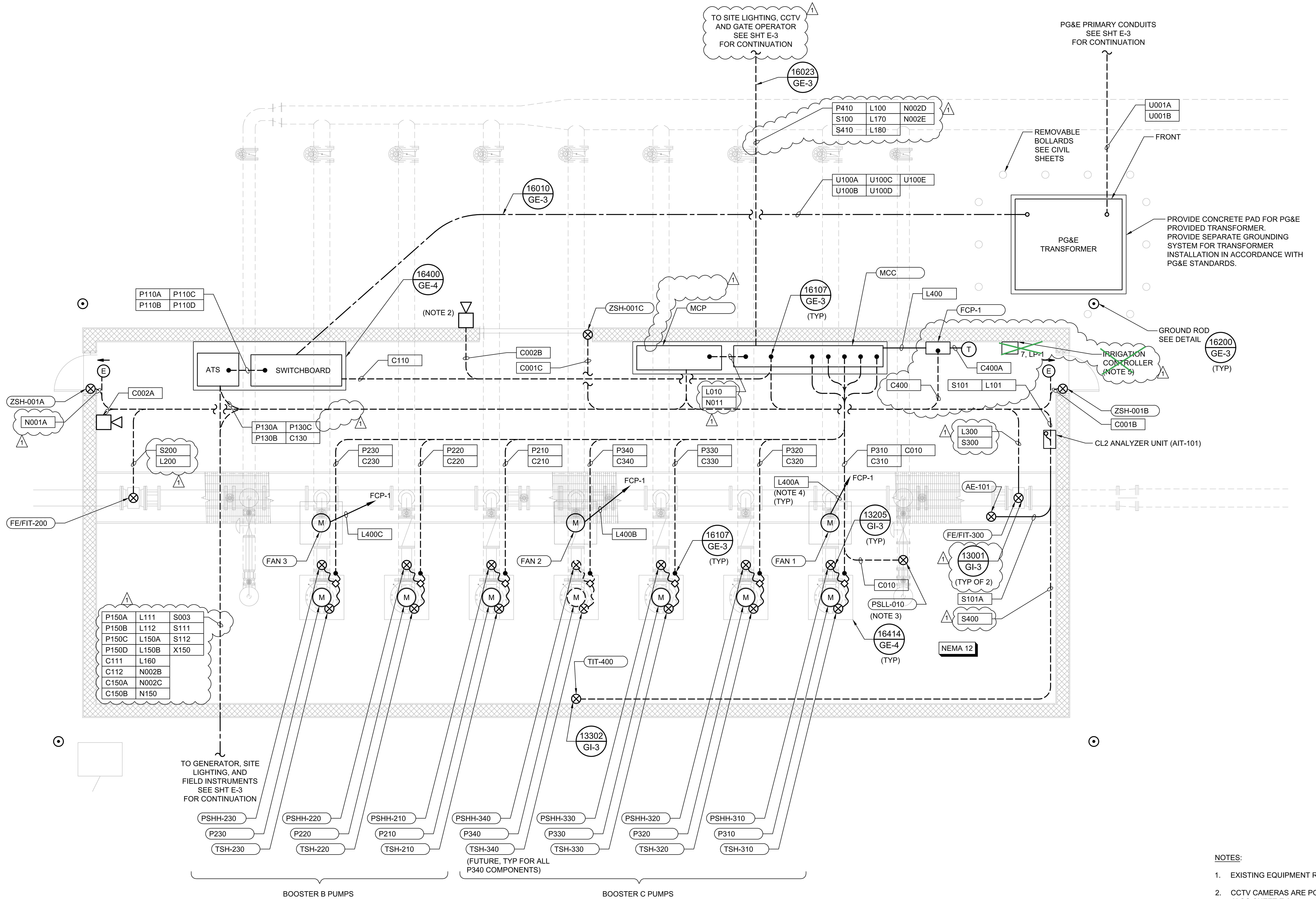
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
3 QUAIL RUN CIRCLE, STE. 101
SALINAS, CA 93907
(831) 883-4848

1/4/21

A1/A2 RESERVOIRS AND B/C BOOSTER PUMP STATION
A1/A2 RESERVOIRS PLAN DRAWING

DATE:	1/4/2021
SCALE:	AS SHOWN
DESIGN:	HT
DRAWN:	BV
CHECK:	PJG

SHEET E-3 OF



B/C BOOSTER PUMP STATION PLAN

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

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

0 4 8 12 16

SCALE IN FEET

NOTES:

1. EXISTING EQUIPMENT RELOCATED UNDER THIS CONTRACT.
2. CCTV CAMERAS ARE POWER OVER INTERNET. TYPICAL, SEE ALSO SHEET E-3.
3. MOUNT PSLL-010 ON VERTICAL. BYPASS/PRESSURE RELIEF RISER.
4. ROUTE CIRCUIT THROUGH FAN DISCONNECT SWITCH ON ROOF.
5. ~~FIELD LOCATE FINAL LOCATION OF IRRIGATION CONTROLLER WITH IRRIGATION SUPPLIER.~~

NO.	REVISION DESCRIPTION	DATE	APPR
1	ADDENDUM NO. 2	01/21	RKT

MARINA COAST WATER DISTRICT
11 RESERVATION ROAD
MARINA, CA 93933
(831) 384-6131

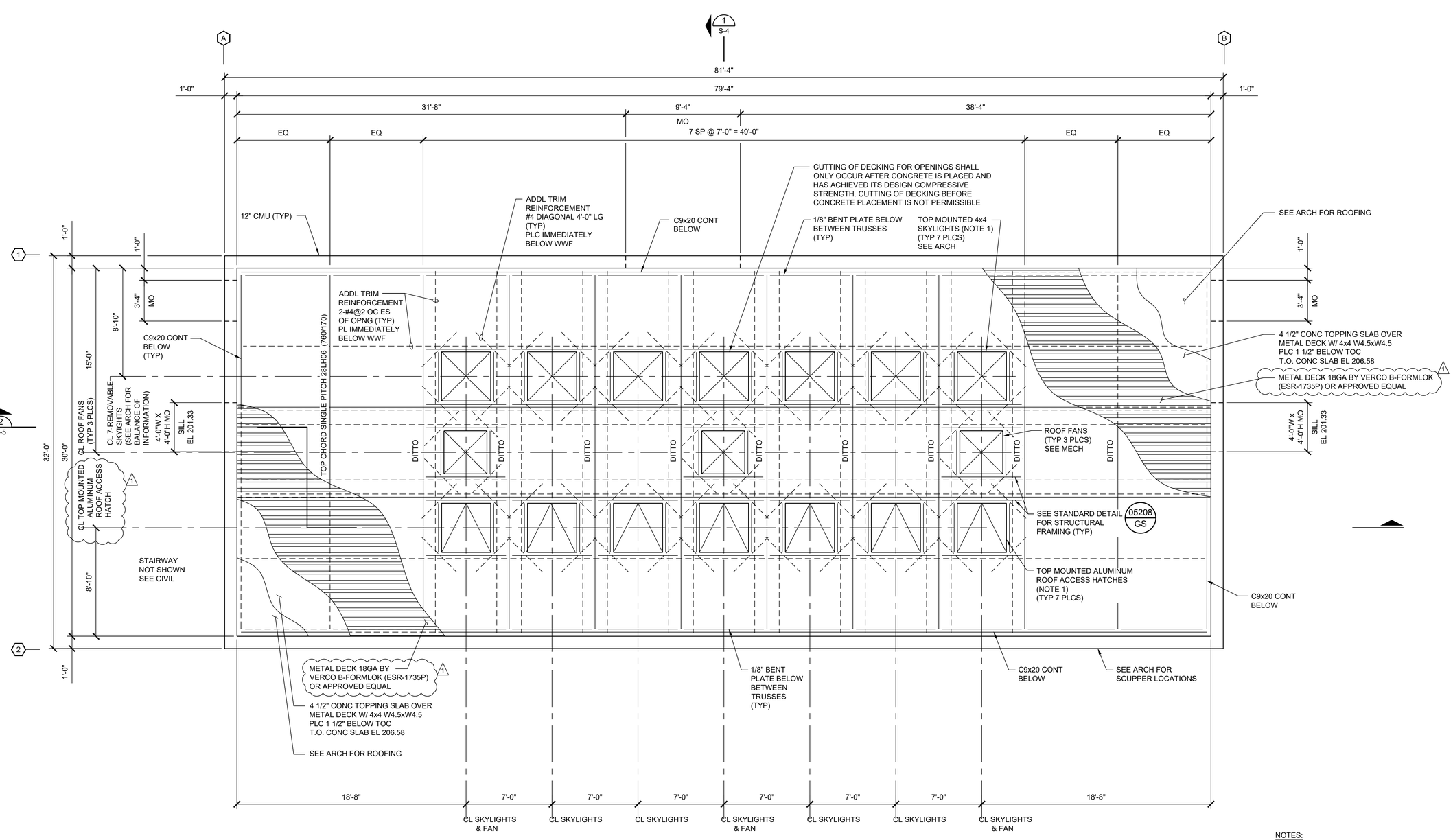
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
3 QUAIL RUN CIRCLE, STE. 101
SALINAS, CA 93907
(831) 883-4848

No. E 11674 Exp. 09/30/22 ELECTRICAL STATE OF CALIFORNIA
1/4/21

A1/A2 RESERVOIRS AND B/C BOOSTER PUMP STATION
B/C BOOSTER PUMP STATION POWER AND SIGNAL PLAN

DATE: 1/4/2021
SCALE: AS SHOWN
DESIGN: HT
DRAWN: BV
CHECK: PJG

SHEET E-4 OF



ROOF PLAN

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

NOTES:

1. TOP MOUNTED ROOF ACCESS HATCHES ARE DEFERRED SUBMITTAL ITEMS AND ARE THE RESPONSIBILITY OF THE CONTRACTOR. TOP MOUNTED ROOF ACCESS HATCHES HAVE NOT BEEN DESIGNED BY THE ENGINEER OF RECORD. REFER TO STRUCTURAL NOTES, SHEET GS-1 AND PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. CUTTING OF DECKING FOR OPENINGS SHALL ONLY OCCUR AFTER CONCRETE IS PLACED AND HAS ACHIEVED ITS DESIGN COMPRESSIVE STRENGTH. CUTTING OF DECKING BEFORE CONCRETE PLACEMENT IS NOT PERMISSIBLE.

NO.	REVISION DESCRIPTION	DATE	APPR
1	ADDENDUM NO. 2	01/21	RKT

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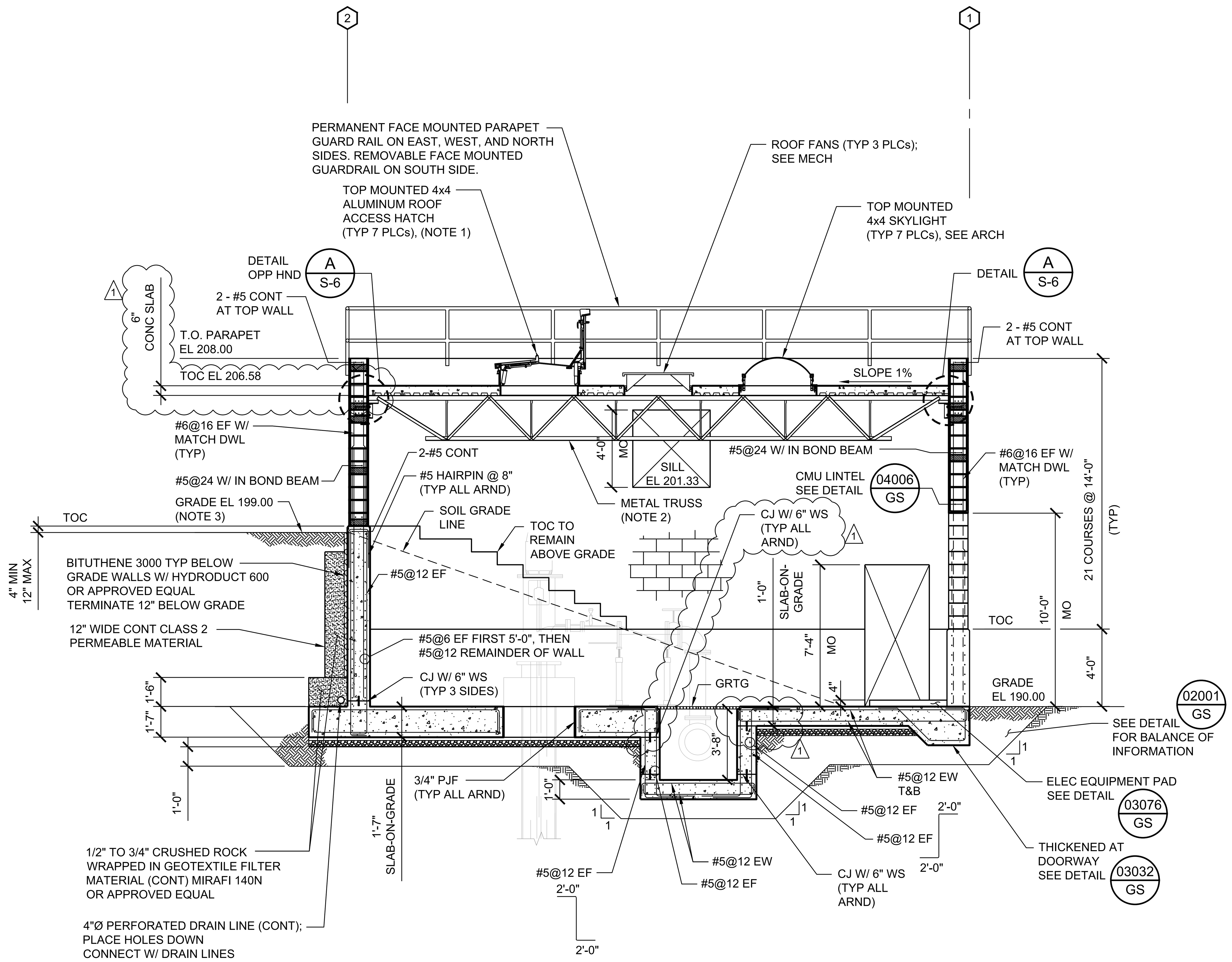
REGISTERED PROFESSIONAL ENGINEER — STRUCTURAL — STATE OF CALIFORNIA
1/4/21

A1/A2 RESERVOIRS AND B/C BOOSTER PUMP STATION

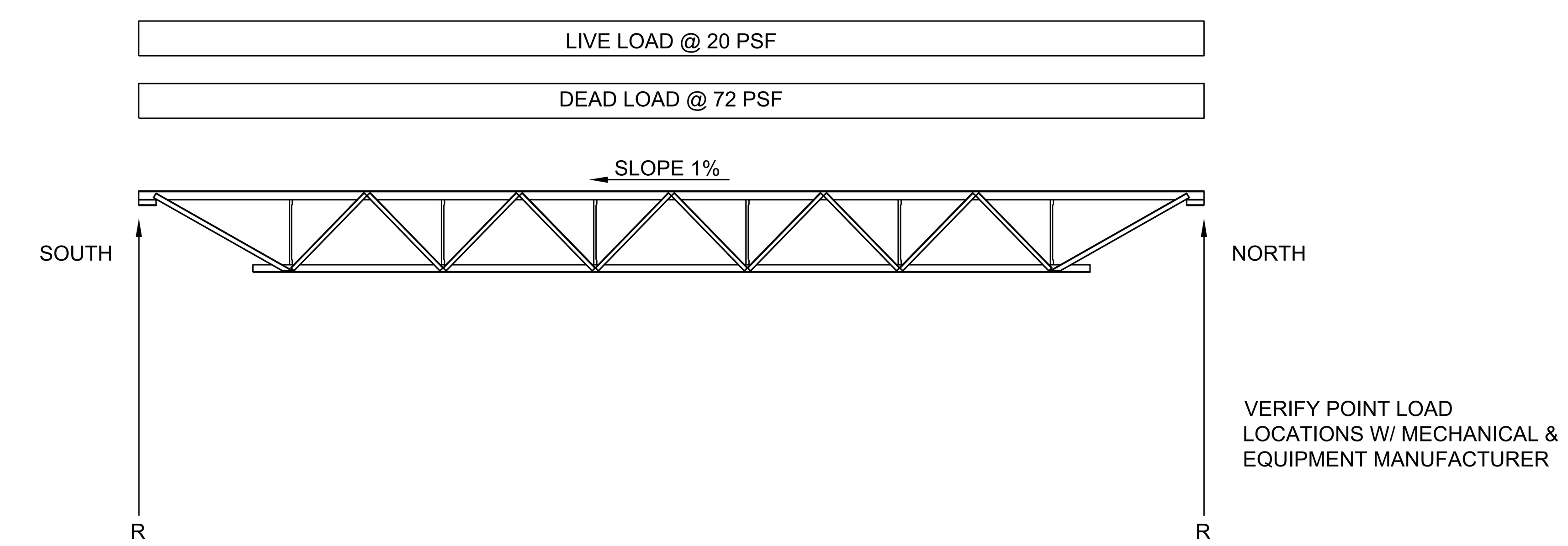
BOOSTER PUMP STATION ROOF PLAN

DATE:	1/4/2021
SCALE:	AS SHOWN
DESIGN:	RKT
DRAWN:	ADP
CHECK:	

SHEET S-3 OF



SECTION 1
SCALE: 1/4"=1'-0" S-1, S-2 & S-3



NOTES:

1. FASTEN METAL DECK TO END SUPPORTS (BOUNDARY WELD) WITH 4-3/4" SHEAR STUDS PER PANEL.
2. FASTEN METAL DECK SIDE LAPS WITH 3/8"x1/2" SIDE SEAM WELDS @ 12" OC.
3. FASTEN METAL DECK TO SIDE SUPPORTS WITH 3/4" SHEAR STUDS @ 18" OC.
4. SHEAR STUDS SHALL BE COMPATIBLE WITH THE SELECTED METAL DECK AND RECOGNIZED AND ACCEPTABLE TO THE METAL DECK MANUFACTURER. SHALL HAVE A MINIMUM ALLOWABLE SHEAR VALUE OF 8.60 KIPS PER STUD.
5. ROOF DECKING SHALL BE CONTINUOUS FOR MINIMUM OF THREE SPANS WHENEVER POSSIBLE.
6. DESIGN AND FURNISH JOISTS AND BRIDGING FOR NET UPLIFT OF 15 PSF.
7. STEEL JOISTS SHALL BE DESIGNED FOR APPLIED DEAD LOAD OF 72 PSF AND LIVE LOAD OF 20 PSF.
8. ADDITIONAL ROW OF BRIDGING REQUIRED AT BOTTOM CHORD FIRST PANEL POINT FROM SUPPORT BEAM SIDE.

TRUSS LOAD DIAGRAM
SCALE: NTS

NOTES:

1. TOP MOUNTED ROOF ACCESS HATCHES ARE DEFERRED SUBMITTAL ITEMS AND ARE THE RESPONSIBILITY OF THE CONTRACTOR. TOP MOUNTED ROOF ACCESS HATCHES HAVE NOT BEEN DESIGNED BY THE ENGINEER OF RECORD. REFER TO STRUCTURAL NOTES, SHEET GS-1 AND PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. METAL TRUSSES IS A DEFERRED SUBMITTAL ITEM AND IS THE RESPONSIBILITY OF THE CONTRACTOR. METAL TRUSSES HAVE NOT BEEN DESIGNED BY THE ENGINEER OF RECORD. REFER TO STRUCTURAL NOTES, SHEET GS-1 AND PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION.
3. BACK-FILL SHALL NOT BE PLACED AGAINST WALLS UNTIL SUCH TIME THAT THE CONCRETE AND MASONRY GROUT HAVE ACHIEVED THEIR FULL DESIGN STRENGTH, AS DEMONSTRATED BY FIELD CYLINDER TESTS. DESIGN STRENGTH SHALL BE ESTABLISHED BY AN AVERAGE OF NOT LESS THAN TWO CYLINDERS.

TJC and ASSOCIATES, Inc.

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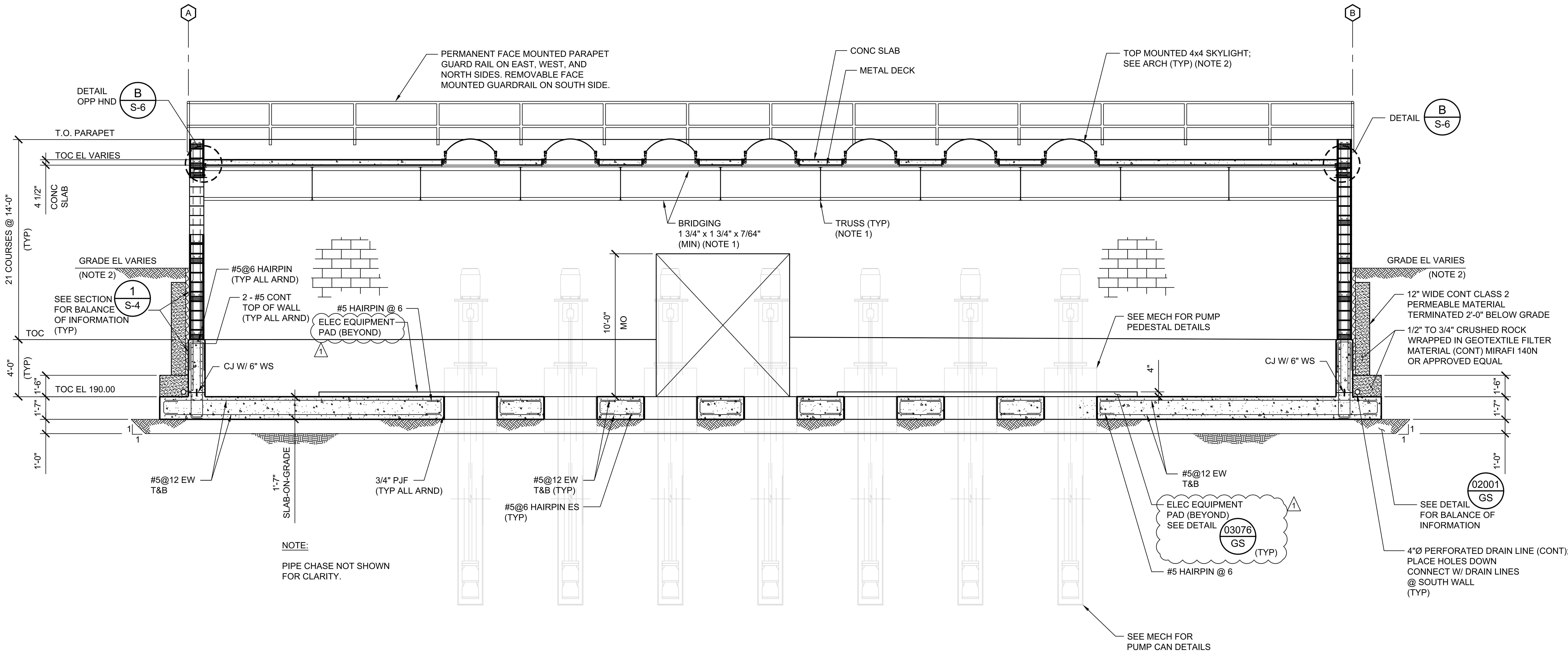
REGISTERED PROFESSIONAL ENGINEER — STRUCTURAL — STATE OF CALIFORNIA
1/4/21

A1/A2 RESERVOIRS AND B/C BOOSTER PUMP STATION

BOOSTER PUMP STATION SECTION

DATE: 1/4/2021
SCALE: AS SHOWN
DESIGN: RKT
DRAWN: ADP
CHECK:

SHEET S-4 OF



SECTION 2
SCALE: 1/4"=1'-0" S-1, S-2 & S-3

NOTES:

1. METAL TRUSSES AND BRIDGING ARE DEFERRED SUBMITTAL ITEMS AND ARE THE RESPONSIBILITY OF THE CONTRACTOR. METAL TRUSSES AND BRIDGING HAVE NOT BEEN DESIGNED BY THE ENGINEER OF RECORD. REFER TO STRUCTURAL NOTES, SHEET GS-1 AND PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION.

2. BACK-FILL SHALL NOT BE PLACED AGAINST WALLS UNTIL SUCH TIME THAT THE CONCRETE AND MASONRY GROUT HAVE ACHIEVED THEIR FULL DESIGN STRENGTH, AS DEMONSTRATED BY FIELD CYLINDER TESTS. DESIGN STRENGTH SHALL BE ESTABLISHED BY AN AVERAGE OF NOT LESS THAN TWO CYLINDERS.

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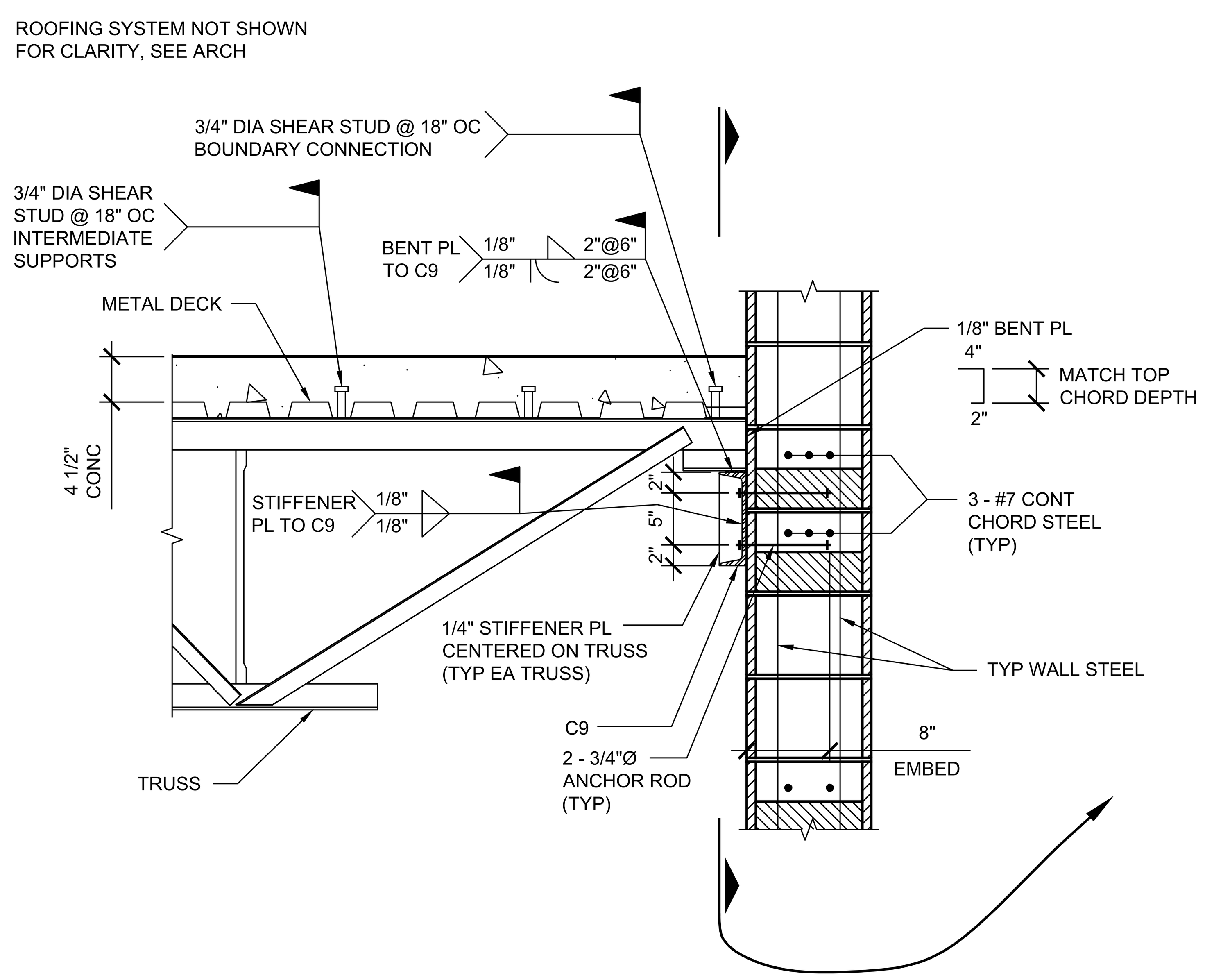
1/4/21

A1/A2 RESERVOIRS AND B/C BOOSTER PUMP STATION

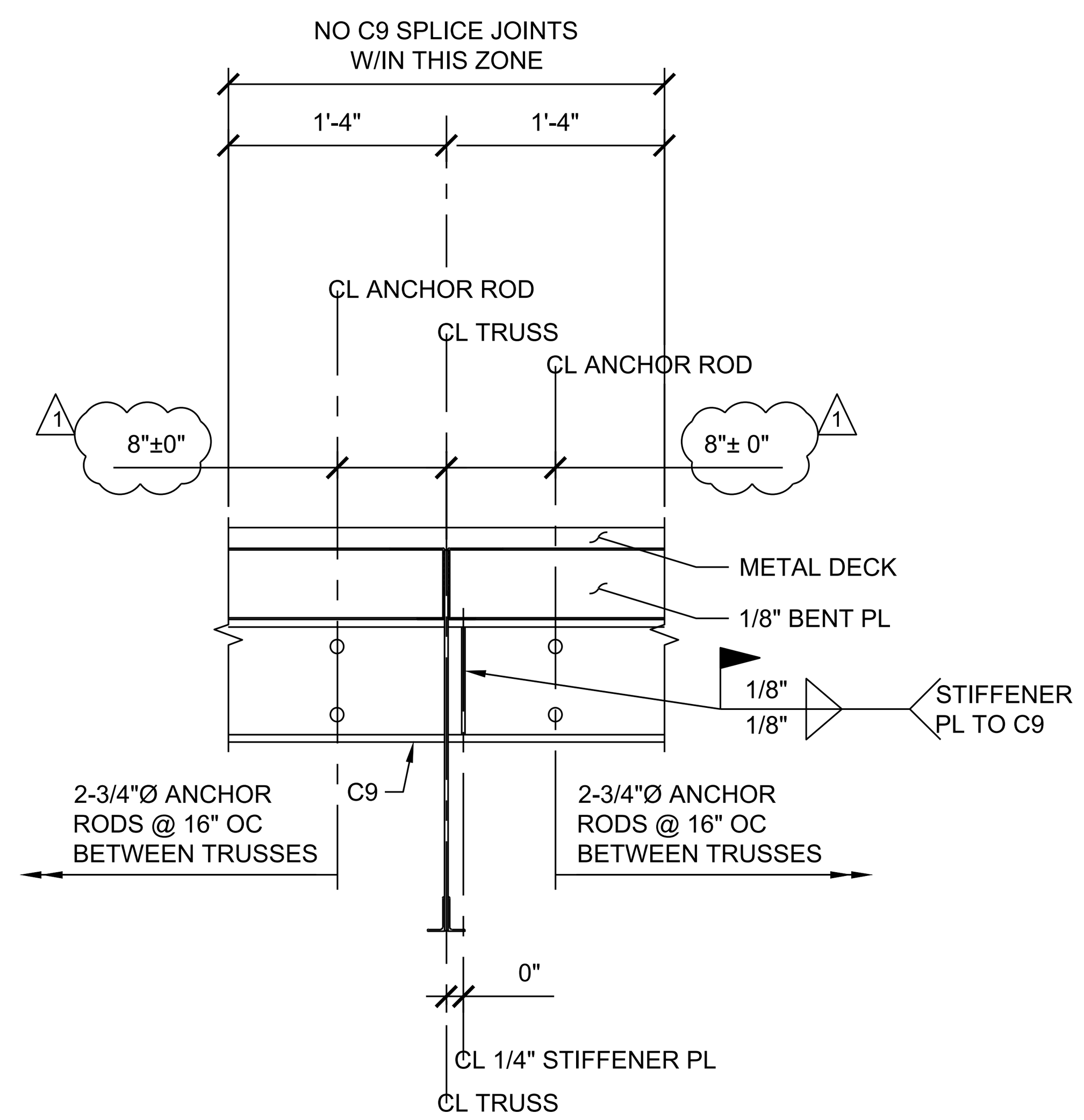
BOOSTER PUMP STATION
SECTION

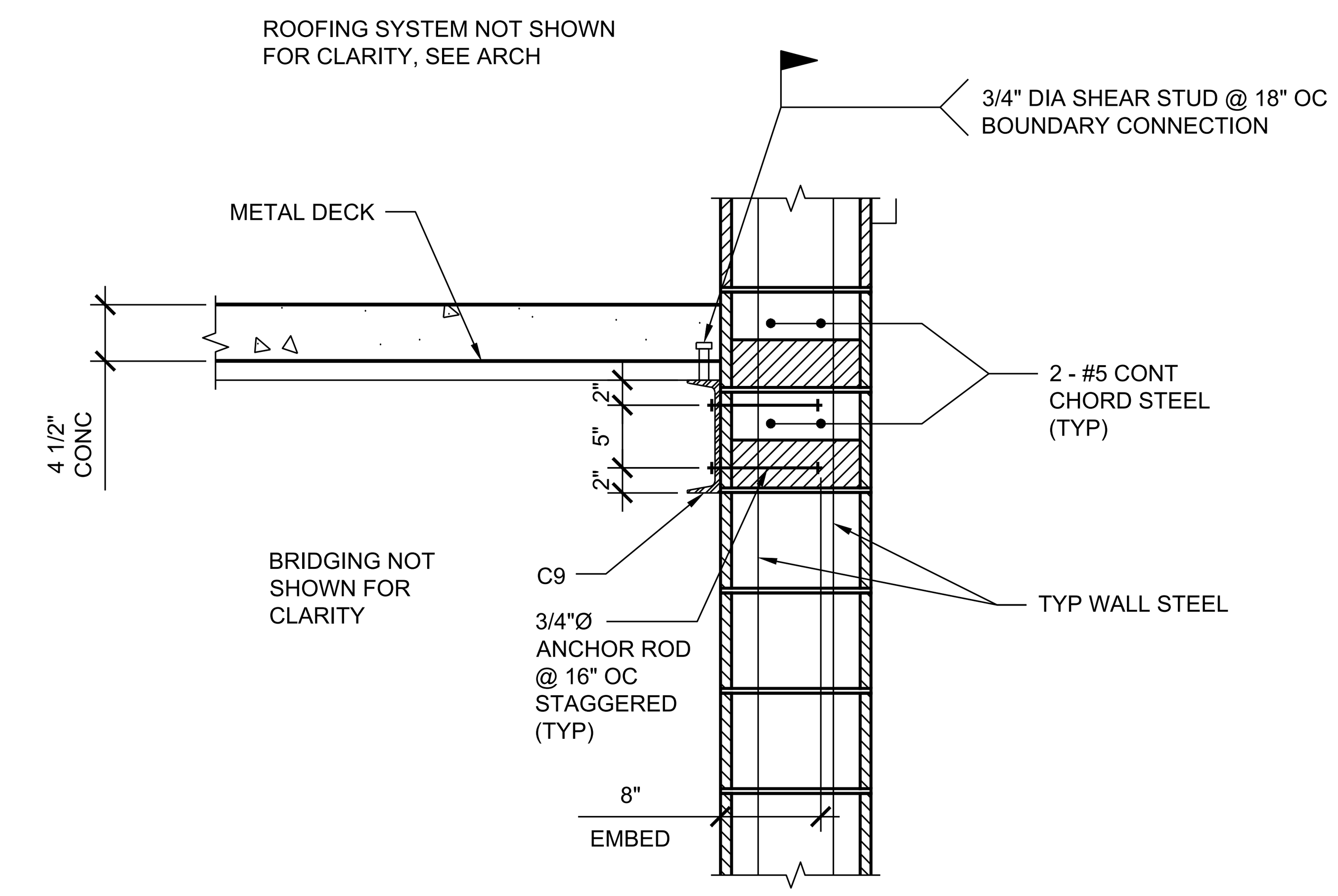
DATE:	1/4/2021
SCALE:	AS SHOWN
DESIGN:	RKT
DRAWN:	ADP
CHECK:	

SHEET S-5 OF



DETAIL A
SCALE: 1"=1'-0" S-4





DETAIL B
SCALE: 1"=1'-0" S-5

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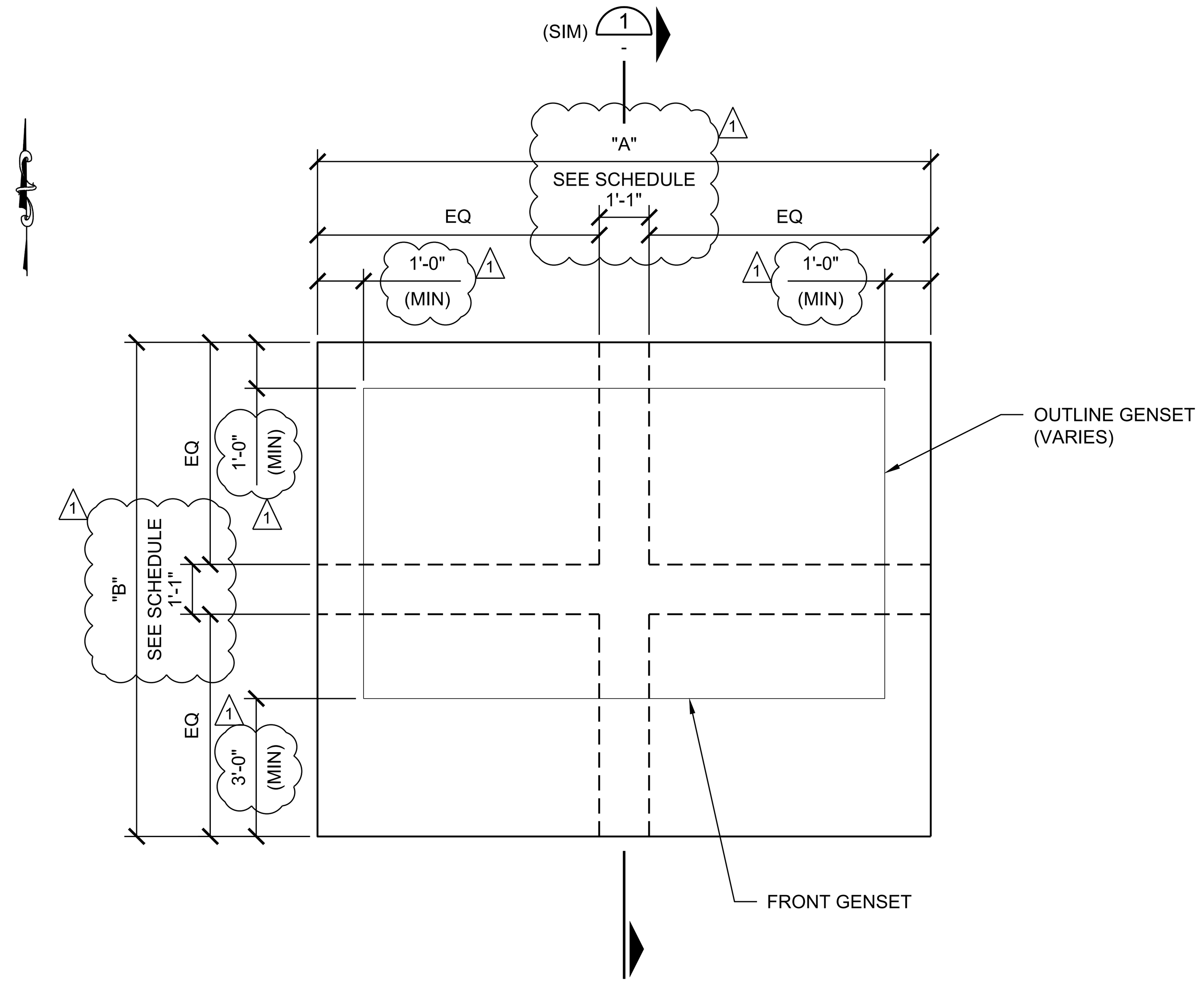
1/4/21

A1/A2 RESERVOIRS AND B/C BOOSTER PUMP STATION

BOOSTER PUMP STATION
DETAILS

DATE: 1/4/2021
SCALE: AS SHOWN
DESIGN: RKT
DRAWN: ADP
CHECK:

SHEET
S-6
OF

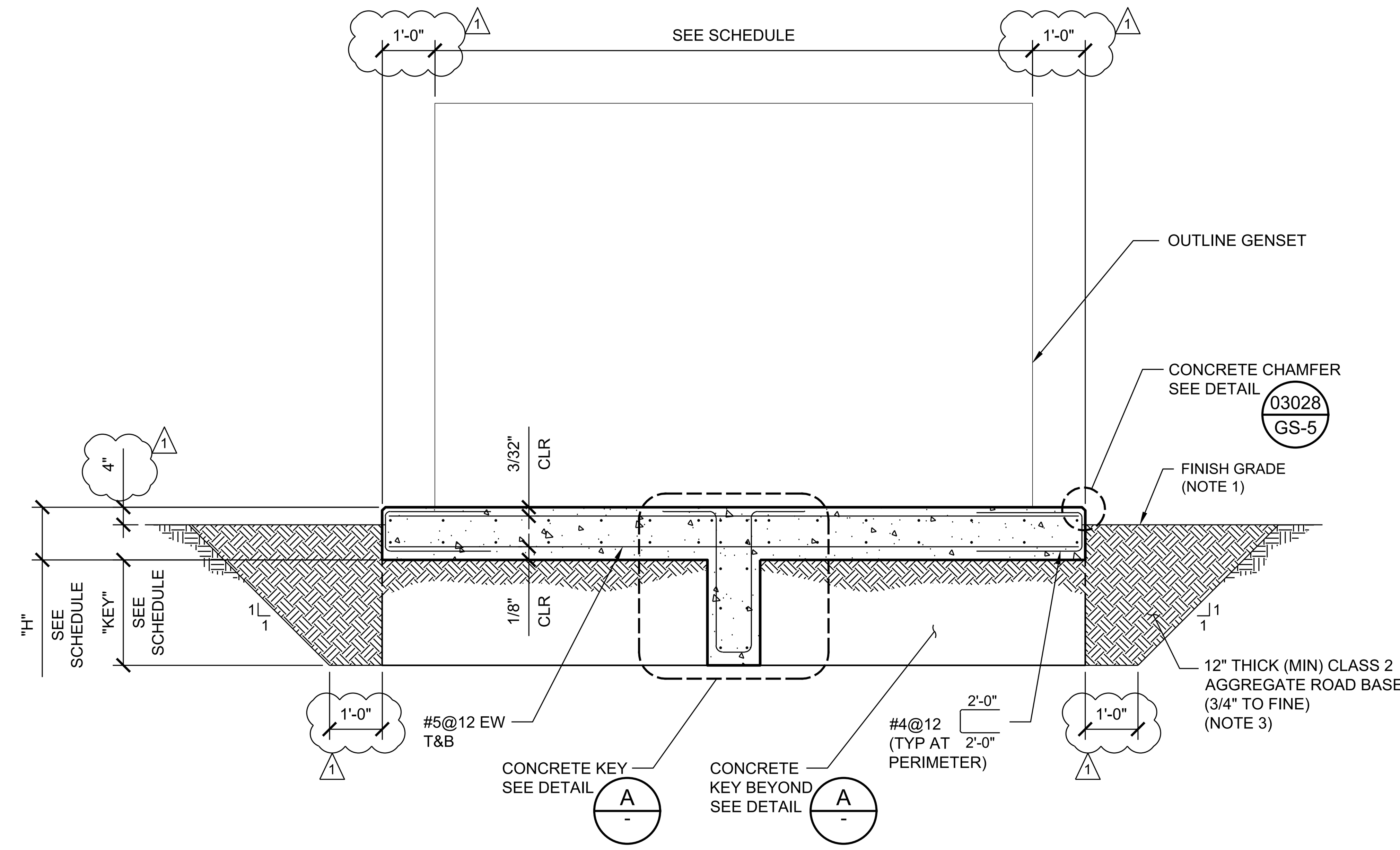


GENSET PAD SCHEDULE							
SITE	MODEL	WEIGHT	"A"	"B"	"H"	"KEY"	ANCHORAGE(1)(2)
F-BOOSTER PS	CAT C9-300ekW-60HZ	17,989 lbs	14'-6"	10'-9"	1'-4"	1'-5"	10 - 5/8"Ø (h_{ef} = 8")
ZONE B/C	CAT C18-600kW-60Hz	25,845 lbs	20'-3"	10'-9"	1'-4"	2'-3"	10 - 5/8"Ø (h_{ef} = 8")

(1) SIMPSON STRONGTIE SET-XP; W/ ATR A193 GR. B8/B8M (304/316 SS) (ICC-ES ESR-2508); OR APPROVED EQUAL.
(2) ASSUMES ANCHORS ARE EQUALLY SPACED, HALF PER LONG SIDE.
(3) ANY DEVIATIONS IN GENSET WEIGHTS AND/OR ANCHOR COUNT SHALL BE COORDINATED WITH ENGINEER PRIOR TO COMMENCEMENT OF THE WORK.
(4) SEE ELECTRICAL DRAWINGS FOR BALANCE OF INFORMATION.

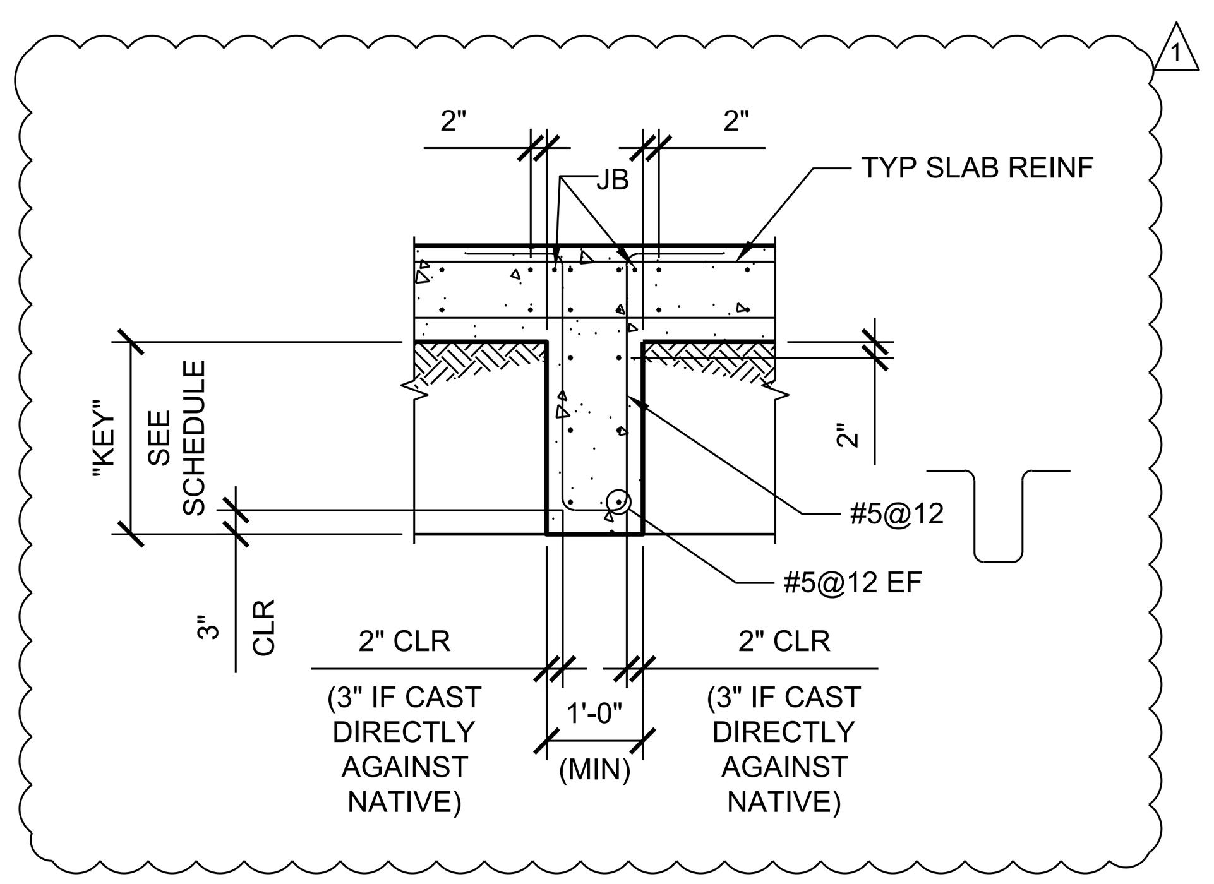
GENSET PAD PLAN

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



SECTION 1

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



DETAIL A

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

NOTES:

1. SLOPE GRADE AWAY FROM SLAB.
2. GENERATOR ANCHORAGE IS DEFERRED SUBMITTAL ITEMS AND IS THE RESPONSIBILITY OF THE CONTRACTOR. EQUIPMENT ANCHORAGE HAVE NOT BEEN DESIGNED BY THE ENGINEER OF RECORD. REFER TO STRUCTURAL NOTES ON SHEET GS-1 FOR ADDITIONAL INFORMATION.
3. 12" THICK (MIN) CLASS 2 AGGREGATE ROAD BASE (3/4" TO FINE) COMPACTED TO 95% OF MAXIMUM DENSITY AND MOISTURE CONTENT OF NOT LESS THAN TWO PERCENTAGE POINTS ABOVE OPTIMUM PER ASTM D1557.

CLASS 2 AGGREGATE ROAD BASE GRADATION	
SIEVE SIZE	PERCENT PASSING
1"	100
3/4"	88-100
NO. 4	30-65
NO. 30	5-35
NO. 200	0-12

4. SEE ELECTRICAL DRAWINGS FOR ORIENTATION ON PROJECT SITE.

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1/4/21

A1/A2 RESERVOIRS AND B/C BOOSTER PUMP STATION

GENSET
PLAN, SECTION, AND DETAIL

DATE: 1/4/2021
SCALE: AS SHOWN
DESIGN: RKT
DRAWN: BV
CHECK:

SHEET S-11 OF