



**Judson Rd. Water Infrastructure Improvement Project**  
**Solicitation Number: CO-00289-FG**  
**Job No.: 19-7002**

**ADDENDUM #2**  
**October 30, 2020**

To Bidder of Record:

This addendum, applicable to work referenced above, is an amendment to the bid proposal, plans and specification and such will be a part of and included in the Contract Documents. Acknowledge receipt of this addendum by entering the Addendum number and issue date on the space provided in submitted copies of the bid proposal.

<b>RESPONSES TO QUESTIONS</b>
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**1. Question: Can this bid be moved after Election Day?**

*Response: Bid opening has been extended to 9:00 a.m. (CT) on November 12, 2020.*

**2. Question: Please let me know if this project involve removing any coatings from steel surfaces?**

*Response: We are not aware of any coatings from steel surfaces that will need to be removed.*

**3. Question: On the above project, Line Item 41 reads as 6 EA, Two Way Sanitary Sewer Lift Station and references Spec No. 854.1. This Spec when looked up on your website is for Sanitary Sewer Laterals. Can you please clarify what this line item is?**

*Response: This item has been removed from the bid. See new bid proposal worksheet, attached in addendum.*

**4. Question: Line Item 50 is a CPS Energy Allowance for a new inline pole but there wasn't an amount included as the allowance. Can you please revise this line item to include the allowance amount?**

*Response: Allowance is estimated to be at \$15,000.00. Note: Reimbursement amount shall be the actual fees incurred with the project scope. CONTRACTOR shall provide receipts from CPS Energy to the OWNER for reimbursement.*

**5. Question: The line items for Mobilization and Prep of Right of Way were not included on the bid proposal. Are this subsidiary or can they be added as line items?**

*Response: Mobilization and Prep of Right of Way items are included on the bid proposal as items 52-55.*



6. **Question: Quality Assurance: Section E: Testing - Section 1 and 2 states that pumps must be factory tested and certified test results be provided. This is not done for small pumps that are being requested on this project. The pumps this project calls for are off the shelf pumps and not customer built to order like larger projects have. Those larger pumps are factory tested.**

*Response: Testing of the pumps shall be done as requested per section 1 and 2 of the quality assurance section.*

7. **Question: SP 870 - 1.05 Design Conditions: Section A - This section states that “....pumps shall be continuous duty and capable of passing a 3in non-compressible sphere”. This spec is for a solids handling sewage pump.**

*Response: Special Spec has been revised to read “....pumps shall be continuous duty and capable of cutting a 3in compressible sphere”.*

8. **Question: SP 870 - 2.00 Products: SUBMERSIBLE SEWAGE PUMP - “B. Cast Iron Grinder Pump” Spec calls out a grinder pump. A grinder pump is not a solids handling pump as requested in section 1.05.**

*Response: Special Spec has been revised to read “....pumps shall be continuous duty and capable of cutting a 3in compressible sphere” in section 1.05. To further clarify, Cast Iron Grinder Pumps shall be used for this project.*

## CHANGES TO THE PLANS

9. **Sheet 2 of 52 Addendum 2:**

*Removed Item 41 – Two Way Sanitary Sewer Cleanout (3” Pressure).  
Updated Overall Project Quantity Table*

10. **Sheet 9 of 52 Addendum 2:**

*Removed Two Way Sanitary Sewer Cleanout (3” Pressure) STA 18+50.00.  
Updated Sheet Quantity Table*

11. **Sheet 10 of 52 Addendum 2:**

*Removed Two Way Sanitary Sewer Cleanout (3” Pressure) STA 22+50.00.  
Updated Sheet Quantity Table*

12. **Sheet 11 of 52 Addendum 2:**

*Removed Two Way Sanitary Sewer Cleanout (3” Pressure) STA 26+69.00.  
Updated Sheet Quantity Table*



**13. Sheet 14 of 52 Addendum 2:**

*Removed Two Way Sanitary Sewer Cleanout (3" Pressure) STA 36+76.00.  
Updated Sheet Quantity Table*

**14. Sheet 16 of 52 Addendum 2:**

*Removed Two Way Sanitary Sewer Cleanout (3" Pressure) STA 43+80.00.  
Updated Sheet Quantity Table*

**15. Sheet 18 of 52 Addendum 2:**

*Removed Two Way Sanitary Sewer Cleanout (3" Pressure) STA 50+50.60.  
Updated Sheet Quantity Table*

**16. Sheet 22 of 52 Addendum 2:**

*Removed In-Line Cleanout – Force Main 3" DIA or Greater Detail).  
Updated Sheet Quantity Table*

**17. Sheet 31 of 52 Addendum 2:**

*Removed Pump/System Curve*

*Revised note no. 6 on plans (removed H20 rating requirement on wet well cover)*

*Revised Designed Criteria.*

*Revised Float Elevations*

*Added Electrically Power Vent Assist Fan with Air Injector to Vent Stack.*

**18. Sheet 35 of 52 Addendum 2:**

*Added power for vent pipe fan*

*Clarified requirements for lift station pumps and hazardous locations.*

**19. Sheet 37 of 52 Addendum 2:**

*Modified generator size and generator feeder size.*



**20. Sheet 39 of 52 Addendum 2:**

*Modified circuit for lift station pumps to reflect new pump sizes.*

*Added power for vent pipe fan to panel schedule.*

**21. Sheet 41A of 52 Addendum 2:**

*NEW SHEET ADDED TO PLAN SET*

*Added details for hazardous locations and requirements.*

<b>GEOTECHNICAL DATA REPORT</b>
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**22. Replace Geotechnical Report.**

*Revised Geotechnical Data Report will be uploaded to the website.*

<b>CHANGES TO THE SPECIFICATIONS</b>
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**23. Replace Bid Proposal (BP).**

*The Bid Proposal (BP) is being modified to revise deletion of item no. 41 and addition of CPS allowance amount. Remove the Bid Proposal (BP) in its entirety and replace with the revised version attached. The updated version must be used by Bidders when submitting a response for the project. Failure to do so may result in the bid being found non-responsive and rejected.*

**24. Replace Statement of Bidder's Experience (SBE).**

*The Statement of Bidder's Experience (SBE) form is being modified to revise the types of similar projects required to bid the project. Remove the Statement of Bidder's Experience (SBE) in its entirety and replace with the revised version attached. The updated version must be used by Bidders when submitting a response for the project. Failure to do so may result in the bid being found non-responsive and rejected.*

**25. Replace Section SP870 – Sanitary Sewer Lift Station.**

*Revised Section 1.05 DESIGN CONDITIONS*

*Revised Section 2.00 PRODUCTS*

*Revised SCHEDULES*

**26. Replace Section 26 32 13 – Diesel Engine Generator Sets.**

*Revised service load on generator.*



**END OF ADDENDUM #2**

This Addendum is 59 pages in its entirety, with 54 attachments.

Attachment:     Sheet 2 of 52 (1 page)  
                  Sheet 9 of 52 (1 page)  
                  Sheet 10 of 52 (1 page)  
                  Sheet 11 of 52 (1 page)  
                  Sheet 14 of 52 (1 page)  
                  Sheet 16 of 52 (1 page)  
                  Sheet 18 of 52 (1 page)  
                  Sheet 22 of 52 (1 page)  
                  Sheet 31 of 52 (1 page)  
                  Sheet 35 of 52 (1 page)  
                  Sheet 37 of 52 (1 page)  
                  Sheet 39 of 52 (1 page)  
                  Sheet 41A of 52 (1 page)  
                  Bid Proposal – BP (6 pages)  
                  Statement of Bidder’s Experience - SBE (6 pages)  
                  SP870 - Sanitary Sewer Lift Station (11 pages)  
                  Section 26 32 13 – Diesel Engine Generator Sets (18 pages)




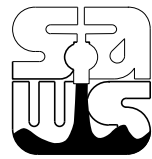
JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS QUANTITIES				
ITEM NO.	SPEC NO.	DESCRIPTION	UNITS	QUANTITY
1	103.1	REMOVE CONCRETE CURB	LF	150
2	103.3	REMOVE SIDEWALK AND DRIVEWAYS	SF	1120
3	202.1	PRIME COAT	GAL	137
4	203.1	TACK COAT	GAL	69
5	205.3	HOT MIX ASPHALTIC PAVEMENT, TYPE C (2" COMP DEPTH)	SY	681
6	206.1	ASPHALT TREATED BASE (12" COMP DEPTH)	SY	128
7	208.1	SALVAGING, HAULING & STOCKPILING RECLAIMABLE ASPHALTIC PAVEMENT (2")	SY	681
8	401.0	15" REINFORCED CONCRETE PIPE (CLASS III)	LF	468
9	401.1	24" REINFORCED CONCRETE PIPE (CLASS III)	LF	57
10	401.4	12" SAFETY END TREATMENT (TYPE II)	EA	2
11	401.4	24" SAFETY END TREATMENT (TYPE II)	EA	2
12	500.4	CONCRETE CURB AND GUTTER	LF	150
13	502.1	CONCRETE SIDEWALKS	SY	20
14	503.2	CONCRETE DRIVEWAYS - COMMERCIAL	SY	91
15	515.1	TOPSOIL (4")	CY	650
16	520.1	HYDROMULCHING	SY	5759
17	530.0	BARRICADES, SIGNS, AND TRAFFIC HANDLING	LS	1
18	540.0	STORM WATER POLLUTION PREVENTION PLAN	LS	1
19	540.1	ROCK FILTER DAMS (INSTALL/REMOVE) (TYPE 3)	LF	100
20	550.0	TRENCH EXCAVATION SAFETY PROTECTION	LF	3212
21	658.0	INSTALL OBJECT MARKER ASSEMBLIES	EA	2
22	SP 801	LEVEL II B PROTECTIVE FENCING	EA	15
23	SP 815	3" HDPE FORCEMAIN DR11 (INSTALLED, OPEN CUT)	LF	1362
24	SP 815	3" HDPE FORCEMAIN DR11 (MATERIAL, TRENCHLESS)	LF	2675
25	SP 815	4" HDPE WATERLINE DR11	LF	5
26	SP 815	8" HDPE WATERLINE DR11	LF	5
27	SP 815	16" HDPE WATERLINE DR11	LF	1840
28	824.0	NEW UNMETERED 1" SHORT SERVICE	EA	1
29	828.0	3" PLUG VALVE AND BOX, COMPLETE	EA	2
30	828.0	4" GATE VALVE AND BOX COMPLETE	EA	1
31	828.0	8" GATE VALVE AND BOX COMPLETE	EA	1
32	828.0	16" GATE VALVE AND BOX COMPLETE	EA	3
33	833.0	NEW METER BOX	EA	1
34	834.1	FIRE HYDRANT W/6-IN VALVE & BOX	EA	2
35	836.0	PIPE FITTINGS ALL SIZES AND TYPES	TON	0.42
36	840.0	24" WATER TIE-INS	EA	1
37	841.0	HYDROSTATIC TESTING	EA	4
38	844.0	2" BLOWOFF, TEMPORARY	EA	3
39	846.0	1" COMBINATION AIR RELEASE VALVE	EA	2
40	846.0	2" COMBINATION AIR RELEASE VALVE	EA	3
42	858.0	CONCRETE ENCASMENT, CRADLES, SADDLES AND COLLARS	CY	0.14
43	SP 864-S1	BYPASS PUMPING SMALL DIAMETER SANITARY SEWER	LS	1
44	866.0	SEWER MAIN PRE-TELEVISION INSPECTION AND CLEANING (LOOP 1604 CASING)	LF	618
45	SP 870	SANITARY SEWER LIFT STATION	LS	1
46	SP 872	EXISTING CASING - 3" HDPE FORCEMAIN DR11 TO BE INSTALLED	LF	618
47	SP 880	HORIZONTAL DIRECTIONAL DRILLING	LF	2057
48	SP 910	REHABILITATE EXISTING MANHOLE	VF	10
49	DIVISION 26	ELECTRICAL SPECS PAY ITEMS	LS	1
50	SC 11	CPS ENERGY ALLOWANCE - NEW INLINE POLE	LS	1
51	6001	PORTABLE MESSAGE SIGN (TXDOT SPEC)	EA	1

## INDEX OF SHEETS

SHT NO.	DESCRIPTION
1	COVER SHEET
2	INDEX OF DRAWINGS AND SUMMARY OF QUANTITIES
3	SAWS GENERAL NOTES
4	GENERAL CONSTRUCTION NOTES
5	PROJECT LAYOUT AND SURVEY CONTROLS FORCE MAIN
6	HORIZONTAL DATA FORCE MAIN
7	PROJECT LAYOUT AND HORIZONTAL DATA SHEET 1 OF 1
8-18	FORCE MAIN PLAN AND PROFILE LAYOUTS
19-21	WATER MAIN LAYOUTS
22-23	SEWER DETAILS
24-25	WATER DETAILS
26	DRIVEWAY DETAILS
27	CONCRETE DRIVEWAY STANDARDS
28	SAFETY END TREATMENT STANDARD
29	SEWER SUGGESTED BYPASS
30	LIFT STATION SITE AND GRADING PLANS
31	LIFT STATION SECTION
32	LIFT STATION DETAILS
33-41A	LIFT STATION ELECTRICAL PLANS AND DETAILS
42	TRAFFIC CONTROL PLAN
43	TRAFFIC CONTROL LANE CLOSURE STANDARD
44	EROSION / SEDIMENTATION CONTROL PLAN GENERAL NOTES
45	EROSION / SEDIMENTATION STANDARD NOTES AND DETAILS
46-51	TREE PRESERVATION LAYOUT SHEETS
52	TREE PROTECTION DETAILS



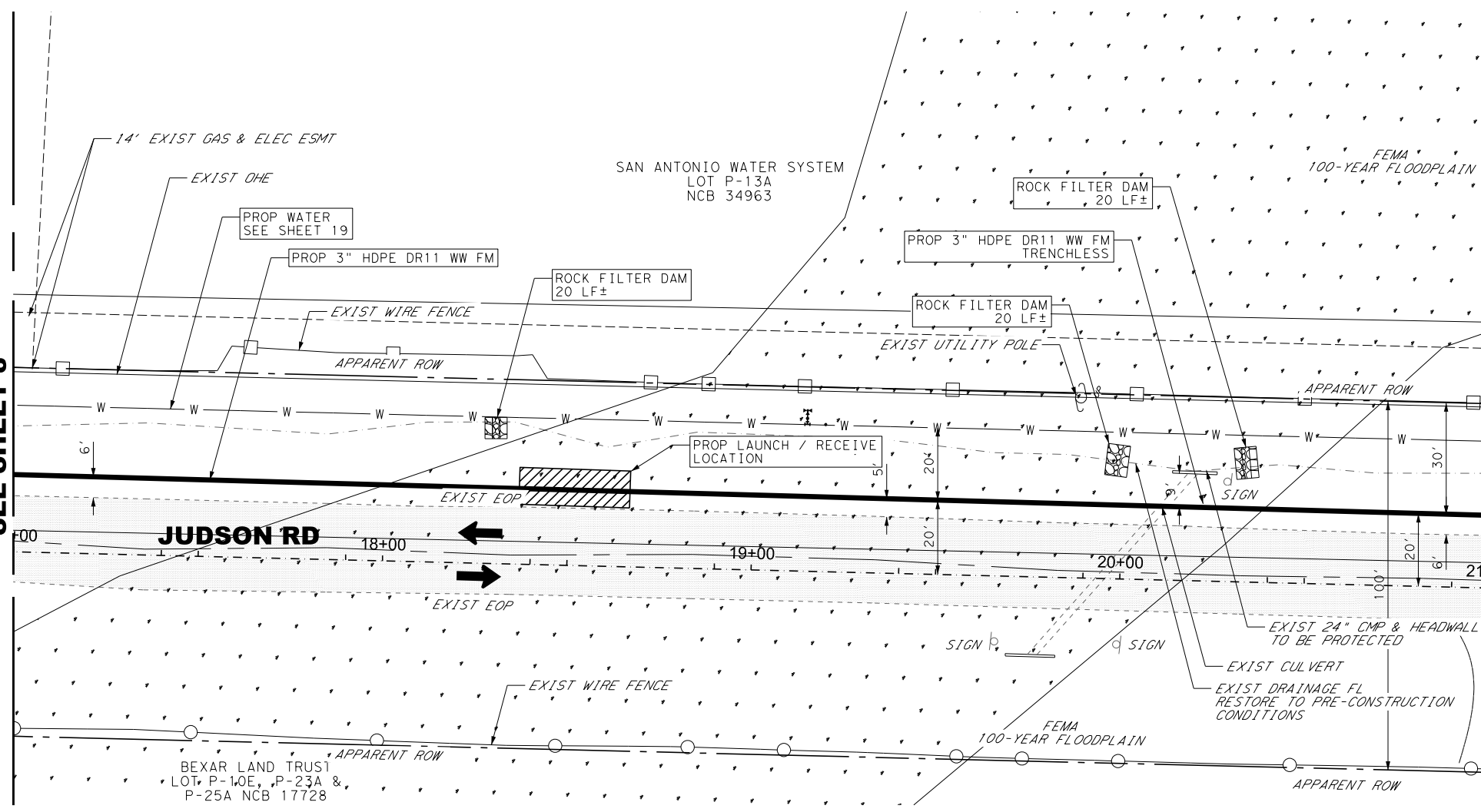
FINAL SET 10/28/2020

		KCI TECHNOLOGIES, INC. 13750 SAN PEDRO AVENUE - SUITE 640 SAN ANTONIO, TX 78232 - 210.544.5751 TEXAS REGISTERED ENGINEERING FIRM TBPE FIRM No. F-10573 www.kci.com		
△	Addendum No.2	AJ	DR2	10/28/20
NO.	DRAWN	APPROVED	DATE	
<b>REVISIONS</b>				
		JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS <b>INDEX OF DRAWINGS          AND          SUMMARY OF QUANTITIES</b>		
DEVELOPER: SAN ANTONIO WATER SYSTEM				
CONT.		BUDGET PROJ. #		
SUBMITTED _____				
APPROVED _____				
MAP No. MISC.192-642, 194-642		JOB No.: 19-7002		SHEET
SECT No.	DRN: NM	DSGN: NM	CHK: FJD	2 OF 52

JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS QUANTITIES			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
515.1	TOPSOIL (4")	CY	28.70
520.1	HYDROMULCHING	SY	258
540.1	ROCK FILTER DAMS (INSTALL/REMOVE) (TYPE 3)	LF	60
550.0	TRENCH EXCAVATION SAFETY PROTECTION	LF	155
SP 815	3" HDPE FORCEMAIN DR11 (INSTALLED, OPEN CUT)	LF	155
SP 815	3" HDPE FORCEMAIN DR11 (MATERIAL, TRENCHLESS)	LF	244
SP 880	HORIZONTAL DIRECTIONAL DRILLING	LF	244

MATCHLINE STA 17+00  
SEE SHEET 8

MATCHLINE STA 21+00  
SEE SHEET 10

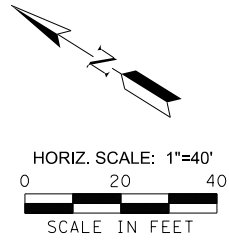


NOTES:

- SEE SHEET 19 FOR PROPOSED WATER MAIN.
- DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, CPS ENERGY MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES IN THIS AREA.
- PROPOSED FORCE MAIN SHALL BE 3" HDPE DR11 (DUCTILE IRON PIPE SIZE).
- CONTRATOR SHALL REMOVE, STORE AND REPLACE SIGNS AFTER CONSTRUCTION. PAYMENT FOR REMOVING, STORING AND REPLACING SIGNS SHALL BE SUBSIDIARY TO PREPARATION OF RIGHT-OF-WAY.
- THE LAUNCH / RECEIVE PITS DEPICTED ON THE PLANS ARE FOR REFERENCE ONLY. THE SHAPE SHOWN REPRESENTS AN AREA APPROXIMATELY 10 FEET WIDE BY 30 FEET LONG. CONTRACTOR IS RESPONSIBLE FOR DETERMINING AREA REQUIRED TO PERFORM THE WORK BASED ON THE CONTRACTOR'S MEANS AND METHODS.



FINAL SET 10/28/2020



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NO.	DRAWN	APPROVED	DATE
1	AJ	DR2	10/28/20

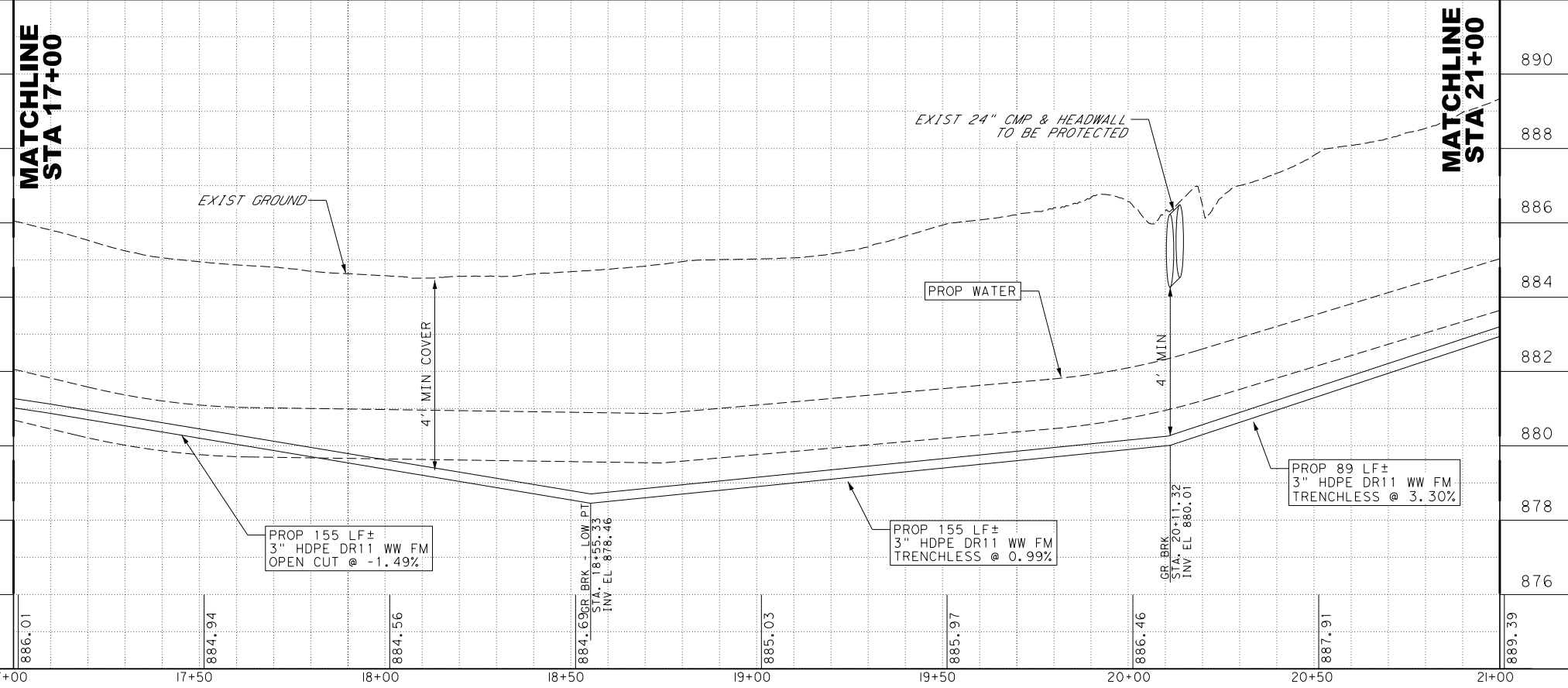
**REVISIONS**

JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS  
FORCE MAIN LAYOUT P & P  
STA 17+00 TO STA 21+00  
SHEET 2 OF 11

DEVELOPER: SAN ANTONIO WATER SYSTEM	
CONT.	BUDGET PROJ. #
SUBMITTED	
APPROVED	
MAP No.	192-642, 194-642
SECT No.	JOB No.: 19-7002
DRN: NM	DSGN: NM
CHK: FJD	

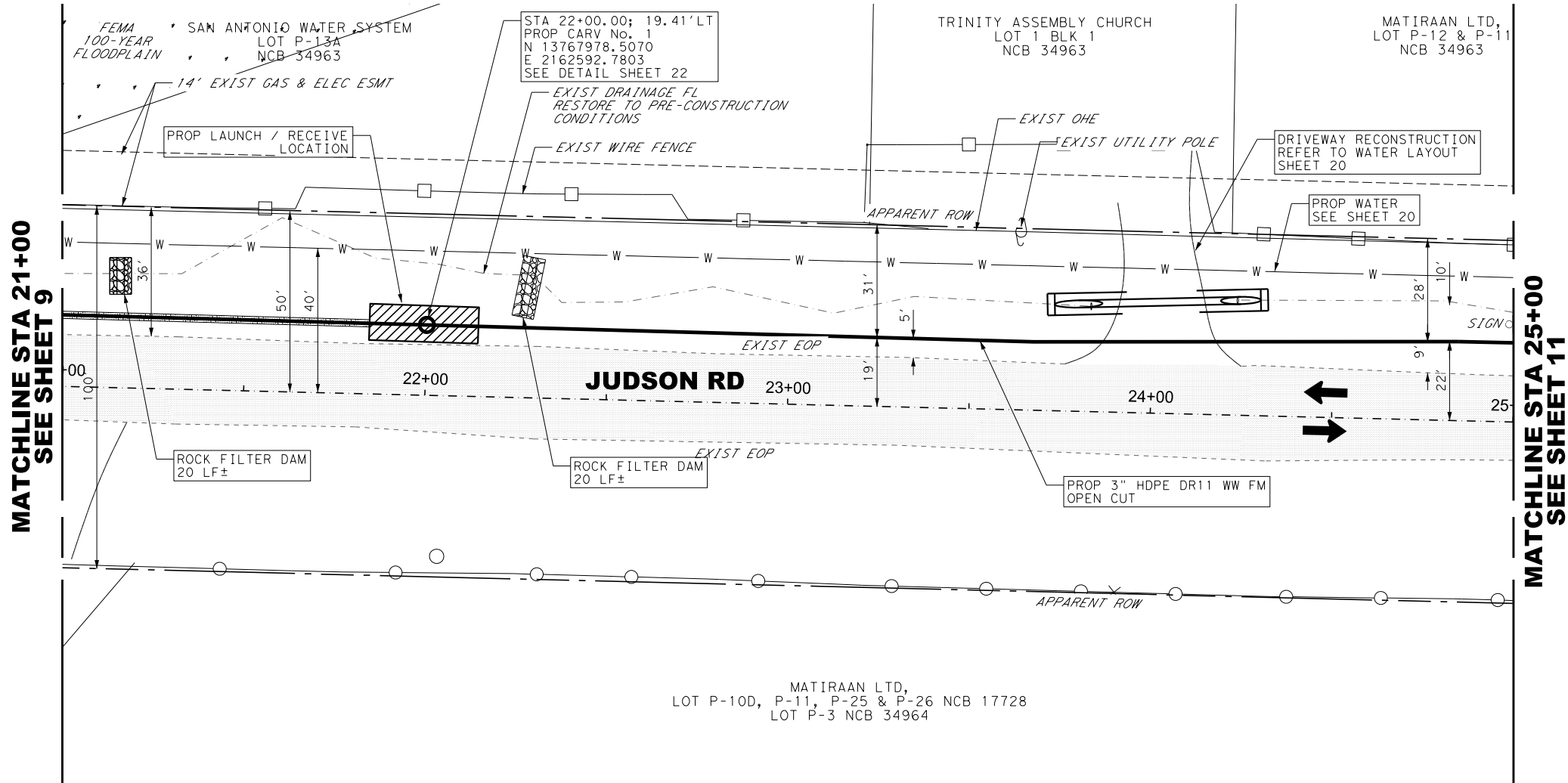
**LEGEND**

- EXIST CONCRETE RIPRAP
- EXIST PAVEMENT
- FLEX BASE PAVEMENT
- PROP FORCE MAIN
- EXIST SANITARY SEWER
- PROP WATER MAIN
- EXIST WATER MAIN
- EXIST DRAINAGE
- GAS MAIN
- UTILITY POLE LINE
- ELECTRIC CABLE
- EASEMENT
- EXIST CASING
- APPARENT ROW
- EXIST CONCRETE
- EXIST WIRE FENCE
- EXIST BARBED WIRE FENCE
- TRAFFIC FLOW ARROW
- UTILITY CROSSING





JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS QUANTITIES			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
515.1	TOPSOIL (4")	CY	55.56
520.1	HYDROMULCHING	SY	500
540.1	ROCK FILTER DAMS (INSTALL/REMOVE) (TYPE 3)	LF	40
550.0	TRENCH EXCAVATION SAFETY PROTECTION	LF	300
SP 815	3" HDPE FORCEMAIN DR11 (INSTALLED, OPEN CUT)	LF	300
SP 815	3" HDPE FORCEMAIN DR11 (MATERIAL, TRENCHLESS)	LF	100
846.0	2" COMBINATION AIR RELEASE VALVE	EA	1
SP 880	HORIZONTAL DIRECTIONAL DRILLING	LF	100

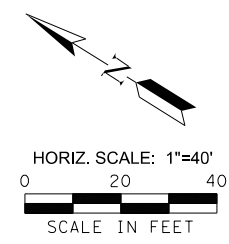


NOTES:

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FINAL SET 10/28/2020



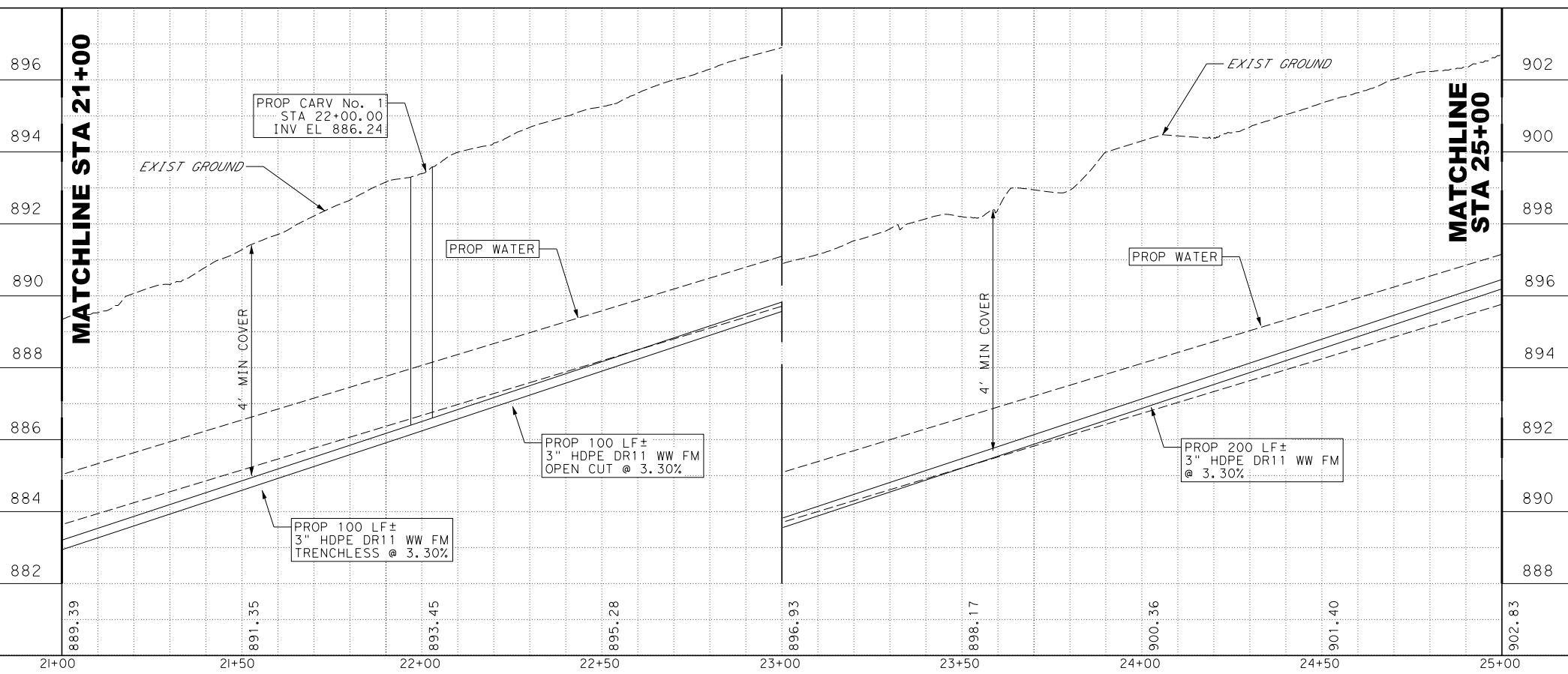
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NO.	DRAWN	APPROVED	DATE
1	AJ	DR2	10/28/20

**REVISIONS**

JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS  
 FORCE MAIN LAYOUT P & P  
 STA 21+00 TO STA 25+00  
 SHEET 3 OF 11

DEVELOPER: SAN ANTONIO WATER SYSTEM		BUDGET PROJ. #	
SUBMITTED		APPROVED	
MAP No.	192-642, 194-642	SHEET	
SECT No.	JOB No.: 19-7002	10 OF 52	
DRN: NM	DGSN: NM	CHK: FJD	



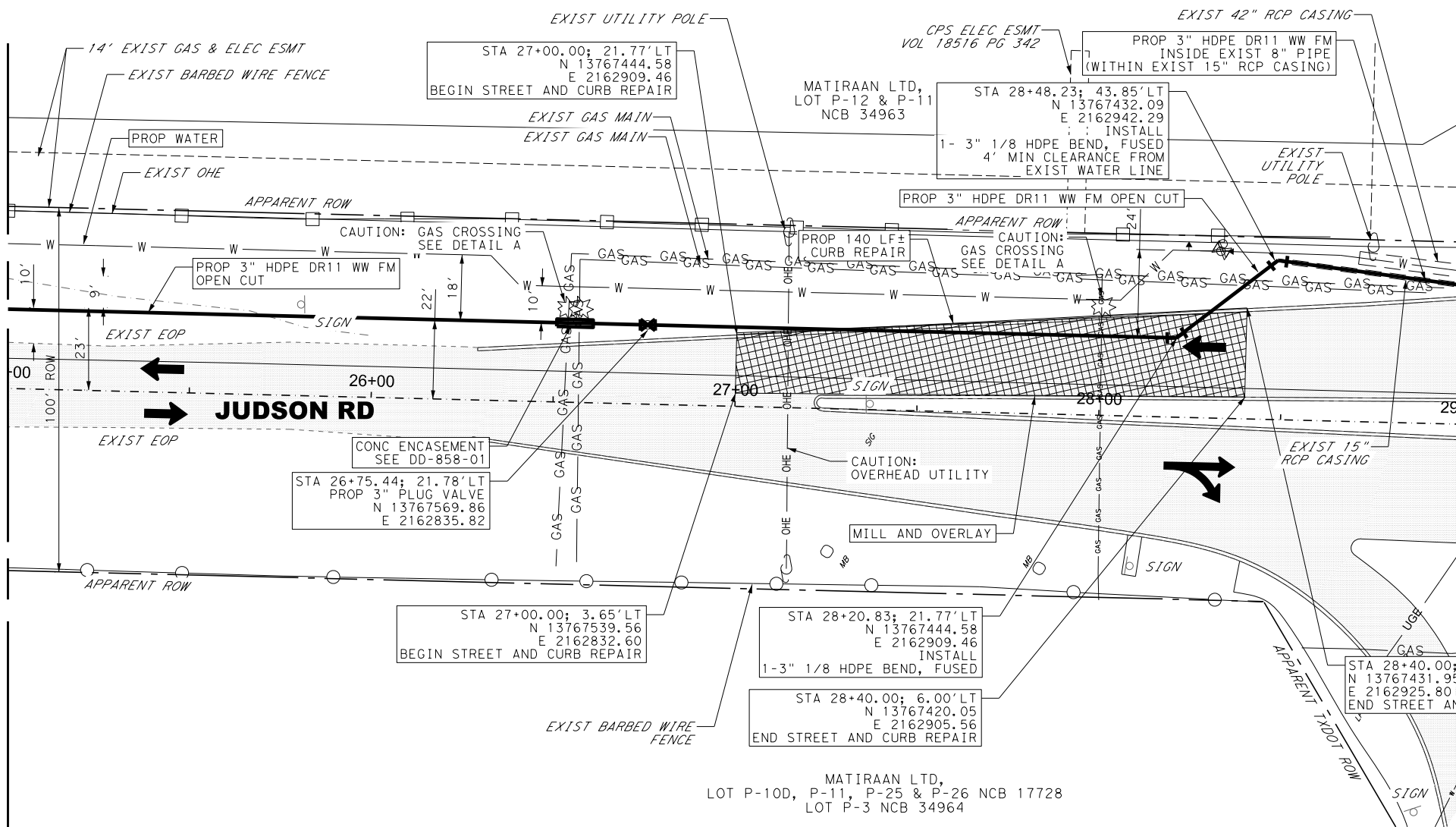
**LEGEND**

- EXIST CONCRETE RIPRAP
- EXIST PAVEMENT
- FLEX BASE PAVEMENT
- PROP FORCE MAIN
- EXIST SANITARY SEWER
- PROP WATER MAIN
- EXIST WATER MAIN
- EXIST DRAINAGE
- GAS MAIN
- UTILITY POLE LINE
- ELECTRIC CABLE
- EASEMENT
- EXIST CASING
- APPARENT ROW
- EXIST CONCRETE
- EXIST WIRE FENCE
- EXIST BARBED WIRE FENCE
- TRAFFIC FLOW ARROW
- UTILITY CROSSING



MATCHLINE STA 25+00  
SEE SHEET 10

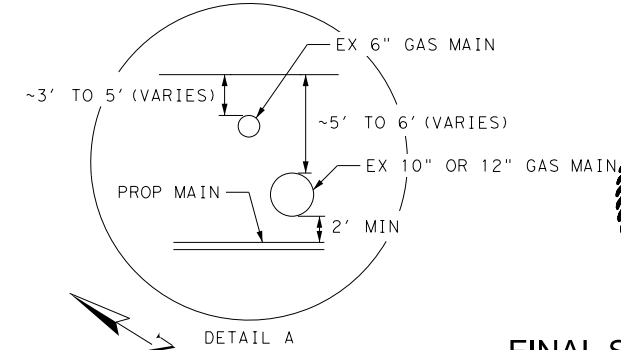
MATCHLINE STA 29+00  
SEE SHEET 12



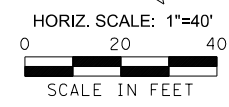
JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS QUANTITIES			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
103.1	REMOVE CONCRETE CURB	LF	140
202.1	PRIME COAT	GAL	62
203.1	TACK COAT	GAL	31
205.3	HOT MIX ASPHALTIC PAVEMENT, TYPE C (2" COMP DEPTH)	SY	311
206.1	ASPHALTIC TREATED BASE (12" COMP DEPTH)	SY	78
208.1	SALVAGING, HAULING & STOCKPILING RECLAIMABLE ASPHALTIC PAVEMENT (2")	SY	311
500.4	CONCRETE CURB AND GUTTER	LF	140
515.1	TOPSOIL (4")	CY	67.04
520.1	HYDROMULCHING	SY	603
550.0	TRENCH EXCAVATION SAFETY PROTECTION	LF	362
SP 815	3" HDPE FORCEMAIN DR11 (INSTALLED, OPEN CUT)	LF	362
SP 815	3" HDPE FORCEMAIN DR11 (MATERIAL, TRENCHLESS)	LF	48
828.0	3" PLUG VALVE AND BOX COMPLETE	EA	1
836.0	PIPE FITTINGS ALL SIZES AND TYPES	TON	0.003
858.0	CONCRETE ENCASEMENT, CRADLES, SADDLES AND COLLARS	CY	0.139
866.0	SEWER MAIN PRE-TELEVISION INSPECTION AND CLEANING (LOOP 1604 CASING)	LF	48
SP 872	EXISTING CASING HDPE PIPE INSTALLATION	LF	48

NOTES:

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FINAL SET 10/28/2020



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TEXAS REGISTERED ENGINEERING FIRM  
TBPE FIRM No. F-10573  
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NO.	DESCRIPTION	DRAWN	APPROVED	DATE
1	Addendum No.2	AJ	DR2	10/28/20

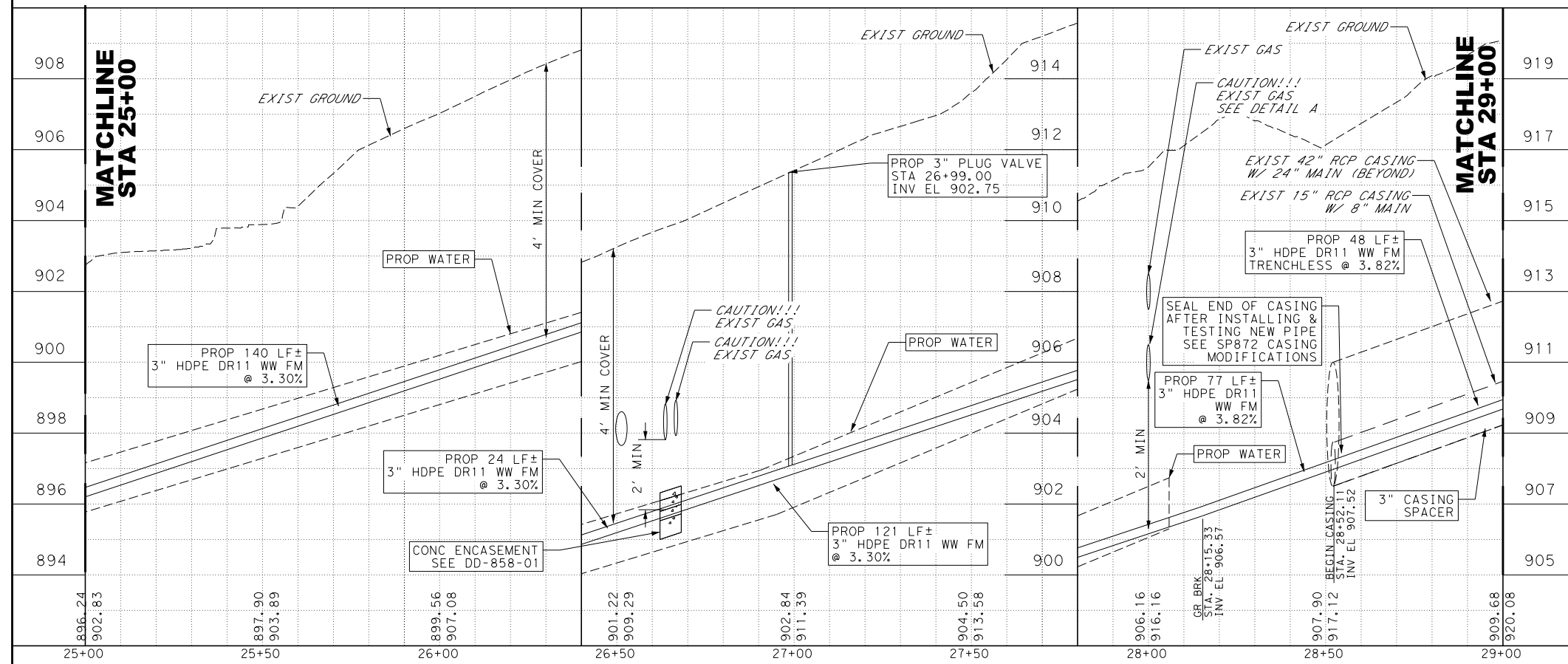
REVISIONS

JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS  
**FORCE MAIN LAYOUT P & P**  
STA 25+00 TO STA 29+00  
SHEET 4 OF 11

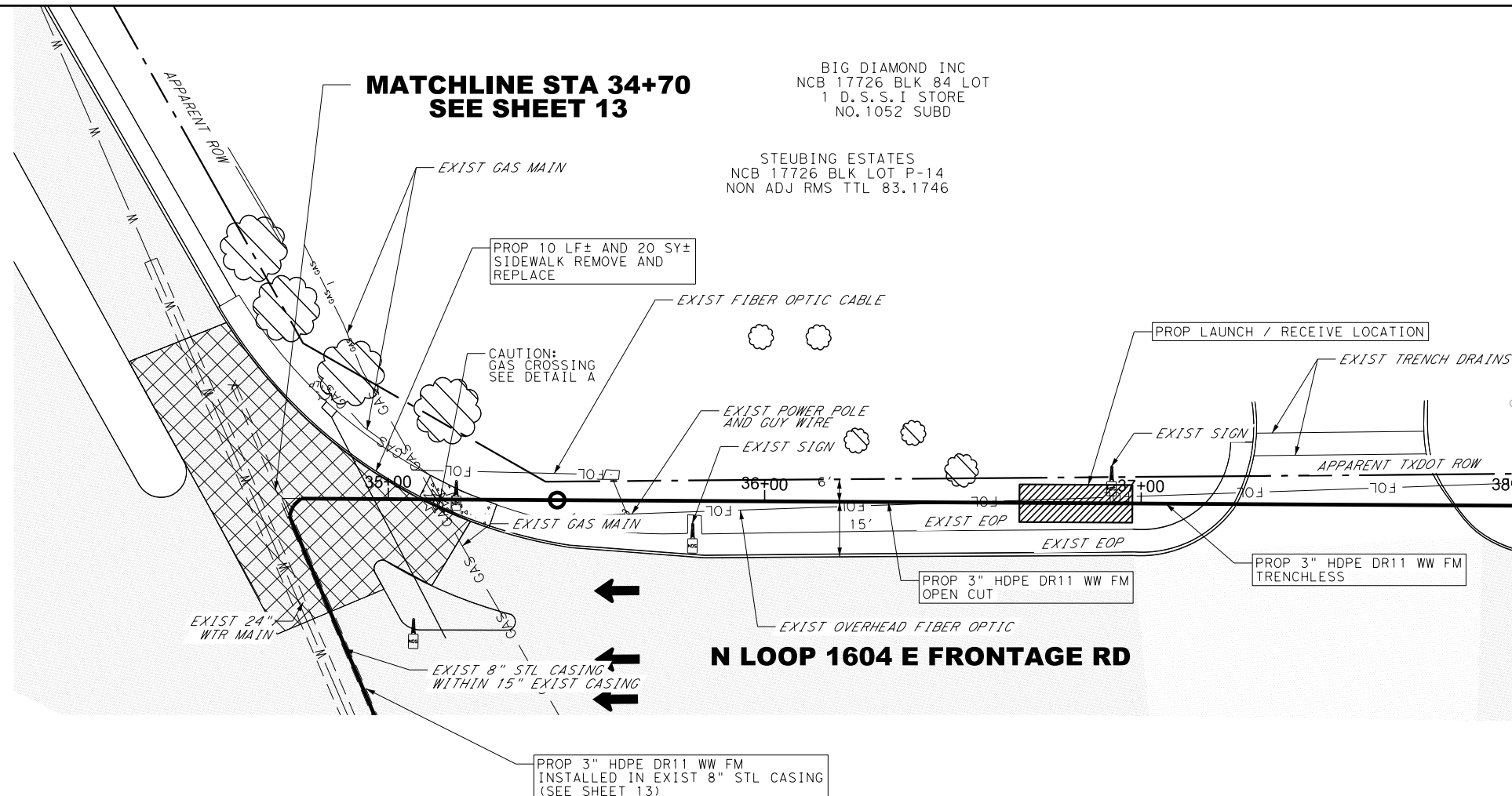
DEVELOPER:	SAN ANTONIO WATER SYSTEM		
CONT.	BUDGET PROJ. #		
SUBMITTED			
APPROVED			
MAP No.	192-642, 194-642		SHEET
SECT No.	JOB No.:	19-7002	11 OF 52
DRN: NM	DGSN: NM	CHK: FJD	

LEGEND

EXIST CONCRETE RIPRAP	[Symbol]
EXIST PAVEMENT	[Symbol]
FLEX BASE PAVEMENT	[Symbol]
PROP FORCE MAIN	[Symbol]
EXIST SANITARY SEWER	[Symbol]
PROP WATER MAIN	[Symbol]
EXIST WATER MAIN	[Symbol]
EXIST DRAINAGE	[Symbol]
GAS MAIN	[Symbol]
UTILITY POLE LINE	[Symbol]
ELECTRIC CABLE	[Symbol]
EASEMENT	[Symbol]
EXIST CASING	[Symbol]
APPARENT ROW	[Symbol]
EXIST CONCRETE	[Symbol]
EXIST WIRE FENCE	[Symbol]
EXIST BARBED WIRE FENCE	[Symbol]
TRAFFIC FLOW ARROW	[Symbol]
UTILITY CROSSING	[Symbol]

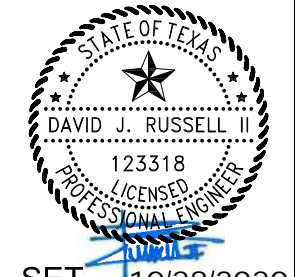
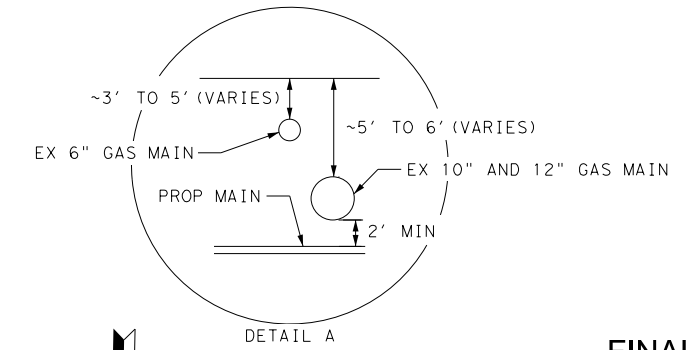


JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS QUANTITIES			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
515.1	TOPSOIL (4")	CY	37.96
520.1	HYDROMULCHING	SY	342
550.0	TRENCH EXCAVATION SAFETY PROTECTION	LF	205
SP 801	LEVEL II B PROTECTIVE FENCING	EA	7
SP 815	3" HDPE FORCEMAIN DR11 (INSTALLED, OPEN CUT)	LF	205
SP 815	3" HDPE FORCEMAIN DR11 (MATERIAL, TRENCHLESS)	LF	124
836.0	PIPE FITTINGS ALL SIZES AND TYPES	TON	0.005
841.0	HYDROSTATIC TESTING	EA	1
844.0	2" BLOWOFF, TEMPORARY	EA	1
846.0	2" COMBINATION AIR RELEASE VALVE	EA	1
SP 880	HORIZONTAL DIRECTIONAL DRILLING	LF	124

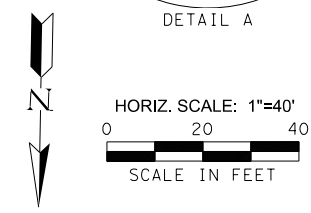
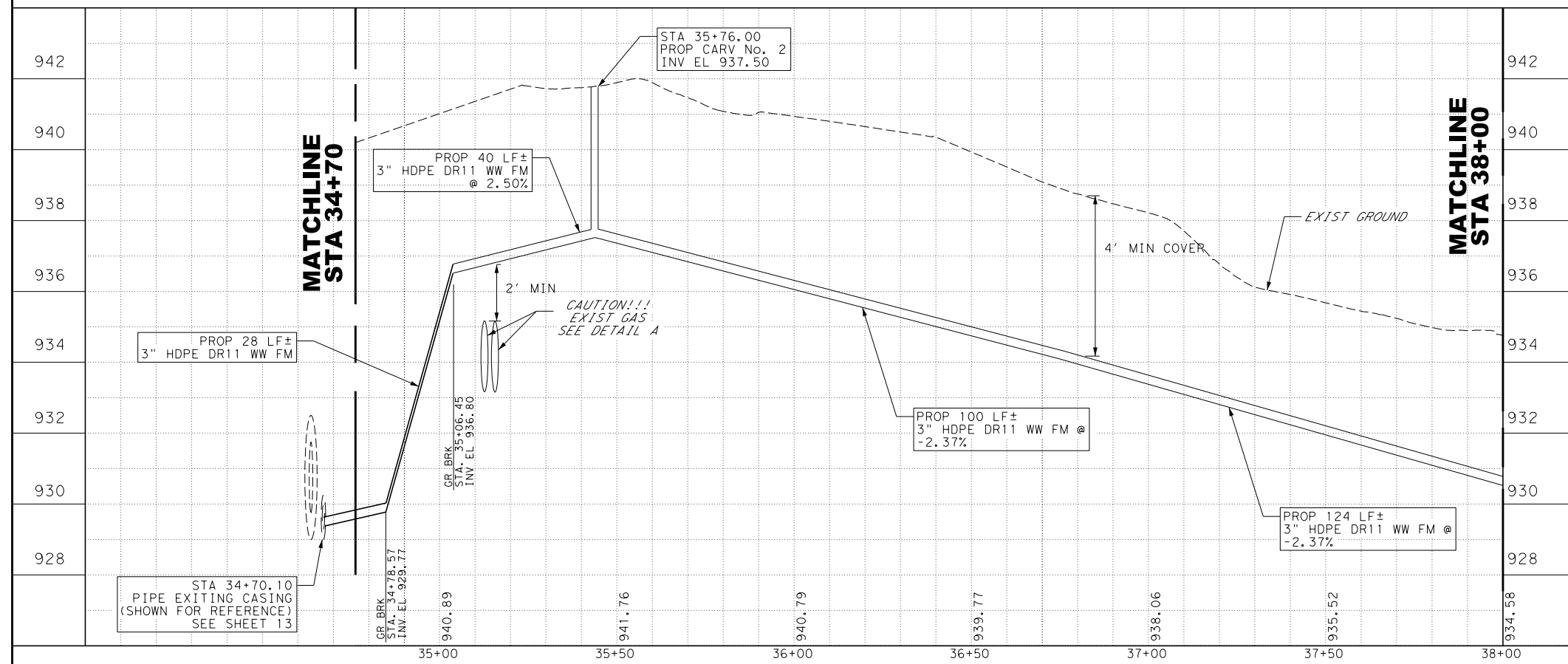


**NOTES:**

- SEE SHEETS 19 THROUGH 21 FOR PROPOSED WATER MAIN.
- DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, CPS ENERGY MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES IN THIS AREA.
- PROPOSED FORCE MAIN SHALL BE 3" HDPE DR11 (DUCTILE IRON PIPE SIZE).
- CONTRACTOR SHALL REMOVE, STORE AND REPLACE SIGNS AFTER CONSTRUCTION. PAYMENT FOR REMOVING, STORING AND REPLACING SIGNS SHALL BE SUBSIDIARY TO PREPARATION OF RIGHT-OF-WAY.
- THE LAUNCH / RECEIVE PITS DEPICTED ON THE PLANS ARE FOR REFERENCE ONLY. THE SHAPE SHOWN REPRESENTS AN AREA APPROXIMATELY 10 FEET WIDE BY 30 FEET LONG. CONTRACTOR IS RESPONSIBLE FOR DETERMINING AREA REQUIRED TO PERFORM THE WORK BASED ON THE CONTRACTOR'S MEANS AND METHODS.
- CONTRACTOR TO RELOCATE / REPAIR PRIVATE SPRINKLER SYSTEM.



**FINAL SET 10/28/2020**



**LEGEND**

- EXIST CONCRETE RIPRAP
- EXIST PAVEMENT
- FLEX BASE PAVEMENT
- PROP FORCE MAIN
- EXIST SANITARY SEWER
- PROP WATER MAIN
- EXIST WATER MAIN
- EXIST DRAINAGE
- GAS MAIN
- UTILITY POLE LINE
- ELECTRIC CABLE
- EASEMENT
- EXIST CASING
- APPARENT ROW
- EXIST CONCRETE
- EXIST WIRE FENCE
- EXIST BARBED WIRE FENCE
- TRAFFIC FLOW ARROW
- UTILITY CROSSING

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NO.	DRAWN	APPROVED	DATE
1	AJ	DR2	10/28/20

**REVISIONS**

JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS  
**FORCE MAIN LAYOUT P & P**  
STA 34+70 TO STA 38+00  
SHEET 7 OF 11

DEVELOPER: SAN ANTONIO WATER SYSTEM  
CONT. BUDGET PROJ. #  
SUBMITTED  
APPROVED

MAP No. 192-642, 194-642  
SECT No. JOB No.: 19-7002  
DRN: NM DSGN: NM CHK: FJD

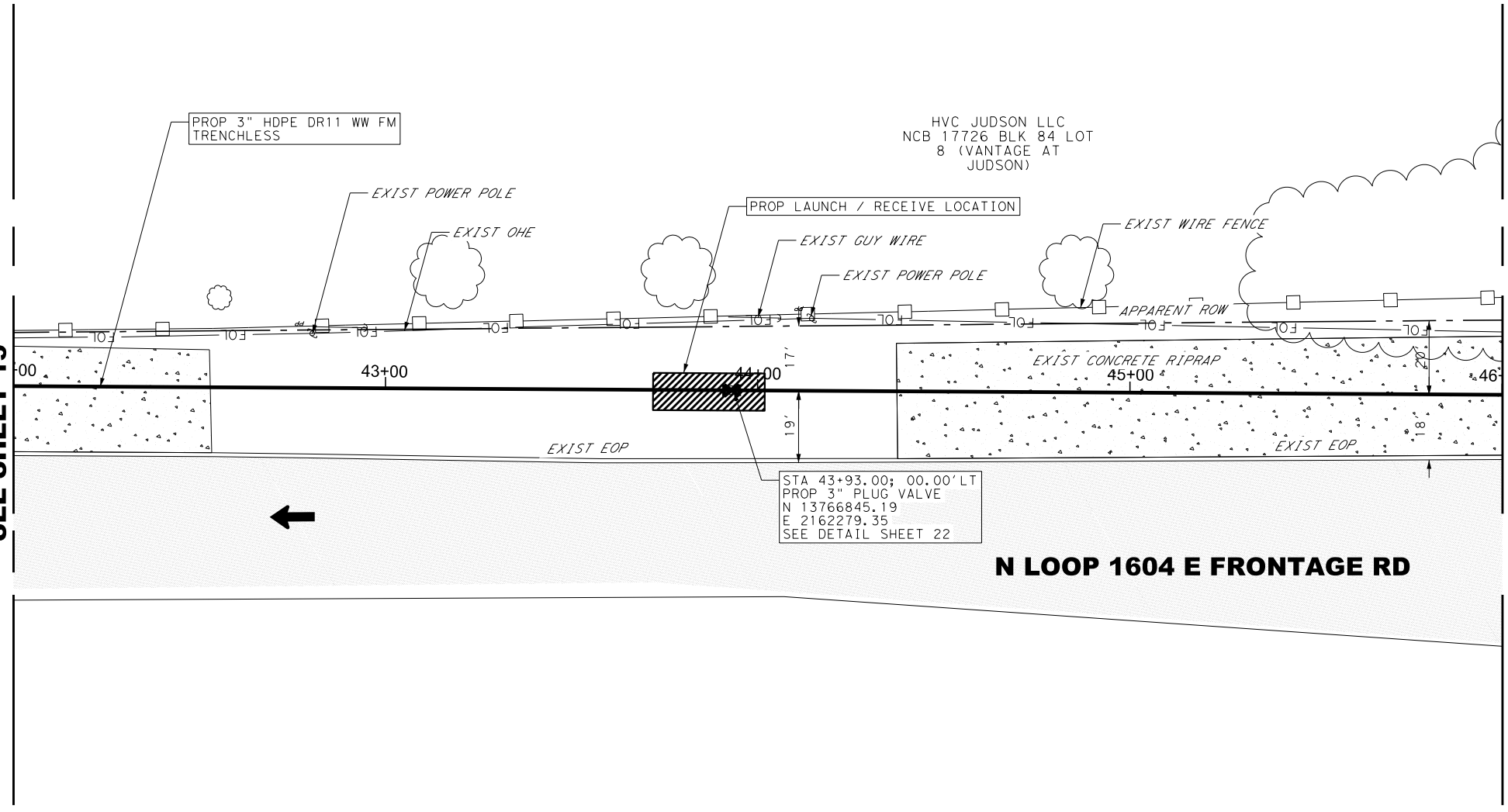
SHEET 14 OF 52



JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS QUANTITIES			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
515.1	TOPSOIL (4")	CY	3.70
520.1	HYDROMULCHING	SY	33
SP 815	3" HDPE FORCEMAIN DR11 (MATERIAL, TRENCHLESS)	LF	400
828.0	3" PLUG VALVE AND BOX COMPLETE	EA	1
SP 880	HORIZONTAL DIRECTIONAL DRILLING	LF	400

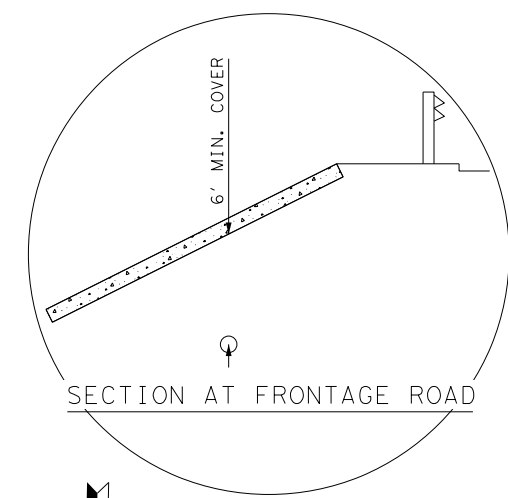
MATCHLINE STA 42+00  
SEE SHEET 15

MATCHLINE STA 46+00

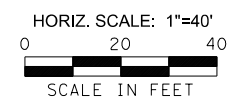
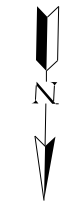
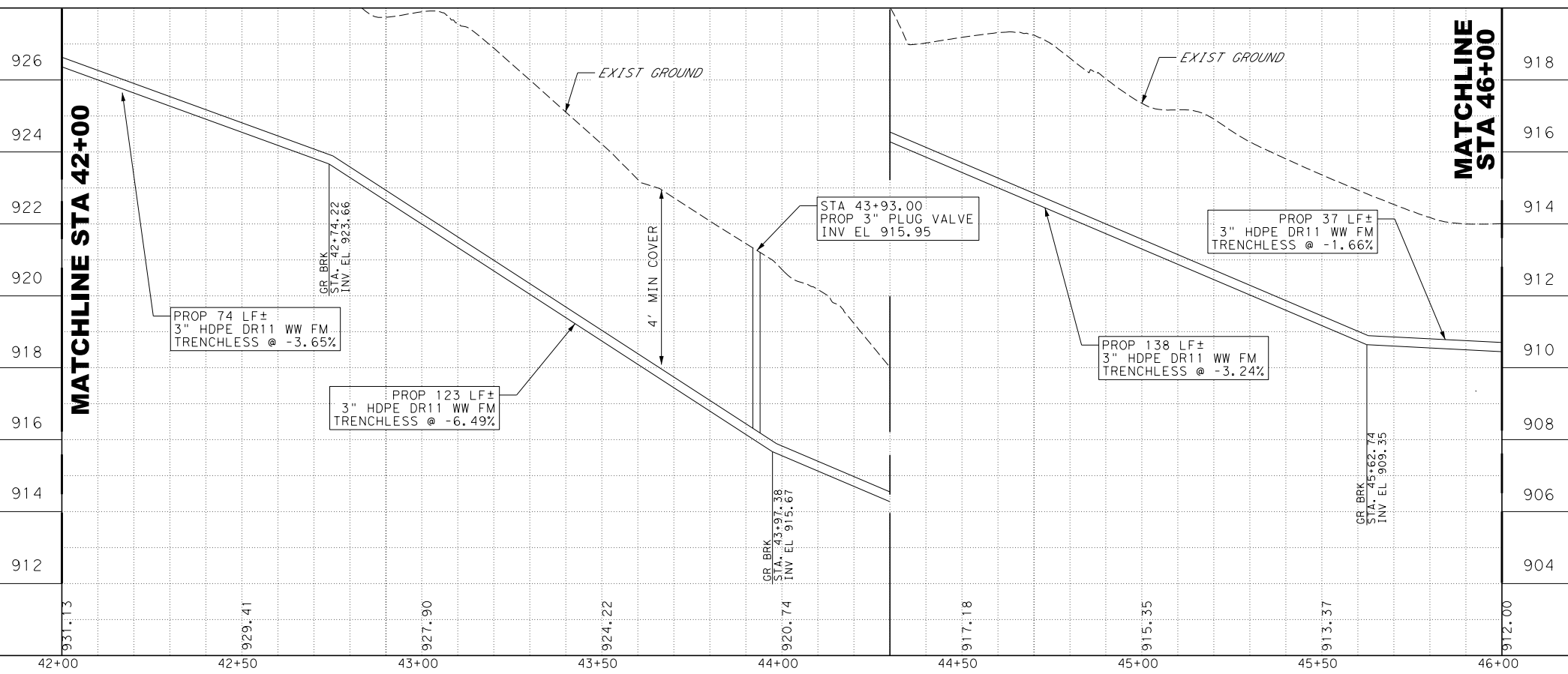


NOTES:

- SEE SHEETS 19 THROUGH 21 FOR PROPOSED WATER MAIN.
- DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, CPS ENERGY MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES IN THIS AREA.
- PROPOSED FORCE MAIN SHALL BE 3" HDPE DR11 (DUCTILE IRON PIPE SIZE).
- CONTRACTOR SHALL REMOVE, STORE AND REPLACE SIGNS AFTER CONSTRUCTION. PAYMENT FOR REMOVING, STORING AND REPLACING SIGNS SHALL BE SUBSIDIARY TO PREPARATION OF RIGHT-OF-WAY.
- THE LAUNCH / RECEIVE PITS DEPICTED ON THE PLANS ARE FOR REFERENCE ONLY. THE SHAPE SHOWN REPRESENTS AN AREA APPROXIMATELY 10 FEET WIDE BY 30 FEET LONG. CONTRACTOR IS RESPONSIBLE FOR DETERMINING AREA REQUIRED TO PERFORM THE WORK BASED ON THE CONTRACTOR'S MEANS AND METHODS.



FINAL SET 10/28/2020



LEGEND	
EXIST CONCRETE RIPRAP	[Symbol]
EXIST PAVEMENT	[Symbol]
FLEX BASE PAVEMENT	[Symbol]
PROP FORCE MAIN	[Symbol]
EXIST SANITARY SEWER	[Symbol]
PROP WATER MAIN	[Symbol]
EXIST WATER MAIN	[Symbol]
EXIST DRAINAGE	[Symbol]
GAS MAIN	[Symbol]
UTILITY POLE LINE	[Symbol]
ELECTRIC CABLE	[Symbol]
EASEMENT	[Symbol]
EXIST CASING	[Symbol]
APPARENT ROW	[Symbol]
EXIST CONCRETE	[Symbol]
EXIST WIRE FENCE	[Symbol]
EXIST BARBED WIRE FENCE	[Symbol]
TRAFFIC FLOW ARROW	[Symbol]
UTILITY CROSSING	[Symbol]

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Addendum No.2	AJ	DR2	10/28/20
NO.	DRAWN	APPROVED	DATE

**REVISIONS**

**JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS**  
**FORCE MAIN LAYOUT P & P**  
**STA 42+00 TO STA 46+00**  
**SHEET 9 OF 11**

DEVELOPER: SAN ANTONIO WATER SYSTEM

CONT. BUDGET PROJ. #

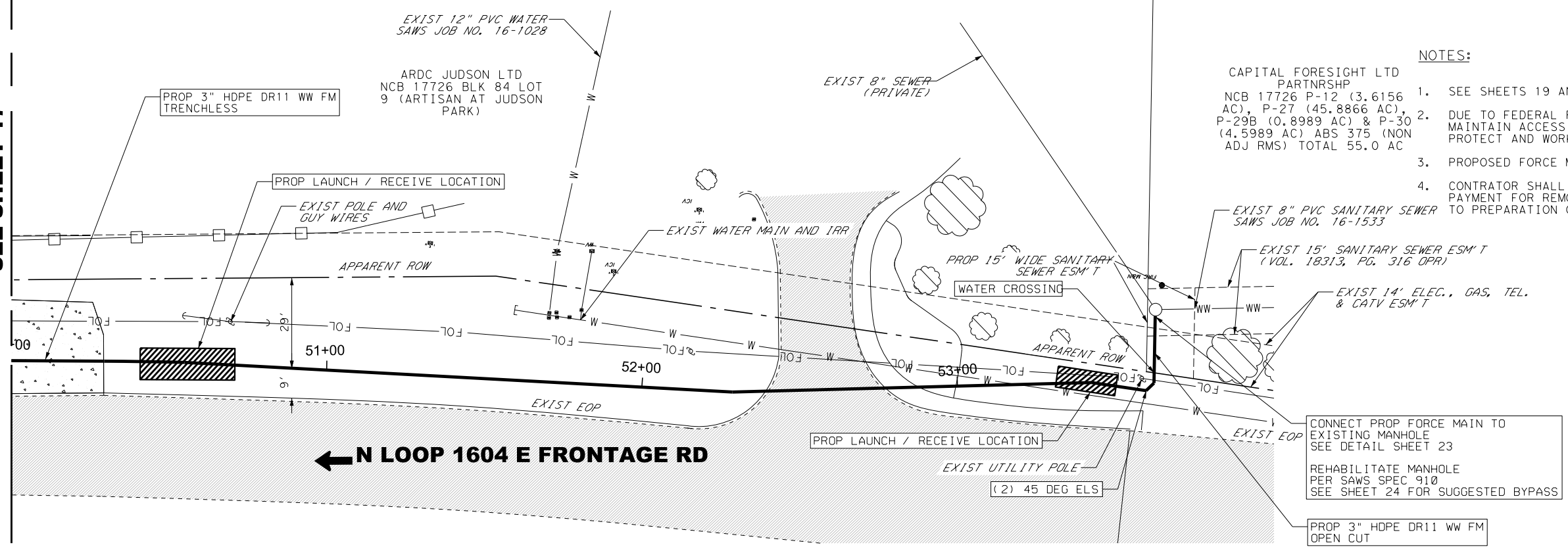
SUBMITTED \_\_\_\_\_

APPROVED \_\_\_\_\_

MAP No. 192-642, 194-642	SHEET 16 OF 52
SECT No. _____	JOB No.: 19-7002
DRN: NM	DSGN: NM
CHK: FJD	

JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS QUANTITIES			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
515.1	TOPSOIL (4")	CY	14.81
520.1	HYDROMULCHING	SY	66.67
550	TRENCH EXCAVATION SAFETY PROTECTION	LF	40
SP 801	LEVEL II B PROTECTIVE FENCING	EA	5
SP 815	3" HDPE FORCEMAIN DR11 (INSTALLED, OPEN CUT)	LF	40
SP 815	3" HDPE FORCEMAIN DR11 (MATERIAL, TRENCHLESS)	LF	385
836	PIPE FITTINGS ALL SIZES AND TYPES	TON	0.005
841	HYDROSTATIC TESTING	EA	1
844	2" BLOWOFF, TEMPORARY	EA	1
854.1	TWO-WAY SANITARY SEWER CLEANOUT (3" PRESSURE)	EA	1
SP 864-S	BYPASS PUMPING SMALL DIAMETER SANITARY SEWER	LS	1
SP 880	HORIZONTAL DIRECTIONAL DRILLING	LF	385
SP 910	REHABILITATE EXISTING MANHOLE	VF	10

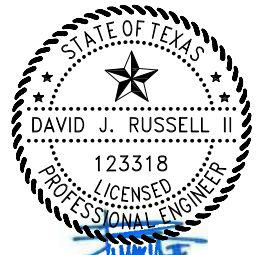
MATCHLINE STA 50+00  
SEE SHEET 17



**NOTES:**

CAPITAL FORESIGHT LTD  
PARTNRSHP  
NCB 17726 P-12 (3.6156 AC), P-27 (45.8866 AC), P-29B (0.8989 AC) & P-30 (4.5989 AC) ABS 375 (NON ADJ RMS) TOTAL 55.0 AC

- SEE SHEETS 19 AND 20 FOR PROPOSED WATER MAIN.
- DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, CPS ENERGY MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES IN THIS AREA.
- PROPOSED FORCE MAIN SHALL BE 3" HDPE DR11 (DUCTILE IRON PIPE SIZE).
- CONTRATOR SHALL REMOVE, STORE AND REPLACE SIGNS AFTER CONSTRUCTION. PAYMENT FOR REMOVING, STORING AND REPLACING SIGNS SHALL BE SUBSIDIARY TO PREPARATION OF RIGHT-OF-WAY.



FINAL SET 10/28/2020

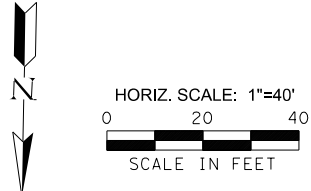
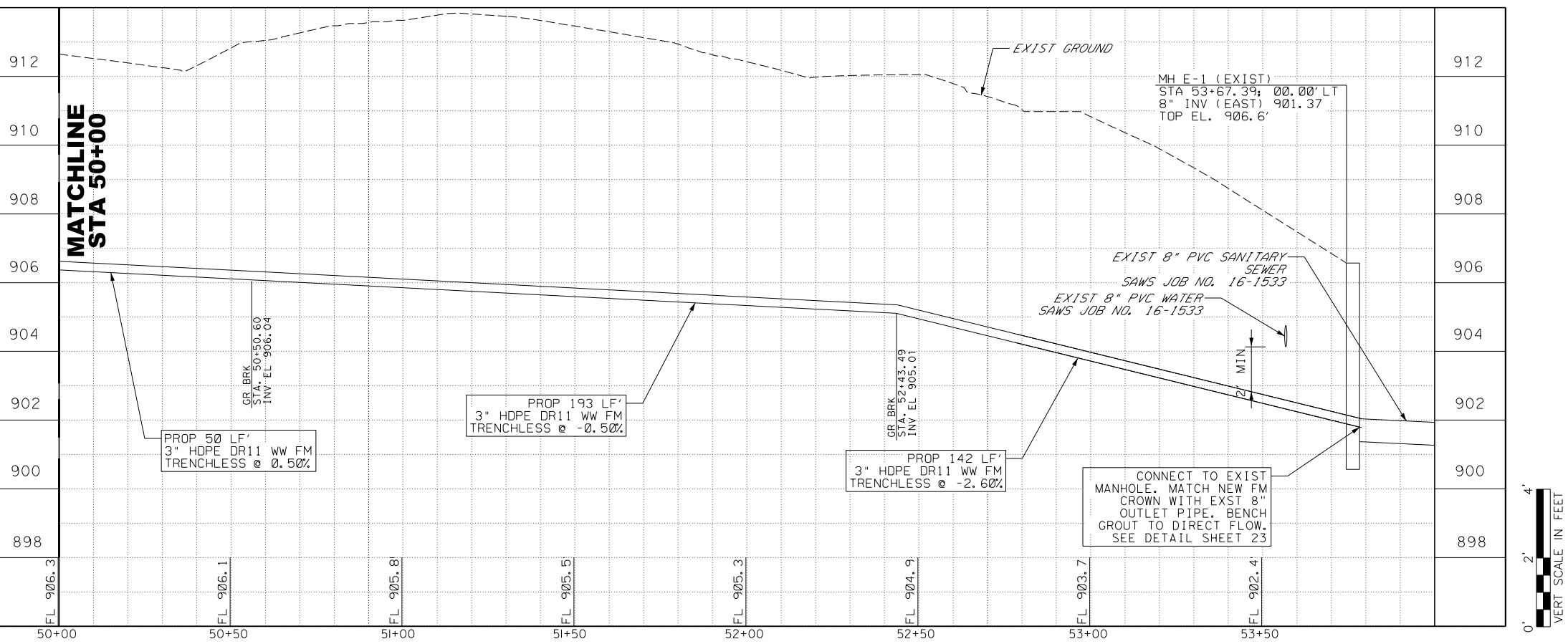
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NO.	ADDENDUM	DRAWN	APPROVED	DATE
1	Addendum No.2	AJ	DR2	10/28/20

**REVISIONS**

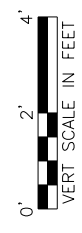
JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS  
**FORCE MAIN LAYOUT P & P**  
STA 50+00 TO END  
SHEET 11 OF 11

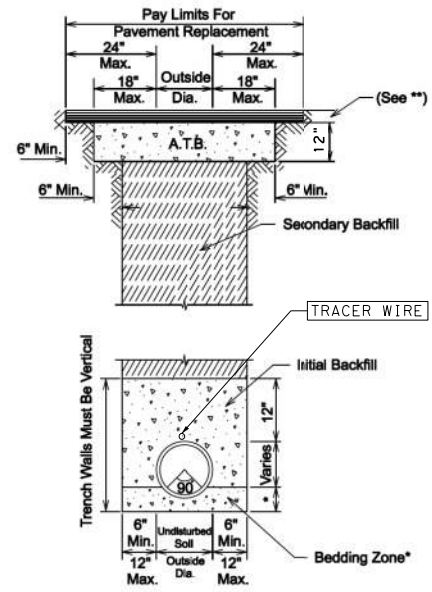
DEVELOPER:	SAN ANTONIO WATER SYSTEM		
CONT.	BUDGET PROJ.	#	
SUBMITTED			
APPROVED			
MAP No.	192-642, 194-642		SHEET
SECT No.	JOB No.:	19-7002	18 OF 52
DRN: NM	DGSN: NM	CHK: FJD	



**LEGEND**

- EXIST CONCRETE RIPRAP [Symbol]
- EXIST PAVEMENT [Symbol]
- FLEX BASE PAVEMENT [Symbol]
- PROP FORCE MAIN [Symbol]
- EXIST SANITARY SEWER [Symbol]
- PROP WATER MAIN [Symbol]
- EXIST WATER MAIN [Symbol]
- EXIST DRAINAGE [Symbol]
- GAS MAIN [Symbol]
- UTILITY POLE LINE [Symbol]
- ELECTRIC CABLE [Symbol]
- EASEMENT [Symbol]
- EXIST CASING [Symbol]
- APPARENT ROW [Symbol]
- EXIST CONCRETE [Symbol]
- EXIST WIRE FENCE [Symbol]
- EXIST BARBED WIRE FENCE [Symbol]
- TRAFFIC FLOW ARROW [Symbol]
- UTILITY CROSSING [Symbol]



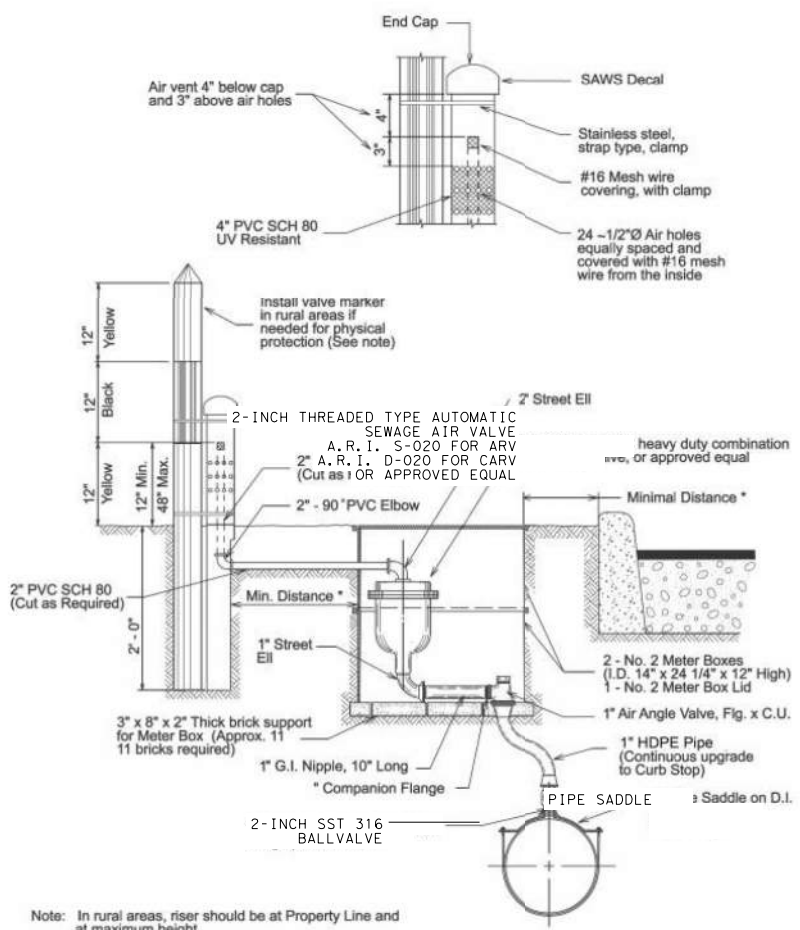


\* Sewer Gravel 6" Min. or 1/8 O.D. of the pipe, whichever is greater.

In areas of over excavation, encasement shall extend from trench wall to trench wall. Pay Limits shall not exceed 12" max. as shown on detail. Additional encasement shall be incidental.

SANITARY SEWER PIPE LAID IN TRENCH WITH TRACER WIRE  
NOT TO SCALE

\*\* Min 2" HMAC Type "D" for trench repair in Local / Residential streets.  
\*\* Min 3" HMAC Type "C" for trench repair in Collector / Arterial streets.

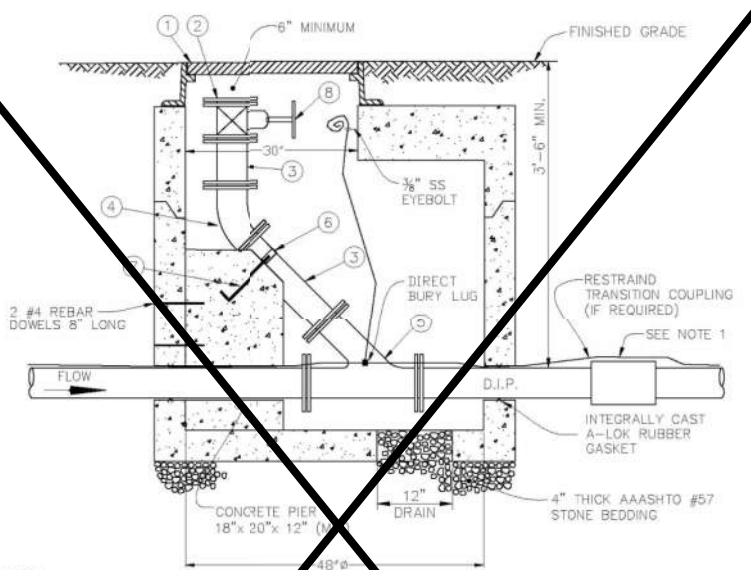


Note: In rural areas, riser should be at Property Line and at maximum height.

\* Per direction from inspector.

1" COMBINATION AIR RELEASE VALVE FOR HDPE PIPE

NOT TO SCALE



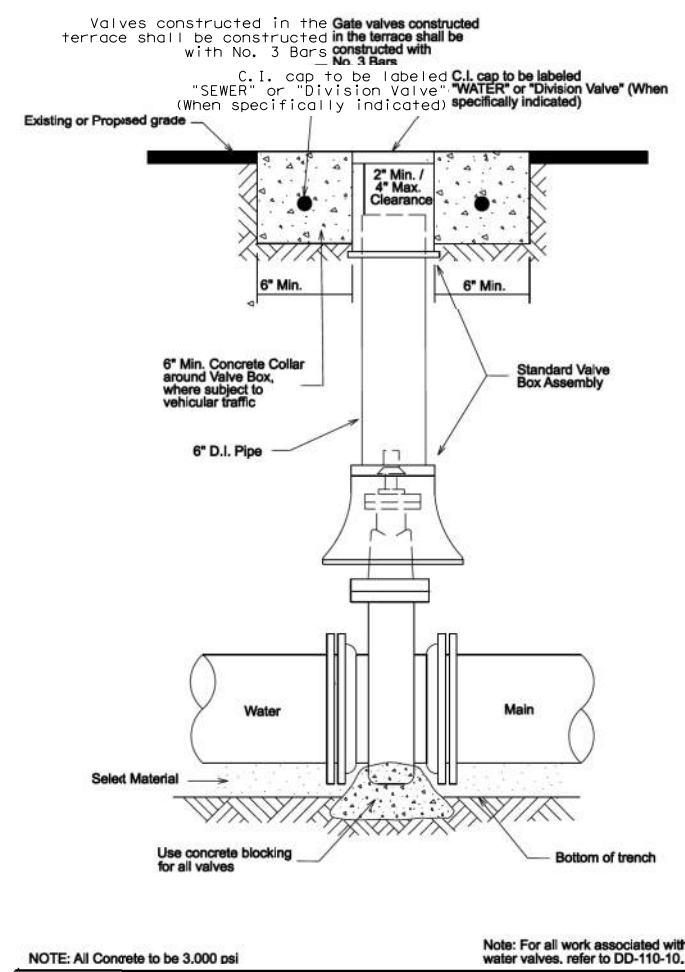
NOTES:

1. TRACER WIRE TO RUN ALONG ENTIRE LENGTH OF F.M. AND TO BE ACCESSIBLE TO TOP COVER. CONTRACTOR MUST PERFORM ELECTRICAL CONTINUITY TEST BEFORE ACCEPTANCE.
2. ALL NUTS & BOLTS SHALL BE STAINLESS STEEL.
3. FIRST LENGTH OF PIPE FROM CLEANOUT, THROUGH THE MANHOLE WALL SHALL BE DUCTILE IRON PIPE (DIP).
4. ALL DIP SHALL BE COATED WITH 1 COATS ASPHALTIC COATING.
5. KNOT TRACER WIRE AROUND EYEBOLT AND COIL ENOUGH WIRE TO EXTEND 12" ABOVE GROUND.
6. EYEBOLT SHALL BE WITHIN 3 INCHES MANHOLE COVER.

ITEM	DESCRIPTION
①	NIPPLE STD. M.H. COVER & FRAME-DETAIL
②	FLANGE, 4" OR 6" BLIND FLANGE C.I.
③	3", 4" OR 6" DIP SPOOL (FJ x PE) WITH FLANGE ADAPTER
④	3", 4" OR 6" EIGHTH BEND (FJ x FJ)
⑤	3", 4" OR 6" WYE (FJ x FJ x FJ)
⑥	PIPE STRAP - S.S. MIN. 1" WIDE, MIN. 1/8" THICK
⑦	J-ANCHOR - S.S., MIN. 10" LONG, 3/8" DIAMETER
⑧	GATE VALVE FLG x FLG RESILIENT WEDGE

NOT TO SCALE

IN-LINE CLEANOUT - FORCE MAIN 3" DIA OR GREATER



NOTE: All Concrete to be 3,000 psi

Note: For all work associated with recycled water valves, refer to DD-110-10, Sheet 1 of 1

NOT TO SCALE

INSTALLATION OF PLUG VALVE WITH VALVE BOX AND EXTENSION



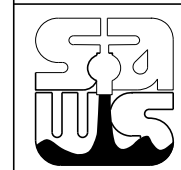
FINAL SET 10/28/2020



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NO.	DESCRIPTION	DRAWN	APPROVED	DATE
△	Addendum No.2	AJ	DR2	10/28/20

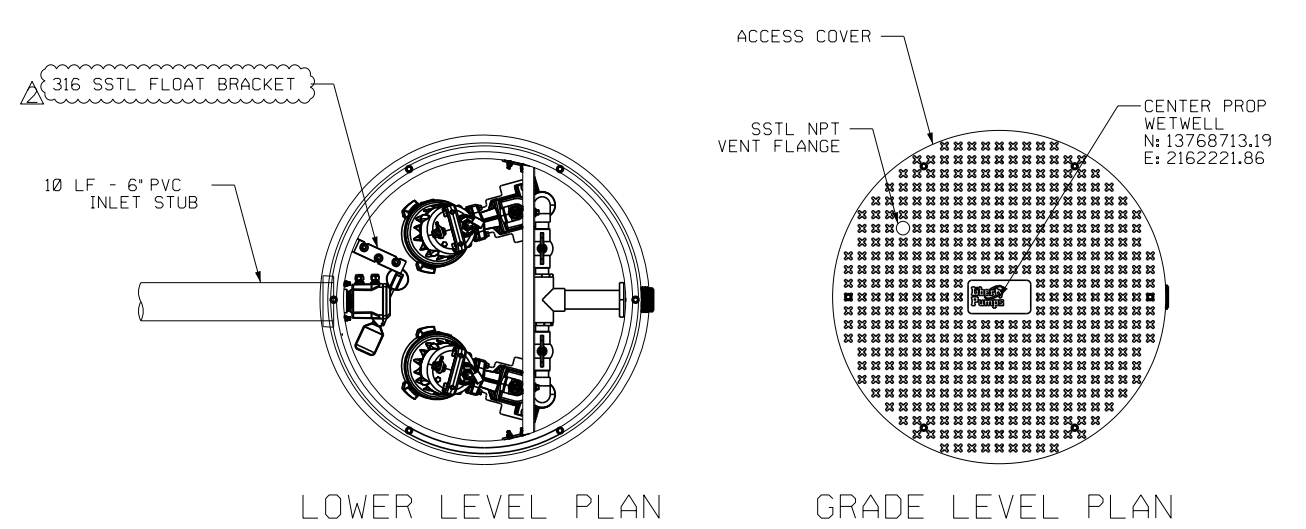
REVISIONS



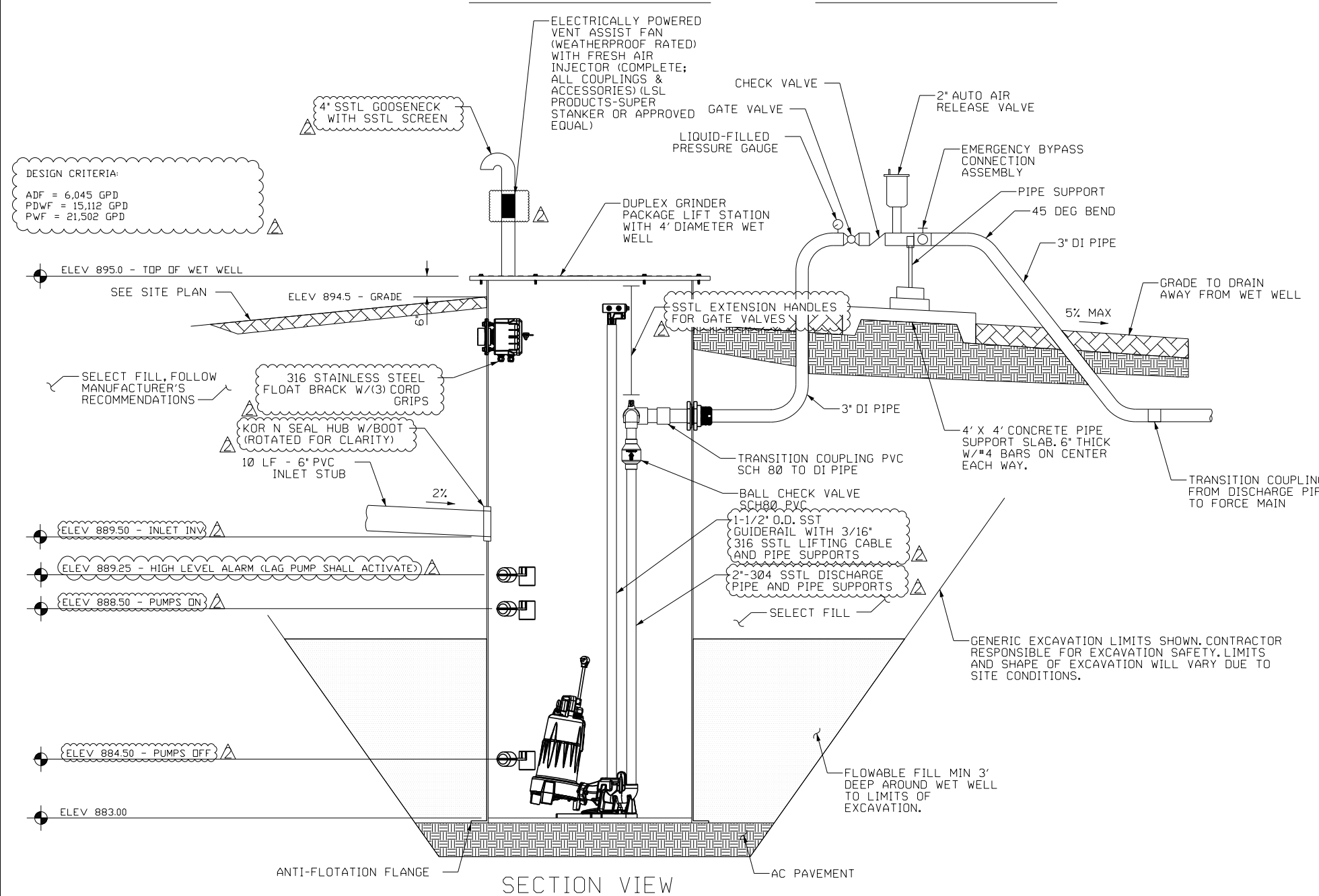
JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS  
SEWER DETAILS

DEVELOPER:	SAN ANTONIO WATER SYSTEM		
CONT.	BUDGET PROJ.	#	
SUBMITTED			
APPROVED			
MAP No.	192-642, 194-642		SHEET
SECT No.	JOB No.:	19-7002	
DRN: NM	DSGN: NM	CHK: FJD	22 OF 52





- NOTES:**
1. VERIFY PLACEMENT OF ALL PROPOSED EQUIPMENT WITH ENGINEER IN FIELD. SEE SHEET 29 FOR COORDINATES.
  2. FLEXBASE PER TXDOT ITEM 247, TYPE A, GRADE 2
  3. EXCAVATED ONSITE SOILS MAY BE USED AS BACKFILL WHERE FLOWABLE FILL IS NOT REQUIRED. SOILS SHALL BE COMPACTED SIMILAR TO TXDOT ITEM 247. PLACE SOIL IN LOOSE LIFTS NOT EXCEEDING 4". COMPACTION OF NATIVE SOIL SHALL ACHIEVE MINIMUM NINETY-EIGHT (98%) OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE TXDOT TESTING METHOD TEX 113-E, AT A MOISTURE CONTENT OF -1% TO +3% OF OPTIMUM.
  3. BACK FILL PER TXDOT ITEM 400.3.C.1, EXCEPT AS MODIFIED ABOVE.
  4. CONTRACTOR SHALL INSTALL TEMPORARY CONSTRUCTION FENCE TO ISOLATE LIFT STATION CONSTRUCTION AREA.
  5. NO SEPARATE PAY ITEMS SHALL BE INCLUDED IN THE LUMP SUM COST OF THE LIFT STATION.
  6. WET WELL COVER (300psf) SHALL HAVE ONE OR MORE LOCKABLE ALUMINUM HATCH COVERS WITH ANTI-SLIP TOP SURFACE. MINIMUM HATCH DIMENSIONS SHALL BE 3 FT BY 4 FT, OR AS REQUIRED. HATCH SAFETY NET SHALL BE INSTALLED TO PROVIDE FALL PROTECTION AND SHALL CONSIST OF ALUMINUM MATERIAL. SAFETY NET SHALL BE DESIGNED TO HAVE GAPS OF NOT MORE THAN 5 INCHES, AND TO BE FLUSH WITH THE TOP OF THE WET WELL. BLACK AND YELLOW STRIPS SHALL BE PAINTED AROUND THE ACCESS HATCH USING EPOXY ENAMEL (TNEMEC, OR EQUAL) COATING SYSTEM. ALSO A "CAUTION / FALL HAZARD" SIGN SHALL BE PAINTED / STENCILED ON ALL FOUR SIDES OF THE HATCH. COATING REQUIREMENTS AND THICKNESS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
  7. EMERGENCY (QUICK-CONNECTION) PUMP BY-PASS SYSTEM SHALL BE PROVIDED. CONNECTION SHALL BE 2 INCHES AND SHALL CONSIST OF A GATE VALVE AND ADAPTER FLANGE WITH CAMLOCK "QUICK DISCONNECT" MALE FITTING WITH DUST CAP. PROVIDE A CHECK VALVE FLOW ONLY IN THE FORCE MAIN DIRECTION.

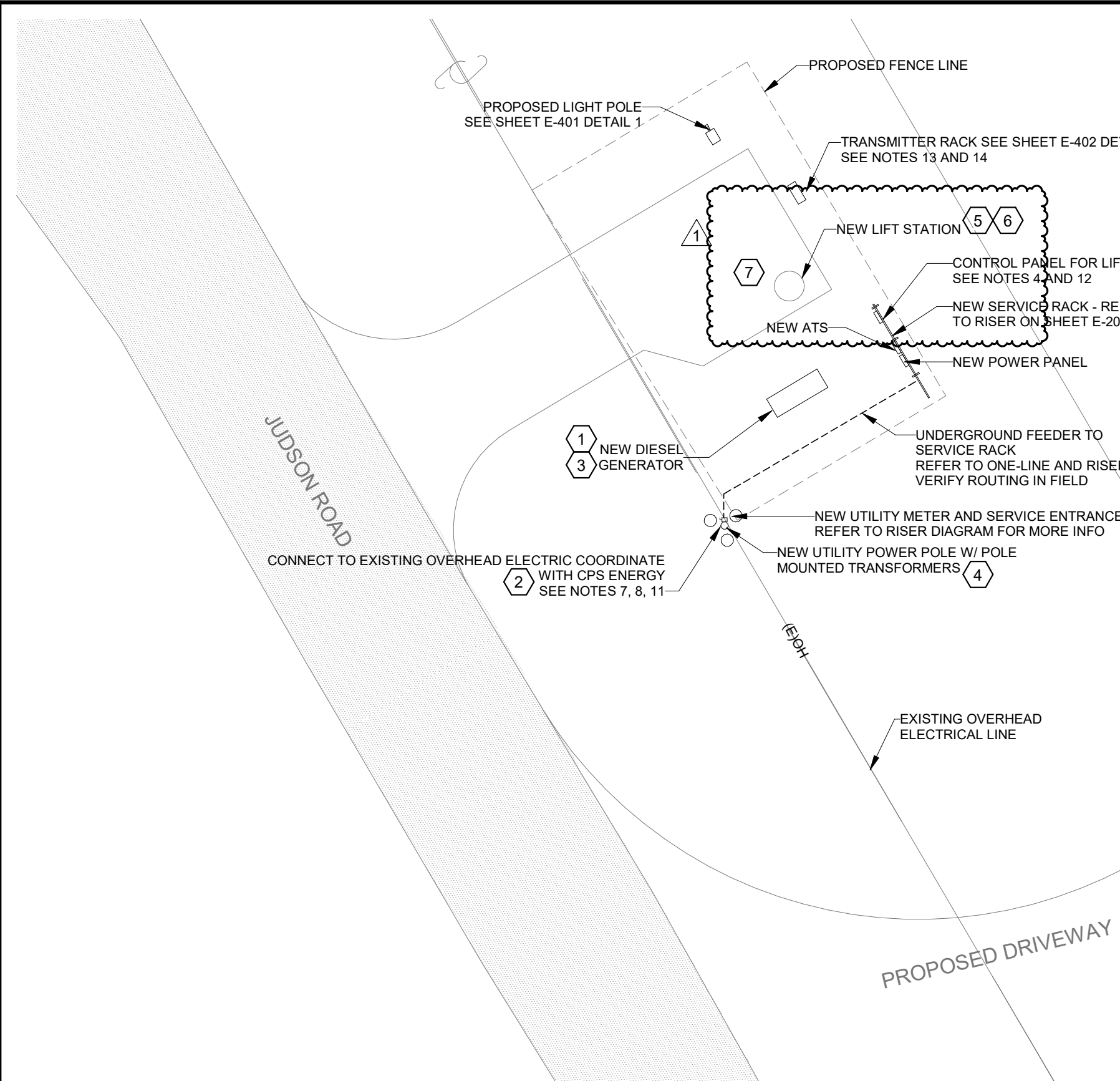


FINAL SET 10/28/2020

- ADDITIONAL NOTES:**
1. EPOXY GROUT SEAL PIPING GOING THROUGH WALLS
  2. WET WELLS MUST BE TESTED TO MEET OR EXCEED THE REQUIREMENTS OF 30 TAC 213.5(c) (3) (E) AND 30 TAC 317.2(e) (5) (H).
  3. ALL ACCESSORY HARDWARE IN WET WELL INCLUDING BUT NOT LIMITED TO CHAINS, CABLES, BOLTS, NUTS, FASTENERS, BRACKETS, ANCHOR BOLTS, WASHERS, CABLE HOLDERS, AND SIDE RAILS SHALL BE 316 STAINLESS STEEL.
  4. ALL EXPOSED PIPE, VALVES, AND FITTINGS OUTSIDE THE WET WELL SHALL RECEIVE AFTER INSTALLATION A 100% SOLIDS EPOXY COATING SYSTEM WITH A TOP COAT SYSTEM OF URETHANE, SUITABLE FOR THE ENVIRONMENT. PRIOR TO APPLICATION, PREPARE SURFACES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. ANY REFERENCE TO CLEANING IN THE MANUFACTURER'S INSTRUCTIONS SHALL BE UNDERSTOOD TO REFER TO THE APPLICABLE SSPS SPECIFICATIONS. THICKNESS, MIXING, AND APPLICATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. APPLY FINISH COAT IN ACCORDANCE WITH THE COLOR-CODING SET FORTH IN TABLE 2, BELOW. APPROVED MANUFACTURERS ARE TNEMEC, SHERWIN-WILLIAMS, PPG, AND M.A.B. PAINTS.
  5. ALL PUMP DISCHARGE PIPE AND FITTINGS WITHIN THE WET WELL, EXCEPT SS 316 AND PVC, SHALL RECEIVE AFTER INSTALLATION, A 100% SOLIDS COAL TAR EPOXY COATING SYSTEM. THICKNESS, MIXING, AND APPLICATIONS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. PRIOR TO APPLICATION, PREPARE SURFACES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. ANY REFERENCE TO CLEANING IN THE MANUFACTURER'S INSTRUCTIONS SHALL BE UNDERSTOOD TO REFER TO THE APPLICABLE SSPC SPECIFICATIONS. APPROVED MANUFACTURERS ARE TNEMEC, SHERWIN-WILLIAMS, PPG, AND M.A.B. PAINTS.

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ADDENDUM NO. 2	AJ	DR2	10/28/20
<b>REVISIONS</b>			
<b>JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS</b>			
<b>LIFT STATION SECTION</b>			
DEVELOPER: SAN ANTONIO WATER SYSTEM			
CONT.		BUDGET PROJ. #	
SUBMITTED _____			
APPROVED _____			
MAP No.	192-642, 194-642		SHEET
SECT No.	JOB No.: 19-7002		31 OF 52
DRN: NM	DGSN: NM	CHK: FJD	





**SITE GENERAL NOTES**

- A. PLAN REPRESENTS ENGINEER'S PROPOSED DESIGN. COORDINATE LOCATION AND INSTALLATION OF ELECTRICAL SERVICE AND ALL RELATED DEVICES AND EQUIPMENT WITH SAWS AND CPS ENERGY. CONTRACTOR SHALL PROVIDE ALL CONDUITS, WIRING, ACCESSORIES, ETC. AS REQUIRED PER CPS ENERGY REQUIREMENTS.
- B. UNDERGROUND SITE WORK: CONTRACTOR IS REQUIRED TO USE LINE LOCATOR TO IDENTIFY LOCATION(S) OF ALL EXISTING UTILITY LINES. CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ALL DAMAGES TO ANY EXISTING UTILITY LINES CAUSED BY EXCAVATION AND SUBSEQUENT REPAIR OF UTILITY LINES.
- C. AS-BUILT UNDERGROUND UTILITY DRAWINGS MUST BE PROVIDED SHOWING SPECIFIC LOCATIONS OF ALL UTILITIES BURIED ON THE ENTIRE SITE.

**KEYNOTE LEGEND**

- 1 NEW 30KW DIESEL GENSET WITH INTEGRAL FUEL TANK PER TCEQ REQUIREMENTS. REFER TO GENERATOR SPEC FOR MORE INFO. PROVIDE WITH ATS AND ALL CONDUITS, WIRING AND ACCESSORIES AS NEEDED FOR A COMPLETE AND OPERATING STANDBY POWER GENSET.
- 2 CONTRACTOR SHALL COORDINATE WITH CPS ENERGY TO PROVIDE NEW ELECTRICAL SERVICE. REFER TO RISER, ONE-LINE AND GENERAL NOTES FOR MORE INFO.
- 3 PROVIDE (3) DEDICATED CIRCUITS W/20A BREAKERS FOR GENERATOR ACCESSORIES. (1) CIRCUIT FOR BATTERY CHARGER, (1) CIRCUIT FOR ENGINE HEATER, (1) CIRCUIT FOR ALTERNATOR. COORDINATE EXACT REQUIREMENTS WITH GENERATOR VENDOR. REFER TO PANEL SCHEDULE
- 4 PROVIDE (2) 1" SPARE CONDUITS FROM SERVICE RACK FOR FUTURE TELECOM SERVICE. REFER TO RISER.
- 5 PROVIDE POWER TO LIFT STATION. COORDINATE WORK WITH PUMP VENDOR AND PROVIDE ALL WIRING, CONDUITS, ETC. AS NEEDED FOR A COMPLETE AND OPERATING SYSTEM. PROVIDE EXPLOSION PROOF ENCLOSURES AND SEAL OFFS AS REQUIRED FOR HAZARDOUS LOCATIONS.
- 6 PROVIDE POWER TO VENT PIPE FAN. INSTALL PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. PROVIDE EXPLOSION PROOF ENCLOSURES AND SEAL OFFS AS REQUIRED FOR HAZARDOUS LOCATIONS.
- 7 REFER TO ELECTRICAL DETAILS FOR DELINEATION OF HAZARDOUS CLASS 1 ZONES. ALL ELECTRICAL WORK WITHIN ZONES SHALL COMPLY WITH NEC ARTICLE 501 FOR CLASS 1 LOCATIONS. PROVIDE EXPLOSION PROOF ENCLOSURES AND SEAL OFFS AS REQUIRED. SEAL OFFS ARE REQUIRED FOR ALL CONDUITS ENTERING OR LEAVING CLASS 1 ZONES. REFER TO ELECTRICAL DETAILS FOR MORE INFORMATION.



FINAL SET 10.28.20

- NOTES:**
- 1. PVC COATED ALUMINUM CONDUIT SHALL BE PROVIDED IN AREAS WHERE CONCRETE COMES INTO CONTACT WITH ALUMINUM CONDUIT.
  - 2. UTILITIES NOT SHOWN FOR CLARITY. PLEASE SEE CIVIL DRAWINGS FOR UTILITIES.
  - 3. CONTRACTOR SHALL OBSERVE NEC WORKING SPACE REQUIREMENTS WHEN LOCATING EQUIPMENT.
  - 4. PUMP CONTROL PANEL IS PREFABRICATED BY FRANKLIN ELECTRIC OR EQUAL. REFER TO CIVIL PLANS & SPECIFICATIONS. REFER TO CIVIL DRAWINGS FOR EXACT LOCATION.
  - 5. PUMP CONTROL DOOR SHOULD OPEN AWAY FROM WET WELL.
  - 6. SEE SHEET E-402 DETAIL 5 FOR PUMP CONTROL PANEL DETAIL.
  - 7. IF LOCATION OF ELECTRIC SERVICE POLE CHANGES DURING CONSTRUCTION PHASE, CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY FOR APPROVAL.
  - 8. OVERHEAD CONDUCTORS MUST HAVE A HORIZONTAL CLEARANCE WITHOUT WIND OF 10 FEET FOR VOLTAGES UP TO 50KV.
  - 9. DUCTBANK LAYOUT IS FOR DIAGRAMMATIC PURPOSE ONLY. IF THERE ARE MORE THAN 360 DEGREE OF BENDS CONTRACTOR TO USE HANDHOLE. REFER TO SAWS SPECIFICATIONS AND SHEET E-401 DETAIL 8 FOR HANDHOLE DETAIL.
  - 10. ENSURE ELECTRICAL SERVICE POLE IS 20 FEET AWAY FROM WETWELL AND HEADER PIPING. COORDINATE WITH CIVIL PLANS FOR EXACT LOCATION.
  - 11. FLOAT SWITCHES REQUIRE INTRINSICALLY SAFE BARRIERS.
  - 12. PRESSURE TRANSMITTER WILL BE LOCATED ON RACK IF PRESSURE TRANSMITTER TAPS ARE PROVIDED IN WET WELL BY CIVIL ENGINEER.
  - 13. DISCHARGE PRESSURE TRANSMITTER TO BE INSTALLED IN ASSOCIATION WHICH MAXIMIZES ACCURACY. MODIFY PIPING AS NEEDED TO MEET THIS REQUIREMENT.

ALL CONDUITS SHALL BE BURIED AND EMBEDDED IN CONCRETE TO PREVENT TRIPPING HAZARDS. TYPICAL FOR ALL CONDUITS EXCEPT FOR FINAL VERTICAL RUN TO CONNECT TO PANELS, EQPM, ETC.

REFER TO CIVIL PLANS FOR MORE INFORMATION. EXACT DIMENSIONS SHALL BE DETERMINED FROM CIVIL DRAWINGS. COORDINATE WORK WITH ALL OTHER TRADES.

**1 ENLARGED ELECTRICAL SITE PLAN**  
1/16" = 1'-0"



ITEM NUMBER	DESCRIPTION	UNIT	NET QUANTITY
49	DIVISION 26 ELECTRICAL SPECIFICATION PAY ITEMS	LS	1
50	CPS ENERGY ALLOWANCE - NEW INLINE POLE	LS	1

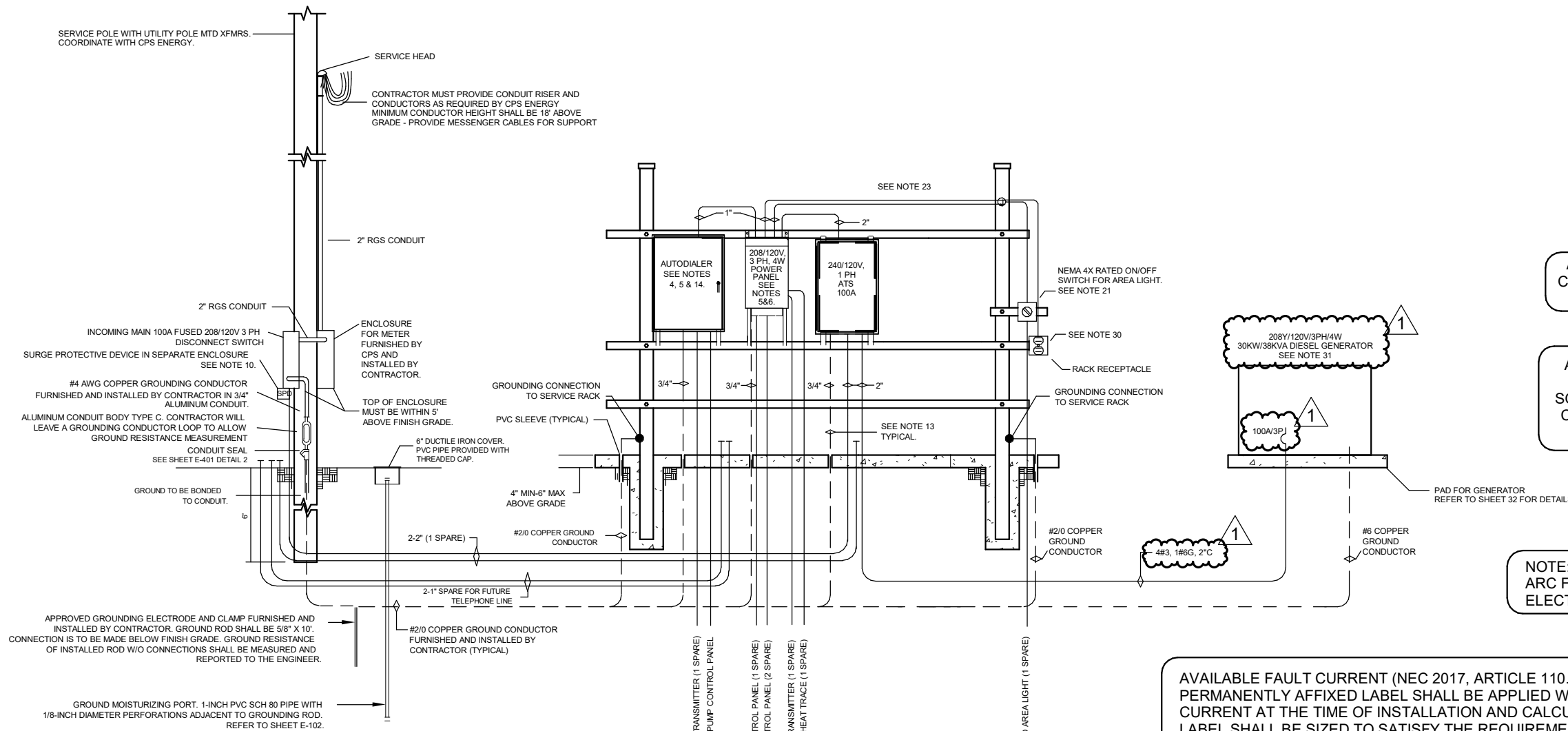
**KCI TECHNOLOGIES, INC.**  
13750 SAN PEDRO AVENUE - SUITE 640  
SAN ANTONIO, TX 78232 - 210.544.5751  
TEXAS REGISTERED ENGINEERING FIRM  
TBPE FIRM No. F-10573  
www.kci.com

NO.	ADDENDUM NO. 2	DHL	CLC	10/28/20
NO.		DRAWN	APPROVED	DATE

**REVISIONS**

JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS  
**E-101**  
ENLARGED ELECTRICAL SITE PLAN

DEVELOPER:	SAN ANTONIO WATER SYSTEM		
CONT.	BUDGET PROJ.	#	
SUBMITTED			
APPROVED			
MAP No.	192-642, 194-642		SHEET
SECT No.	JOB No.: 19-7002		35 OF 52
DRN:	DHL	DSGN:	DHL
CHK:	CLC		



ALL ELECTRICAL COMPONENTS SHALL BE CONNECTED DIRECTLY TO THE GROUNDING ELECTRODE CONDUCTOR

ALL PANELS, DISCONNECTS, ETC. SHALL BE A MINIMUM OF 3' FROM POTENTIAL LEAKAGE SOURCES. AREA WITHIN 3' OF LEAKAGE SOURCES AND AREA WITHIN LIFT STATION WET WELL SHALL BE DIV 1 CLASS 1 RATED. PROVIDE EXPLOSION PROOF CONDUITS, JUNCTION BOXES, ETC. FOR ALL BRANCH CIRCUITS IN THESE AREAS.

NOTE: CONTRACTOR SHALL PROVIDE AN ARC FLASH STUDY FOR ALL NEW ELECTRICAL EQUIPMENT

AVAILABLE FAULT CURRENT (NEC 2017, ARTICLE 110.24A) A PERMANENTLY AFFIXED LABEL SHALL BE APPLIED WITH THE FAULT CURRENT AT THE TIME OF INSTALLATION AND CALCULATION. THE LABEL SHALL BE SIZED TO SATISFY THE REQUIREMENTS OF THE LOCAL JURISDICTION OF WHICH THE PROJECT IS LOCATED AND SHALL BE BLUE LETTERING ON A CONTRASTING BACKGROUND. THIS LABEL SHALL ALSO INCLUDE THE DATE OF THE CALCULATION.

\* SEE LOAD ANALYSIS, PANEL SCHEDULES FOR CONDUIT/WIRE SIZE.  
 ALL WIRES SHALL HAVE TYPE "THHN/THWN" INSULATION TYPICAL UNLESS NOTED OTHERWISE.  
 ALL ABOVE GROUND CONDUITS SHALL BE RIGID ALUMINUM TYPICAL UNLESS NOTED OTHERWISE.  
 ALL UNDERGROUND CONDUITS SHALL BE PVC SCH 40 TYPICAL UNLESS NOTED OTHERWISE.  
 TRANSITION POINTS SHALL BE PVC COATED RIGID ALUMINUM.

- NOTES:
- ALL UNDERGROUND ELECTRIC CONDUIT SHALL BE CONCRETE ENCASED 24 INCHES BELOW GRADE.
  - ABOVE GROUND CONDUIT SHALL BE RIGID ALUMINUM. PVC COATED ALUMINUM CONDUIT SHALL BE PROVIDED IN AREAS WHERE CONCRETE COMES IN CONTACT WITH ALUMINUM CONDUIT.
  - UNDER GROUND CONDUIT SHALL BE PVC SCHEDULE 40 CONDUIT. SEE DETAILS ON SHEETS E-401 AND E-402.
  - ALL ENCLOSURES AND DISCONNECTS MUST BE PAD-LOCKABLE.
  - ALL MOUNTING HARDWARE AND STRUT CHANNEL SHALL BE 316 STAINLESS STEEL. ALL ENCLOSURES SHALL BE NEMA 4X, 316 STAINLESS STEEL.
  - PROVIDE SURGE PROTECTIVE DEVICE FOR POWER PANEL DEVICE MUST ADHERE TO UL1449 3RD EDITION STANDARDS. REFER TO SAWS SPECIFICATIONS.
  - ALL DISCONNECTS SHALL BE NEMA 4X, 316 STAINLESS STEEL.
  - THERE SHALL BE 6" MINIMUM SPACING BETWEEN EQUIPMENT MOUNTED ON THE RACK.
  - PROVIDE SEALING FITTINGS FOR ALL CONDUIT LEAVING THE RACK.
  - PROVIDE A SURGE PROTECTIVE DEVICE IN A SEPARATE ENCLOSURE ATTACHED TO THE BOTTOM OR SIDE OF THE INCOMING MAIN SAFETY SWITCH.
  - ALL SPARE CONDUITS ARE NOT SHOWN ON DETAILS. PROVIDE (1) SPARE CONDUIT FOR EACH POWER CONDUIT. COORDINATE WITH SAWS.
  - ANY LENGTHENING OF THE RACK TO BE APPROVED BY A STRUCTURAL ENGINEER.
  - ALL PANELS SHALL BE GROUNDED WITH #6 COPPER GROUND CONDUCTOR ROUTED IN 3/4" CONDUIT FROM EQUIPMENT TO GRADE PER SAWS DIRECTION.
  - SEE SHEET E-401 DETAIL 9 FOR AUTODIALER INFORMATION.
  - GROUND RESISTANCE SHALL NOT EXCEED 5 OHMS AT ANY POINT.
  - ALL ELECTRICAL COMPONENTS SHALL BE NEMA RATED.
  - IF PROVIDED PUMPS ARE NOT SIZED PER PROJECT PLANS, CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ENGINEERING REQUIRED FOR RESIZING ALL EQUIPMENT AT NO CHARGE TO SAWS.
  - REFER TO SHEET 32 FOR FOUNDATION DETAILS.
  - PROTECTIVE DEVICES ARE SIZED PER NEC GUIDELINES. CONTRACTOR SHALL CHANGE PROTECTIVE DEVICE SIZES IF NECESSARY PER NEC AND PER RESULTS OF POWER SYSTEM STUDY.
  - CONTRACTOR SHALL FOLLOW CPS ENERGY STANDARDS FOR RACK INSTALLATION.
  - NEMA 4X RATED ON/OFF SWITCH FOR AREA LIGHT.
  - MOISTURIZING PORT SHALL BE LOCATED ADJACENT TO TEST WELL AND BE LESS THAN 6" APART.
  - TOP PENETRATIONS ON PANEL ARE NOT ALLOWED. CONDUIT DRAWN FOR DIAGRAMMATIC PURPOSES ONLY.
  - DIELECTRIC COUPLINGS SHALL BE INSTALLED BETWEEN DISSIMILAR METALS IN ALL CASES.
  - CONTRACTOR TO TERMINATE THE SPARE CONDUITS ON TYPE "C" CONDUIT BODIES AND CAP FOR FUTURE ENCLOSURE INSTALLATION BEHIND SCADA PANEL.
  - PUMP CONTROL PANEL TO BE NEMA 4X SUPPLIED BY MANUFACTURER. REFER TO CIVIL PLANS AND SPECIFICATIONS.
  - PROVIDE BREAKER FOR SURGE PROTECTIVE DEVICE AS RECOMMENDED BY MANUFACTURER.
  - PROVIDE THERMAL OVERLOADS AND BREAKERS FOR DUPLEX PUMP SYSTEM.
  - DISCHARGE PRESSURE TRANSMITTER TO BE INSTALLED IN ACCORDANCE WHICH MAXIMIZES ACCURACY. MODIFY PIPING AS NEEDED TO MEET THIS REQUIREMENT.
  - ALL RECEPTACLES USED ON THIS PROJECT MUST BE WEATHER PROOF WHILE "IN-USE" GFCI TYPE UNLESS NOTED OTHERWISE.
  - NEW 36KW DIESEL GENSET. REFER TO PLANS AND SPEC FOR MORE INFO. PROVIDE WITH MINIMUM 100 GALLON INTEGRAL BASE TANK.



FINAL SET 10.28.20

**KCI TECHNOLOGIES**  
 13750 SAN PEDRO AVENUE - SUITE 640  
 SAN ANTONIO, TX 78232 - 210.544.5751  
 TEXAS REGISTERED ENGINEERING FIRM  
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NO.	ADDENDUM No. 2	DHL	CLC	10/28/20
NO.		DRAWN	APPROVED	DATE

**REVISIONS**

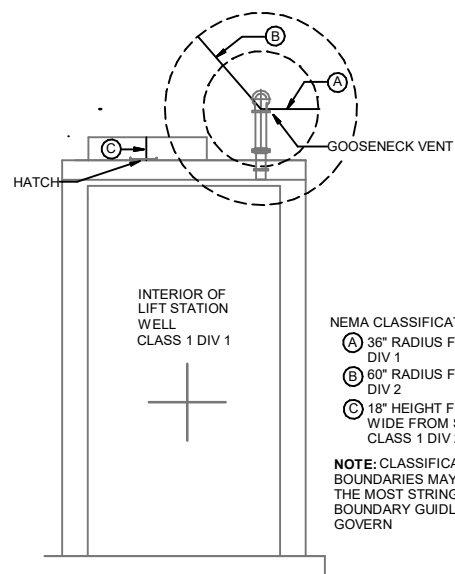
JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS  
**E-200**  
 ELECTRICAL RISER DIAGRAM AND SERVICE RACK LAYOUT

DEVELOPER:	SAN ANTONIO WATER SYSTEM		
CONT.	BUDGET PROJ.	#	
SUBMITTED			
APPROVED			
MAP No.	192-642, 194-642		SHEET
SECT No.	JOB No.: 19-7002		37 OF 52
DRN: DHL	DSGN: DHL	CHK: CLC	

# 1 ELECTRICAL RISER DIAGRAM AND SERVICE RACK LAYOUT

NOT TO SCALE

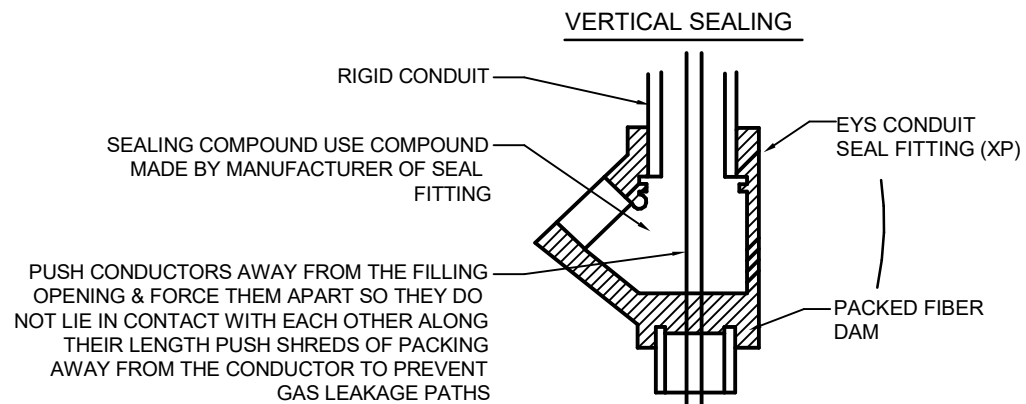




NEMA CLASSIFICATION DESCRIPTION  
**A** 36" RADIUS FROM VENT CLASS 1 DIV 1  
**B** 60" RADIUS FROM VENT CLASS 1 DIV 2  
**C** 18" HEIGHT FROM HATCH, 36" WIDE FROM SIDE OF HATCH CLASS 1 DIV 2

**NOTE:** CLASSIFICATION BOUNDARIES MAY OVERLAP. THE MOST STRINGENT BOUNDARY GUIDELINE SHALL GOVERN

**2** HAZARDOUS LOCATIONS DETAIL  
NTS



**NOTE:**

PROVIDE EXPLOSION PROOF SEALS. IN ACCORDANCE WITH ARTICLE 501, CLASS 1, DIVISION 1 OF THE LATEST NATIONAL ELECTRICAL CODE TYPICAL FOR ALL UNDERGROUND CONDUIT STUB-UPS INTO EQUIPMENT

SEAL OFF ALL CONDUIT ENTERING OR LEAVING CAVITIES OR ENCLOSURES OF DISPENSERS AND ASSOCIATED EQUIPMENT. IN ADDITION, ALL CONDUITS COMING FROM THE BUILDING THROUGH A HAZARDOUS LOCATION ALSO REQUIRE SEAL-OFFS AT BOTH ENDS.

**1** CONDUIT SEAL DETAIL  
NTS



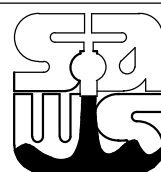
FINAL SET 10.28.20



KCI TECHNOLOGIES, INC.  
 13750 SAN PEDRO AVENUE - SUITE 640  
 SAN ANTONIO, TX 78232 - 210.544.5751  
 TEXAS REGISTERED ENGINEERING FIRM  
 TBPE FIRM No. F-10573  
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△ Addendum No. 2	DHL	CLC	10/28/20
NO.	DRAWN	APPROVED	DATE

REVISIONS



JUDSON RD. WATER INFRASTRUCTURE IMPROVEMENTS  
**E-403**  
 ELECTRICAL DETAILS

DEVELOPER: SAN ANTONIO WATER SYSTEM			
CONT.		BUDGET PROJ. #	
SUBMITTED _____			
APPROVED _____			
MAP No.	192-642, 194-642		SHEET
SECT No.	JOB No.: 19-7002		Approver: 52
DRN: Author	DSGN: Designer	CHK: Checker	

**NEW SHEET**

BID PROPOSAL

PROPOSAL OF \_\_\_\_\_, a corporation  
a partnership consisting of \_\_\_\_\_  
an individual doing business as \_\_\_\_\_

THE SAN ANTONIO WATER SYSTEM:

Pursuant to Instructions and Invitation to Bidders, the undersigned proposes to furnish all labor and materials as specified and perform the work required for the project as specified, in accordance with the Plans and Specifications for the following prices in the bid proposal to wit:

**PLEASE SEE ATTACHED LIST OF BID ITEMS.**

\_\_\_\_\_  
BIDDER'S SIGNATURE & TITLE  
\_\_\_\_\_  
FIRM'S NAME (TYPE OR PRINT)  
\_\_\_\_\_  
FIRM'S ADDRESS  
\_\_\_\_\_  
FIRM'S PHONE NO. /FAX NO.  
\_\_\_\_\_  
FIRM'S EMAIL ADDRESS

The Contractor herein acknowledges receipt of the following:  
Addendum Nos. \_\_\_\_\_

OWNER RESERVES THE RIGHT TO ACCEPT THE OVERALL MOST RESPONSIBLE BID.

The bidder offers to construct the Project in accordance with the Contract Documents for the contract price, and to complete the Project within **270** calendar days after the start date, as set forth in the Authorization to Proceed. **The bidder understands and accepts the provisions of the contract Documents relating to liquidated damages of the project if not completed on time.**

Complete the additional requirements of the Bid Proposal which are included on the following pages.

**Statement on President's Executive Orders**

Has your firm previously performed work subject to the President's Executive Orders Numbers 11246 and 11375 or any preceding similar executive orders (Numbers 10925 and 11114)?

Yes  No

Item No.	Spec No.	Description	Unit	Quantity	Unit Price	Total Price
1	103.1	REMOVE CONCRETE CURB	LF	150	\$	\$
2	103.3	REMOVE SIDEWALK AND DRIVEWAYS	SF	1120	\$	\$
3	202.1	PRIME COAT	GAL	137	\$	\$
4	203.1	TACK COAT	GAL	69	\$	\$
5	205.3	HOT MIX ASPHALTIC PAVEMENT, TYPE C(2" COMP DEPTH)	SY	681	\$	\$
6	206.1	ASPHALT TREATED BASE (12" COMP DEPTH)	SY	128	\$	\$
7	208.1	SALVAGING, HAULING & STOCKPILING RECLAIMABLE ASPHALTIC PAVEMENT (2")	SY	681	\$	\$
8	401.0	15" REINFORCED CONCRETE PIPE (CLASS III)	LF	468	\$	\$
9	401.1	24" REINFORCED CONCRETE PIPE (CLASS III)	LF	57	\$	\$
10	401.4	12" SAFETY END TREATMENT (TYPE II)	EA	2	\$	\$
11	401.4	24" SAFETY END TREATMENT (TYPE II)	EA	2	\$	\$
12	500.4	CONCRETE CURB AND GUTTER	LF	150	\$	\$
13	502.1	CONCRETE SIDEWALKS	SY	20	\$	\$
14	503.2	CONCRETE DRIVEWAYS – COMMERCIAL	SY	91	\$	\$
15	515.1	TOPSOIL (4")	CY	650	\$	\$



Item No.	Spec No.	Description	Unit	Quantity	Unit Price	Total Price
16	520.1	HYDROMULCHING	SY	5759	\$	\$
17	530.0	BARRICADES, SIGNS, AND TRAFFIC HANDLING	LS	1	\$	\$
18	540.0	STORM WATER POLLUTION PREVENTION PLAN	LS	1	\$	\$
19	540.1	ROCK FILTER DAMS (INSTALL/REMOVE)(TYPE 3)	LF	100	\$	\$
20	550.0	TRENCH EXCAVATION SAFETY PROTECTION	LF	3212	\$	\$
21	658.0	INSTALL OBJECT MARKER ASSEMBLIES	EA	2	\$	\$
22	SP 801	LEVEL II B PROTECTIVE FENCING	EA	15	\$	\$
23	SP 815	3" HDPE FORCEMAIN DR11 (INSTALLED, OPEN CUT)	LF	1362	\$	\$
24	SP 815	3" HDPE FORCEMAIN DR11 (MATERIAL, TRENCHLESS)	LF	2675	\$	\$
25	SP 815	4" HDPE WATERLINE DR11	LF	5	\$	\$
26	SP 815	8" HDPE WATERLINE DR11	LF	5	\$	\$
27	SP 815	16" HDPE WATERLINE DR11	LF	1840	\$	\$
28	824.0	NEW UNMETERED 1" SHORT SERVICE	EA	1	\$	\$
29	828.0	3" PLUG VALVE AND BOX COMPLETE	EA	2	\$	\$
30	828.0	4" GATE VALVE AND BOX COMPLETE	EA	1	\$	\$
31	828.0	8" GATE VALVE AND BOX COMPLETE	EA	1	\$	\$

Item No.	Spec No.	Description	Unit	Quantity	Unit Price	Total Price
32	828.0	16" GATE VALVE AND BOX COMPLETE	EA	3	\$	\$
33	833.0	NEW METER BOX	EA	1	\$	\$
34	834.1	FIRE HYDRANT W/6-IN VALVE & BOX	EA	2	\$	\$
35	836.0	PIPE FITTINGS ALL SIZES AND TYPES	TON	0.42	\$	\$
36	840.0	24" WATER TIE-INS	EA	1	\$	\$
37	841.0	HYDROSTATIC TESTING	EA	4	\$	\$
38	844.0	2" BLOWOFF, TEMPORARY	EA	3	\$	\$
39	846.0	1" COMBINATION AIR RELEASE VALVE	EA	2	\$	\$
40	846.0	2" COMBINATION AIR RELEASE VALVE	EA	3	\$	\$
ITEM No. 41 - REMOVED FROM BID						
42	858.0	CONCRETE ENCASEMENT, CRADLES, SADDLES AND COLLARS	CY	0.14	\$	\$
43	SP 864-S1	BYPASS PUMPING SMALL DIAMETER SANITARY SEWER	LS	1	\$	\$
44	866.0	SEWER MAIN PRE-TELEVISION INSPECTION AND CLEANING (LOOP 1604 CASING)	LF	618	\$	\$
45	SP 870	SANITARY SEWER LIFT STATION	LS	1	\$	\$
46	SP 872	EXISTING CASING HDPE PIPE INSTALLATION	LF	618	\$	\$
47	SP 880	HORIZONTAL DIRECTIONAL DRILLING	LF	2057	\$	\$

Item No.	Spec No.	Description	Unit	Quantity	Unit Price	Total Price
48	SP 910	REHABILITATE EXISTING MANHOLE	VF	10	\$	\$
49	DIVISION 26	DIVISION 26 ELECTRICAL SPECIFICATION PAY ITEMS	LS	1	\$	\$
50	SC 11	CPS ENERGY ALLOWANCE – NEW INLINE POLE	LS	1	\$ 15,000.00	\$ 15,000.00
51	6001	PORTABLE MESSAGE SIGN (TxDOT SPEC)	EA	1	\$	\$
	SUBTOTAL (ITEMS 1 - 51)				\$	

Item No.	Spec No.	Description	Unit	Quantity	Unit Price	Total Price
52	100	MOBILIZATION (MAX 10% OF LINE ITEM 1 – 51)	LS	1	\$	\$
53	SPTS 100 A	INTERMEDIATE DEMOBILIZATION AND REMOBILIZATION (PIPELINE)	EA	1	\$	\$
54	SPTS 100 C	INTERMEDIATE DEMOBILIZATION AND REMOBILIZATION (FACILITIES)	EA	1	\$	\$
55	101	PREPARATION OF RIGHT-OF-WAY (MAX 5% OF LINE ITEM 1 – 51)	LS	1	\$	\$

Mobilization and Prep of ROW shall be limited to the maximum percentage shown. **If the percentage exceeds the allowable maximum stated for mobilization and or preparation of ROW, SAWS reserves the right to cap the amount at the percentages shown and adjust the extensions of the bid items accordingly.**

<b>TOTAL BID PRICE (TO INCLUDE LINE ITEMS 1 – 55)</b>	<b>\$</b>
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**STATEMENT OF BIDDER'S EXPERIENCE**

Project Name: Judson Rd. Water Infrastructure Improvements Project  
Contractor: \_\_\_\_\_  
Solicitation No.: CO-00289

1. BIDDER'S HISTORIC INFORMATION

Bidder must answer all questions completely and all information must be clear, accurate and comprehensive. For additional space, use and attach separate sheet(s).

- A. Name of Bidder:
- B. Number of years in business under current company name:

(Note: A minimum of five (5) years required under the current company name. Changes in company name during the experience period are acceptable if the continuity of the company can be demonstrated. Attach separate documentation, if applicable.)

2. BIDDER'S PROJECT EXPERIENCE

Using the forms included below; list and describe Prime and Sub bidder's experience successfully completing projects similar to the work described herein. To be considered responsive, the Prime and Sub bidder must list a minimum of three (3) similar projects for each category, completed during the last ten (10) years. Six (6) similar projects completed during the last ten (10) years, must be submitted in total.

- Three (3) Similar Lift Station Projects completed within the last ten (10) years.
  - Construction of a minimum of 40,000 gallons per day or larger lift stations.
  - Scope to include all major components, including well pump, piping, electrical power, instrumentation, controls, SCADA and radio communication.
- Three (3) Similar HDPE Pipeline Installation Projects via Horizontal Directional Drill (HDD), completed within the last ten (10) years.
  - Construction of a minimum of 2,000 LF of 3" or larger mains

3. RESUMES

Attach resumes for the proposed project manager and the superintendent detailing prior work experience and current references for the Prime and Sub. The resumes must demonstrate that these individuals have worked on at least three (3) similar projects (as defined in Item 2), and successfully completed projects during the last ten (10) years. Describe how the individuals contributed to the specific projects identified below by the Bidder. Please include the Prime and Subs Project Team Experience, and remember that the Prime must complete at least 40% of the Contracted work.

Note: Ensure the contact information provided is current and valid. Selected references will be contacted.

**If all fields are not completed, the Bid is at risk for being rejected due to non-responsiveness. It is not acceptable to indicate "See attached."**

**PROJECT No. 1 – EXPERIENCE (Prime Contractor)**

Name of Project: \_\_\_\_\_ Location: \_\_\_\_\_

OWNER'S Name and Address \_\_\_\_\_

OWNER'S Contact Person (Print) \_\_\_\_\_ Telephone ( ) \_\_\_\_\_

Project Manager Name: \_\_\_\_\_ Superintendent Name: \_\_\_\_\_

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

Contract Price: \$ \_\_\_\_\_ Contract Start Date (NTP): \_\_\_\_\_

Contract Time: \_\_\_\_\_ days ( ) Calendar Days ( ) Working

Contract Substantial Completion Date: \_\_\_\_\_ Actual Substantial Completion Date: \_\_\_\_\_

Number of Contractor's Claims: \_\_\_\_\_ Number of Change Orders: \_\_\_\_\_

Final Contract Price: \$ \_\_\_\_\_

Project Description (Describe how this project is similar to the Judson Rd. Water Infrastructure Improvements Project. Use separate sheet(s) for additional space if necessary):

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**PROJECT No. 2 – EXPERIENCE (Prime Contractor)**

Name of Project: \_\_\_\_\_ Location: \_\_\_\_\_

OWNER'S Name and Address \_\_\_\_\_

OWNER'S Contact Person (Print) \_\_\_\_\_ Telephone ( ) \_\_\_\_\_

Project Manager Name: \_\_\_\_\_ Superintendent Name: \_\_\_\_\_

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

Contract Price: \$ \_\_\_\_\_ Contract Start Date (NTP): \_\_\_\_\_

Contract Time: \_\_\_\_\_ days ( ) Calendar Days ( ) Working

Contract Substantial Completion Date: \_\_\_\_\_ Actual Substantial Completion Date: \_\_\_\_\_

Number of Contractor's Claims: \_\_\_\_\_ Number of Change Orders: \_\_\_\_\_

Final Contract Price: \$ \_\_\_\_\_

Project Description (Describe how this project is similar to the Judson Rd. Water Infrastructure Improvements Project. Use separate sheet(s) for additional space if necessary):

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**PROJECT No. 3 – EXPERIENCE (Prime Contractor)**

Name of Project: \_\_\_\_\_ Location: \_\_\_\_\_

OWNER'S Name and Address \_\_\_\_\_

OWNER'S Contact Person (Print) \_\_\_\_\_ Telephone ( ) \_\_\_\_\_

Project Manager Name: \_\_\_\_\_ Superintendent Name: \_\_\_\_\_

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

Contract Price: \$ \_\_\_\_\_ Contract Start Date (NTP): \_\_\_\_\_

Contract Time: \_\_\_\_\_ days ( ) Calendar Days ( ) Working

Contract Substantial Completion Date: \_\_\_\_\_ Actual Substantial Completion Date: \_\_\_\_\_

Number of Contractor's Claims: \_\_\_\_\_ Number of Change Orders: \_\_\_\_\_

Final Contract Price: \$ \_\_\_\_\_

Project Description (Describe how this project is similar to the Judson Rd. Water Infrastructure Improvements Project. Use separate sheet(s) for additional space if necessary):

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

**PROJECT No. 4 – EXPERIENCE (Prime Contractor)**

Name of Project: \_\_\_\_\_ Location: \_\_\_\_\_

OWNER'S Name and Address \_\_\_\_\_

OWNER'S Contact Person (Print) \_\_\_\_\_ Telephone ( ) \_\_\_\_\_

Project Manager Name: \_\_\_\_\_ Superintendent Name: \_\_\_\_\_

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

Contract Price: \$ \_\_\_\_\_ Contract Start Date (NTP): \_\_\_\_\_

Contract Time: \_\_\_\_\_ days ( ) Calendar Days ( ) Working

Contract Substantial Completion Date: \_\_\_\_\_ Actual Substantial Completion Date: \_\_\_\_\_

Number of Contractor's Claims: \_\_\_\_\_ Number of Change Orders: \_\_\_\_\_

Final Contract Price: \$ \_\_\_\_\_

Project Description (Describe how this project is similar to the Judson Rd. Water Infrastructure Improvements Project. Use separate sheet(s) for additional space if necessary):

=====

**PROJECT No. 5 – EXPERIENCE (Prime Contractor)**

Name of Project: \_\_\_\_\_ Location: \_\_\_\_\_

OWNER’S Name and Address \_\_\_\_\_

OWNER’S Contact Person (Print) \_\_\_\_\_ Telephone ( ) \_\_\_\_\_

Project Manager Name: \_\_\_\_\_ Superintendent Name: \_\_\_\_\_

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

Contract Price: \$ \_\_\_\_\_ Contract Start Date (NTP): \_\_\_\_\_

Contract Time: \_\_\_\_\_ days ( ) Calendar Days ( ) Working

Contract Substantial Completion Date: \_\_\_\_\_ Actual Substantial Completion Date: \_\_\_\_\_

Number of Contractor’s Claims: \_\_\_\_\_ Number of Change Orders: \_\_\_\_\_

Final Contract Price: \$ \_\_\_\_\_

Project Description (Describe how this project is similar to the Judson Rd. Water Infrastructure Improvements Project. Use separate sheet(s) for additional space if necessary):

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

**PROJECT No. 6 – EXPERIENCE (Prime Contractor)**

Name of Project: \_\_\_\_\_ Location: \_\_\_\_\_

OWNER’S Name and Address \_\_\_\_\_

OWNER’S Contact Person (Print) \_\_\_\_\_ Telephone ( ) \_\_\_\_\_

Project Manager Name: \_\_\_\_\_ Superintendent Name: \_\_\_\_\_

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

Contract Price: \$ \_\_\_\_\_ Contract Start Date (NTP): \_\_\_\_\_

Contract Time: \_\_\_\_\_ days ( ) Calendar Days ( ) Working

Contract Substantial Completion Date: \_\_\_\_\_ Actual Substantial Completion Date: \_\_\_\_\_

Number of Contractor’s Claims: \_\_\_\_\_ Number of Change Orders: \_\_\_\_\_

Final Contract Price: \$ \_\_\_\_\_

Project Description (Describe how this project is similar to the Judson Rd. Water Infrastructure Improvements Project. Use separate sheet(s) for additional space if necessary):

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

**PROJECT No. 1 – EXPERIENCE (Sub Contractor)**

Name of Project: \_\_\_\_\_ Location: \_\_\_\_\_

OWNER’S Name and Address \_\_\_\_\_

OWNER’S Contact Person (Print) \_\_\_\_\_ Telephone ( ) \_\_\_\_\_

Project Manager Name: \_\_\_\_\_ Superintendent Name: \_\_\_\_\_

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

Contract Price: \$ \_\_\_\_\_ Contract Start Date(NTP): \_\_\_\_\_

Contract Time: \_\_\_\_\_ days ( ) Calendar Days ( ) Working

Contract Substantial Completion Date: \_\_\_\_\_ Actual Substantial Completion Date: \_\_\_\_\_

Number of Contractor’s Claims: \_\_\_\_\_ Number of Change Orders: \_\_\_\_\_

Final Contract Price: \$ \_\_\_\_\_

Project Description (Describe how this project is similar to the Judson Rd. Water Infrastructure Improvements Project. Use separate sheet(s) for additional space if necessary):

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

**PROJECT No. 2 – EXPERIENCE (Sub Contractor)**

Name of Project: \_\_\_\_\_ Location: \_\_\_\_\_

OWNER’S Name and Address \_\_\_\_\_

OWNER’S Contact Person (Print) \_\_\_\_\_ Telephone ( ) \_\_\_\_\_

Project Manager Name: \_\_\_\_\_ Superintendent Name: \_\_\_\_\_

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

Contract Price: \$ \_\_\_\_\_ Contract Start Date(NTP): \_\_\_\_\_

Contract Time: \_\_\_\_\_ days ( ) Calendar Days ( ) Working

Contract Substantial Completion Date: \_\_\_\_\_ Actual Substantial Completion Date: \_\_\_\_\_

Number of Contractor’s Claims: \_\_\_\_\_ Number of Change Orders: \_\_\_\_\_

Final Contract Price: \$ \_\_\_\_\_

Project Description (Describe how this project is similar to the Judson Rd. Water Infrastructure Improvements Project. Use separate sheet(s) for additional space if necessary):

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

**PROJECT No. 3 – EXPERIENCE (Sub Contractor)**

Name of Project: \_\_\_\_\_ Location: \_\_\_\_\_

OWNER'S Name and Address \_\_\_\_\_

OWNER'S Contact Person (Print) \_\_\_\_\_ Telephone ( ) \_\_\_\_\_

Project Manager Name: \_\_\_\_\_ Superintendent Name: \_\_\_\_\_

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

Contract Price: \$ \_\_\_\_\_ Contract Start Date (NTP): \_\_\_\_\_

Contract Time: \_\_\_\_\_ days ( ) Calendar Days ( ) Working

Contract Substantial Completion Date: \_\_\_\_\_ Actual Substantial Completion Date: \_\_\_\_\_

Number of Contractor's Claims: \_\_\_\_\_ Number of Change Orders: \_\_\_\_\_

Final Contract Price: \$ \_\_\_\_\_

Project Description (Describe how this project is similar to the Judson Rd. Water Infrastructure Improvements Project Use separate sheet(s) for additional space if necessary):

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

**1.00 GENERAL**

**1.01 SUMMARY**

- A. This section governs the furnishing and installing of a sewer lift station and all accompanying equipment. The lift station has select modifications to a basic package configuration as depicted in the plans and herein. The lift station and all associated access and site improvements are paid as Lump Sum.

**1.02 REFERENCES**

- B. San Antonio Water System (SAWS) Lift Station Design and Construction Guidelines

**1.03 QUALITY ASSURANCE**

- A. Acceptable Manufacturers:
  - 1. Package Lift Station
    - a. Barnes Pumps
    - b. Franklin Engineered
    - c. Goulds Water Technology
    - d. Liberty Pumps
- B. All equipment shall be supplied by a single supplier/vendor
- C. Manufacturer's Representative for Startup and Testing: The services of the Manufacturer's technical representative shall be provided for pre-startup installation checks, startup assistance, training of Owner's operating personnel, troubleshooting and other services as required.
- D. The pump supplier shall also provide all of the maintenance required for the first two (2) years of operation.
- E. Testing:
  - 1. Each pump and motor shall be performance tested at the factory. All pumps shall be tested with motor cables to be supplied with the pumps. Three copies of certified test reports, including actual test records, shall be submitted and approved by the Engineer prior to shipment of the equipment.
  - 2. Each pump shall be tested for performance at the factory to determine the head vs. capacity, and motor input power for the full speed at which the pumps are specified and shown on a certified performance test curve as continuous functions throughout the pump's performance range. Tests of models, prototypes or similar units will not be acceptable. All tests shall be run in accordance with the test code for centrifugal pumps of the Standards of Hydraulic Institute, latest edition. The motor and cable on each pump shall be tested for moisture content or insulation defects. After the test, the pump cable end shall be fitted with a shrink-fit rubber boot to protect it from moisture or water.

**1.04 SUBMITTALS**

A. Submittals shall be include:

1. Shop Drawings:

- a. Shop drawings shall include a complete description of the equipment offered including control and mounting system. Shop drawings shall include catalog cuts and pertinent engineering data required to fully evaluate the equipment. Characteristic curves shall be submitted with the shop drawings showing the capacity, head, efficiency, and brake horsepower throughout the full operating range of the pump. Complete specifications on the control equipment including a list of optional features shall be submitted with the shop drawings. Submittal data shall be in such form and so presented that the Engineer may readily review the data.
- b. The Equipment Manufacturer shall submit with the shop drawings a list of 20 similar installations in Texas which have been in satisfactory operation for at least two years. Shop drawings not including this required information will not be accepted. Also, manufacturer must furnish evidence of having an authorized fully staffed and stocked service facility within 100-mile radius of the jobsite as well as having 24-hour parts availability.
- c. Data sheets supplying the following information for the pumping units shall be submitted with the shop drawings.

1). Pump:

Type of pump	Cast Iron Grinder Pump
Speed	xx rpm
Horsepower at rated head	x HP
Power	x Phase

2). Pump:

Total weight (pump and motor)	x lb.
Rated capacity and head on pump curve	x ft, x gpm

3). Motor:

Type of motor	xx rpm with automatic high-temperature protection
Starter insulation class	x (F)

- d. Shop drawings shall be supplied to insure successful installation and operation of the control system and shall consist of all of the following:
  - 1). Sufficient detail to evaluate compliance with these specifications.
  - 2). A detailed component list including manufacturer and catalog number.

- 3). A custom wiring diagram for this specific application to facilitate and insure accurate field connections to the control panel by electrical installation personnel.
  - 4). A description of operation for the control system.
  - 5). An enclosure dimension print.
2. Operation and Maintenance Manuals:
- a. Manuals shall be prepared by the equipment Manufacturer and shall incorporate storage and installation instructions and operation and maintenance procedures, appropriate final certified shop drawings, performance curves, and test data. Manuals may be Manufacturer's standard instructions but shall be supplemented as necessary to cover any special feature not included in standard material. Submit preliminary manuals for review prior to delivery of the equipment.

#### 1.05 DESIGN CONDITIONS

- A. The pumps shall be designed to handle raw unscreened sewage on a continuous duty basis and shall be capable of cutting a 3-inch compressible sphere. Pumps shall be guaranteed free from excessive cavitation and/or vibration throughout the system performance range. The pumps shall meet the operating conditions as specified and shall be designed to operate on a continuous duty basis. Design conditions for the pumps at each lift station shall be as specified.
- B. The presence of abrasives, rags, large solids and stringy materials shall not be considered as abnormal, unanticipated or abusive with regard to the equipment operation or warranty.

#### 1.06 DELIVERY AND STORAGE

- C. General Handling. Although the exterior surfaces of fiberglass reinforced plastic (FRP) sump and sewage basins are designed to withstand normal handling, they can be damaged during transportation and installation. Basins must not be dropped, dragged or handled with sharp objects and with the exception of the minimal movement involved in a visual inspection, should not be rolled.
- D. If the basin or its shell is damaged, installation should be suspended until a determination of the extent of damage can be made by the manufacturer or its agent. Any repairs must be first authorized in writing by the manufacturer and then be done in accordance with the manufacturer's instructions.
- E. Unloading, Lifting and Lowering. The proper way of moving a basin is by lifting it, using chains or cables with the optional lifting lugs (not more than 30° included angle) or by using a non-marring sling around the basin. Before any attempt is made to move the basin, it should be established that all the equipment and accessories have sufficient capacity and reach to lift and lower the basins without dragging and/or dropping. Basins should be maneuvered with guide ropes attached to the sides.
- F. WARNING! Under no circumstances is the use of chains or cables around the basin shell permitted.
- G. Storage. Basins should be stored in a secure, controlled area where the potential for accidental damage or vandalism will be minimized. The storage area should be free from sharp objects, rocks and any other foreign solutions or materials that could cause damage to the basins. Chock the basins until they are needed for installation and if windy conditions are

possible, secure the basins with non-marring restraints of a size and number adequate for securing the basin.

H. Pre-installation inspection. Basins, valves, equipment and piping materials should be physically and visually inspected prior to installation. Adherence to the project's specifications should also be confirmed before installation. If the basin or any of its internal components are damaged, installation should be suspended until a determination of the extent of damage can be made by the manufacturer or its agent. Any repairs must be first authorized in writing by the manufacturer and then be carried out in accordance with the manufacturer's instructions.

## 1.07 WARRANTY

### A. Guarantee:

#### 1. Package Lift Station

- a. The equipment supplier shall furnish a warranty for all equipment provided by the equipment supplier for a period of 2 years from date of Owner's final inspection and acceptance but not longer than 30 months from date of equipment delivery. All equipment shall be guaranteed against defects in material and workmanship to the effect that any defective equipment shall be repaired or replaced without cost or obligation to the Owner.

## 2.00 PRODUCTS

### WET WELL

- A. 48" fiberglass reinforced polyester (FRP) wet wells shall be manufactured from commercial grade unsaturated polyester resin or vinyl ester resin, with fiberglass reinforcements. The wet well shall be manufactured in one-piece including body, bottom and top. Wet well will be provided by the pump manufacturer.
- B. The resins used shall be a commercial grade unsaturated polyester resin.  
The reinforcing materials shall be commercial Grade "E" type glass in the form of mat, continuous roving, chopped roving, roving fabric or a combination of the above, having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin. If reinforcing materials are used on the surface exposed to the contained substance, it shall be a commercial grade chemical-resistant glass that will provide a suitable bond with the resin and leave a resin rich surface.
- C. Fillers, when used, shall be inert to the environment and wet well construction. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used. The resulting reinforced plastic material shall meet the requirement of this specification.
- D. The exterior surface shall be relatively smooth with no sharp projections. Handwork finish is acceptable if enough resin is present to eliminate exposed fiber. The exterior surface shall be free of blisters larger than 1/2 inch in diameter, delamination and exposed fiber.



- E. The interior surface shall be resin rich with no exposed fibers. The surface shall be free of grazing, delamination, and blisters larger than 1/2 inch in diameter, and wrinkles of 1/8 inch or greater in depth. Surface pits shall be permitted up to 6 square feet if they are less than 3/4 inch in diameter and less than 1/16 inch deep.
- F. The bottom to be fabricated using fiberglass material. Bottom to be attached to wet well pipe with fiberglass layup to comply with A.S.T.M.-D3735 specifications. Reinforcement, if needed, shall be fiberglass channel laminated to wet well bottom per A.S.T.M.-D3753.
- G. Bottom: The bottom of the wet well shall be built to withstand full exterior water column with a maximum deflection 3/8”.
- H. Bottom Square Steel Anti-Floatation Flange: A square steel anti-floatation flange shall be installed in the bottom of the wet well. It shall be one solid piece of 3/16” thick A-36 carbon steel that covers the entire bottom of the tank and extends past the wall of the tank. The steel plate shall be totally encapsulated in resin and glass. The bottoms of all fiberglass tanks and wet wells manufactured by Steele Plastics do not require a steel plate bottom be installed in order to meet the 3/8” minimum deflection specification. The installation of a steel anti-float is in addition to the minimum material required to meet the above-mentioned specification.
- I. The fiberglass wet well top shall be fabricated using fiberglass material. Top to be attached to wet well pipe with fiberglass layup to comply with A.S.T.M.-D3753 specifications. Reinforcement, if needed, shall be fiberglass channel laminated to wet well bottom per A.S.T.M.-D3753.
- J. Influent pipe shall be Kor-N-Seal or Inserta-Tee (refer to SAWS and other Standard Drawings for details). Sleeve shall be either PVC or Fiberglass Pipe, and it shall be installed and tested by the manufacturer. Installation of stubouts to be fiberglass layup to comply with A.S.T.M.-D3753 specifications.
- K. Require wet well be designed for the project service conditions (initial and ultimate build out), assuming fully saturated soil external loading and buoyant uplift, with related design calculations included in the engineering report.
- L. The (FRP) wet well shall be installed in strict accordance with the wet well manufacturer’s recommendations.
- M. Each wet well shall be marked with the following information.
  - (1) Manufacturer's name or trademark
  - (2) Manufacturing special number
  - (3) Total length and nominal diameter
- N. Wet Well Testing. An Exfiltration test must be performed immediately after the wet well has been backfilled and compacted. Exfiltration shall not exceed 0.0142 gal/hr per foot diameter per foot depth. The test must be done by plugging the gravity invert and filling up the wet well with water to either 1-foot below the wet well top slab, or up to the manhole lid with the lowest elevation below top slab. (This level must be clearly temporarily marked in the wet well internal wall). Once the wet well is filled, it must be left for stabilization for 48 hours minimum prior to beginning the Exfiltration test. After the stabilization period, the wet well must be refilled up to the mark to begin the test. The test shall be done for two hours minimum, and no water may be added to the wet well during the test period. The Exfiltration

test must be determined by measuring the amount of water required to raise the wet well level back to the mark at the end of the test period. The maximum allowable water loss to pass the test is determined by the following equation:

$$\text{Water Loss (gallons)} = 0.0142tDh$$

Where:

t = test time period (2 hours)

D = wet well diameter (in feet)

h = water level depth within wet well (in feet)

If the Exfiltration test fails the Design Engineer must work with the Contractor to determine all the necessary corrective actions to reduce the exfiltration. Once the repairs are completed the test shall be repeated. The wet well will pass the test when the exfiltration is equal or less than the allowable water loss. SAWS Inspector, Contractor and Design Engineer shall witness the complete Exfiltration test. Design Engineer shall provide a certified letter showing the results of the exfiltration test to SAWS inspector. The certification letter shall include a description of all steps taken to complete the exfiltration test, including water loss, wet well level mark, and any corrective actions taken if a prior test failed.

#### SUBMERSIBLE SEWAGE PUMP

- A. Each pump, motor, and cable assembly shall be furnished in one integral unit, factory assembled by the Pump Manufacturer.
- B. Cast iron grinder pump

#### MOTOR AND CABLE

- A. Squirrel cage induction motor, frequency of 60 Hz, three phase power supply.
- B. The motor shall be housed in either an air or oil filled chamber, watertight enclosure. The motor shall conform to NEMA design Class B and incorporate minimum Class F insulation material to withstand a continuous operating temperature of 155 C (311 F). The pump and motor shall be capable of handling liquids with a maximum temperature of 40 C (104 F). The motor shall be capable of sustaining up to 10 evenly spaced starts per hour. The motor shall be capable of operating in dry or partially submerged conditions for extended periods without damage. If the motor is expected to be exposed for longer than 15 minutes, furnish air filled motors with a water jacket if required. The nameplate motor service factor shall be at least 1.15. The motor shaft shall be 400 series stainless steel. The motors shall be 208-volt, 3-phase, 60-cycle. Lead wires shall be suitable for operation in oil. The motor shall be provided with Klixon motor thermal switches embedded in the windings to protect the motor from burnout due to excessive heating. Inrush on starting shall be no more than allowed by NEC Code Letter G. Each motor shall be suitable for use in a NEC Class 1, Division 1, Group D location and be U.L. or C.S.A. listed.

- C. Incoming lead wires shall be spliced in the motor terminal housing. After splicing, the terminal housing shall be filled with epoxy to seal the outer cable jacket and the individual strands to prevent possibility of water entering the motor housing or the terminal housing. A secondary elastomer compression grommet shall also be supplied. The combination of the epoxy seal and compression grommet shall provide complete sealing and strain relief. Sufficient cable shall be supplied to extend from the motors to the pump control without splicing. Each pump shall be equipped with adequate cable to be routed from the termination junction box to the pump without any splices at a minimum. The power cable shall be sized according to NEC and ICEA standards and also meet P122-MSHA approval and this classification shall be embossed on the cable. Refer to electrical sheets for junction box detail at wet well.
- D. The junction chamber, containing the terminal board, shall be sealed from the motor by elastomer compression seals (O-ring). Connection between the cable conductors and stator leads shall be made with threaded compressed type binding post permanently affixed to a terminal board each with an individual o-ring to prevent liquid passage.
- E. Each unit shall be provided with an adequately designed cooling system. Provision for external cooling and flushing shall also be provided, if the cooling system consists of a water jacket. Each unit shall have motor seal failure sensor(s).
- F. The motor, cable, and electrical controls shall be sized, furnished, and installed so that the motor shall never exceed the nameplate rating at any point on the pumping curve.
- G. Provide stainless steel cable strain relief on each cable at wet well roof slabs.
- H. Pump to have moisture sensor to protect seal leak.

#### GUIDERAIL

- A. The rail support system shall be furnished by the Pump Manufacturer, to adequately support the guide (slide) rails. The system shall be mounted with 316 stainless steel hardware.

#### HOISTS

- A. Pumps will be removed by service trucks with mounted cranes. No hoists will be provided by the manufacturer.

#### ACCESS COVER

- A. The pump supplier shall provide the construction details and dimensions for the cover to the Contractor so that he will have adequate information to construct the adjacent flooring system. Suitable brackets shall be provided to mount the lifting chain power cable supports and any other accessories that are not mounted on the lower level. All accessories shall be mounted so that they are not disturbed during removal of the pumps for routine maintenance. The access cover shall be provided with open assist-slow closure device and hold open device. Provide hasp and staple or other means for locking. Coat access cover frame exterior in contact with concrete with bituminous coating.
- B. Anti-slip top surface shall be installed on the wet well cover for access to the wet well, pumps, floats and level control devices. Black and yellow strips shall be painted around access hatch using Epoxy Enamel (Tnemec, or equal) coating system. Also, a "Caution! Fall

Hazard.” sign shall be painted/stenciled on the hatch. Coating requirements and thickness shall be in accordance with Manufacturer’s recommendations.

#### PUMP CONTROL PANEL

- A. Furnish package pump control panel that shall be supplied by the submersible pump manufacturer. Refer to electrical sheets and specifications for control schematics and other details.
- B. Pump control panel shall include three-phase magnetic full-voltage non-reversing starters for each pump motor, control, overcurrent protection, main disconnect, and all devices required for a complete and operable duplex pump control system. Pump control and alteration shall be provided by level controller with float switches. Provide additional float switches for high level and low level alarms.
- C. Pump control panels shall be enclosed in NEMA 4X- 316 stainless steel panel. Panels shall be dead front door-in-door construction with swing-out inner panel and stud-mounted backpan. Provide print pocket with accepted drawings of control and power wiring. Pump control panel shall have the following additional features.
  - Top-mounted audible-visible alarm that shall be energized from the high-level float switch. Provide top hub for mounting alarm to cabinet. Provide exterior alarm silence pushbutton.
  - Externally operable main disconnect handle rated NEMA 4X. In addition, provide panel mounted disconnect for each motor starter.
  - Control wiring shall be SIS and trained into wire chases that shall be backpan mounted. Each control wire shall be labeled with waterproof plastic labels at each and every connection.
  - Provide panel mounted HOA selector switches, each with engraved function and position identification.
  - Provide panel mounted alarm silence pushbutton, selector switches, run lights, moisture alarm pilot lights, elapse time meter for each motor control circuit. Each device shall be equipped with engraved metal surround to identify function.
  - Provide time delay relays for on-delay of each pump starting cycle.
  - Provide phase protection relay that shall afford protection from line unbalance, over and under voltage.
  - Control voltage shall be 120 VAC and provided by power panel. Refer to electrical sheets.
  - Provide master terminal block for termination of all external power and control wiring. Each terminal shall be labeled. Terminals shall be plated copper.
  - Pump control panel shall be manufactured by U.L. approved shop and shall have a U.L. label.
- D. Incoming power is 208/120 V, three-phase from the electric utility. Provide equipment ground lug and insulated barriered phase lugs for accepting field wiring.
- E. All wiring shall be in accordance with the Electrical specifications and NFPA 70(NEC).

- F. Pump manufacturer and electrical supplier shall coordinate the size of the pumps with the required electrical equipment. If the Contractor provides pumps larger than those indicated, all modifications to the electrical (such as starter size, conductor size, transformer size, transfer switch size, etc.) shall be solely at the Contractor's expense.

G. Auto Control:

Wet Well Level-Responsive Automatic Pump and Alarm Control System: An automatic pump control system shall operate the pumps in accordance with variations in the wet well liquid level. The automatic control system shall employ float switches to sense the liquid level in the wet well.

Liquid Level Controller: This specification is intended to cover a complete and operational automatic pump and alarm control system that responds to the wastewater pumping station wet well level excursions.

The pump/alarm Controller shall accept float switch inputs for automatic operation of pumps. It shall also provide contact closures for high level and low level alarms. Dry contact closures for remote alarm through an automatic telephone dialer shall be provided for each alarm.

Seal Failure Alarm/Over-Temperature Pump Protection: Over-temperature protection/seal failure sensing modules shall be provided by the pump supplier to the control manufacturer for mounting and wiring in the control panel. The module shall operate in conjunction with an over-temperature and moisture sending switch in each pump motor. The control shall provide pump lockout of operation upon occurrence of high temperature. The circuitry shall also include a yellow over-temperature failure indicating light and manual reset push button on the inner door for each pump. Inner door mounted pilot lights shall be provided to indicate a seal failure alarm condition for each sewage pump. These lights shall be operated by a contact closure from each pump protection module. The control equipment manufacturer shall supply any additional control devices necessary for the proper operation of the pump protection modules (transformers, relays, lights, push buttons, etc.).

## **EXECUTION**

### **INSTALLATION**

- A. Installation shall be in accordance with the Manufacturer's instructions. Any modification to the structure as a result of requiring different size access door hatchways is the responsibility of the Contractor.

### **FIELD QUALITY CONTROL**

- A. Upon completion of installation of the equipment, an acceptance test to verify the satisfactory operation of each unit shall be conducted. The Contractor shall provide the services of authorized representative of the equipment manufacturer to conduct all field tests. The test shall be conducted in a manner approved by and in the presence of the Engineer. The unit shall be checked for excessive noise, vibration, alignment, general operation, ease of

removal, etc. All automatic and manual controls shall be tested to verify that they function in accordance with the requirements. Verify that drive equipment operates without being overloaded. The unit must perform in a manner acceptable to the Engineer before final acceptance will be made by the Owner.

**PAINTING**

A. Per manufacturer recommendations and in accordance with the Schedule of Manufacturers and Suppliers: Coating (for exposed equipment outside of the wet well).

Supplier:

- a. Tnemec
- b. Sherwin-Williams
- c. PPG
- d. M.A.B Paints

**SCHEDULES**

	Location No. 1
Location	Northeast Service Center, 18000 Judson Road, San Antonio, TX 78259
Package Lift Station	1
Number of Pumps	2
Design Capacity (gpm)	60
Design Head, TDH (ft.)	107
Design Speed (rpm)	3450
Minimum Motor HP	5
Minimum pump discharge size (in.)	2"

PAYMENT

- A. Inclusive of furnishing all tools, all labor (to include manufacturer's representatives for startup and testing as outlined in 1.03 QUALITY ASSURANCE), materials, equipment, and miscellaneous items necessary for the complete installation of the proposed lift station and miscellaneous piping and appurtenances including all site and access improvements such as pavement and other surfacing, fencing and other items as shown on the drawings and specified in the contract documents, complete and in-place for the Lump Sum price. Electric service, electrical and controls improvements are not part of this pay item and are paid separately.

**END OF SECTION**

**SECTION 26 32 13**

**DIESEL ENGINE GENERATOR SETS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and SAWS Contract requirements, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Diesel engine.
2. Diesel fuel-oil system.
3. Control and monitoring.
4. Generator overcurrent and fault protection.
5. Generator, exciter, and voltage regulator.
6. Load bank.
7. Outdoor engine generator enclosure.
8. Remote radiator motors.
9. Vibration isolation devices.

B. Related Requirements:

1. Section 263623 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine generators.

1.3 DEFINITIONS

- A. EPS: Emergency power supply.
- B. EPSS: Emergency power supply system.
- C. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.



1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Include thermal damage curve for generator.
3. Include time-current characteristic curves for generator protective device.
4. Include fuel consumption in gallons per hour at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
5. Include generator efficiency at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
6. Include airflow requirements for cooling and combustion air in cubic feet per minute at 0.8 power factor, with air-supply temperature of 95, 80, 70, and 50 deg F. Provide Drawings indicating requirements and limitations for location of air intake and exhausts.
7. Include generator characteristics, including, but not limited to, kilowatt rating, efficiency, reactances, and short-circuit current capability.

B. Shop Drawings:

1. Include plans and elevations for engine generator and other components specified. Indicate access requirements affected by height of subbase fuel tank.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Identify fluid drain ports and clearance requirements for proper fluid drain.
4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include base weights.
6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for engine generators and functional relationship between all electrical components.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.

B. Source Quality-Control Reports: Including, but not limited to, the following:

1. Certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads.
2. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
3. Report of sound generation.
4. Report of exhaust emissions showing compliance with applicable regulations.

C. Field quality-control reports.

D. Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals.
  - 1. Include the following:
    - a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
    - b. Operating instructions laminated and mounted adjacent to generator location.
    - c. Training plan.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Fuses: One for each type and rating.
  - 2. Filters: One set each of lubricating oil, fuel, and combustion-air filters.
  - 3. Tools: Each tool listed by part number in operations and maintenance manual.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Testing Agency Qualifications: Accredited by NETA.
  - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Caterpillar, Inc.; Cummins Power Generation; Kohler Power Systems; Generac; MTU Onsite Energy or SAWS approved equivalent.

- B. Source Limitations: Obtain packaged engine generators and auxiliary components from single source from single manufacturer.

## 2.2 PERFORMANCE REQUIREMENTS

- A. B11 Compliance: Comply with B11.19.
- B. NFPA Compliance:
  - 1. Comply with NFPA 37.
  - 2. Comply with NFPA 70.
  - 3. Comply with NFPA 110 requirements for Level 2 EPSS.
- C. UL Compliance: Comply with UL 2200.
- D. Engine Exhaust Emissions: Comply with EPA Tier 3 requirements and applicable state and local government requirements.
- E. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
  - 1. Relative Humidity: Zero to 100 percent.
  - 2. Altitude: Sea level to 800 feet.

## 2.3 ENGINE GENERATOR ASSEMBLY DESCRIPTION

- A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- C. Power Rating: Standby.
- D. EPSS Class: Engine generator shall be classified as a Class 48 according to NFPA 110.
- E. Service Load: 18.2 kVA.
- F. Power Factor: 0.8, lagging.
- G. Frequency: 60 Hz.
- H. Voltage: 208V ac.
- I. Phase: Three-phase, four wire, wye.
- J. Induction Method: Turbocharged.
- K. Governor: Adjustable isochronous, with speed sensing.

- L. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.
- M. Capacities and Characteristics:
  - 1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries.
  - 2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.
- N. Engine Generator Performance:
  - 1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
  - 2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
  - 3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
  - 4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
  - 5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
  - 6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
  - 7. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
  - 8. Start Time:
    - a. Comply with NFPA 110 system requirements.
    - b. 60 seconds.

#### 2.4 DIESEL ENGINE

- A. Fuel: ASTM D975, diesel fuel oil, Grade 2-D S15.
- B. Rated Engine Speed: 1800 rpm.
- C. Lubrication System: Engine or skid-mounted.
  - 1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
  - 2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.

3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
- D. Integral Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator set mounting frame and integral engine-driven coolant pump.
1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
  2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
  3. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
  4. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, UV-, and abrasion-resistant fabric.
    - a. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.
    - b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.
- E. Muffler/Silencer:
1. Commercial type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
    - a. Minimum sound attenuation of 12 dB at 500 Hz.
    - b. Sound level measured at a distance of 25 feet from exhaust discharge after installation is complete shall be 90 dBA or less.
- F. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
- G. Starting System: 12-V electric, with negative ground.
1. Components: Sized so they are not damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Performance Requirements" Article.
  2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
  3. Cranking Cycle: As required by NFPA 110 for system level specified.
  4. Battery: Lead acid, with capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least three times without recharging.
  5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
  6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above

- 50 deg F regardless of external ambient temperature. Include accessories required to support and fasten batteries in place. Provide ventilation to exhaust battery gases.
7. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
  8. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
  9. Battery Charger: Current-limiting, automatic-equalizing, and float-charging type designed for lead-acid batteries. Unit shall comply with UL 1236 and include the following features:
    - a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
    - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 to 140 deg to prevent overcharging at high temperatures and undercharging at low temperatures.
    - c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
    - d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
    - e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
    - f. Enclosure and Mounting: NEMA 250, Type 4x, wall-mounted cabinet. Verify mounting type in field.

## 2.5 DIESEL FUEL-OIL SYSTEM

- A. Comply with NFPA 37.
- B. Piping: Fuel-oil piping shall be Schedule 40 black steel, complying with requirements in Section 231113 "Facility Fuel-Oil Piping." Cast iron, aluminum, copper, and galvanized steel shall not be used in the fuel-oil system.
- C. Main Fuel Pump: Mounted on engine to provide primary fuel flow under starting and load conditions.
- D. Fuel Filtering: Remove water and contaminants larger than 1 micron.
- E. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.
- F. Subbase-Mounted, Double-Wall, Fuel-Oil Tank: Factory installed and piped, complying with UL 142 fuel-oil tank. Features include the following:

1. Tank level indicator.
2. Fuel-Tank Capacity: Minimum 133 percent of total fuel required for planned operation plus fuel for periodic maintenance operations between fuel refills.
3. Leak detection in interstitial space.
4. Vandal-resistant fill cap.
5. Containment Provisions: Comply with requirements of authorities having jurisdiction.

## 2.6 CONTROL AND MONITORING

- A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of engine generator. When mode-selector switch is switched to the on position, engine generator starts. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.
- B. Provide minimum run time control set for 15 minutes with override only by operation of a remote emergency-stop switch.
- C. Comply with UL 508A.
- D. Configuration:
  1. Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the engine generator. Mounting method shall isolate the control panel from engine generator vibration. Panel shall be powered from the engine generator battery.
- E. Control and Monitoring Panel:
  1. Digital engine generator controller with integrated LCD display, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.
  2. Instruments: Located on the control and monitoring panel and viewable during operation.
    - a. Engine lubricating-oil pressure gage.
    - b. Engine-coolant temperature gage.
    - c. DC voltmeter (alternator battery charging).
    - d. Running-time meter.
    - e. AC voltmeter, for each phase connected to a phase selector switch.
    - f. AC ammeter, for each phase connected to a phase selector switch.
    - g. AC frequency meter.
    - h. Generator-voltage adjusting rheostat.
  3. Controls and Protective Devices: Controls, shutdown devices, and common alarm indication, including the following:
    - a. Cranking control equipment.

- b. Run-Off-Auto switch.
- c. Control switch not in automatic position alarm.
- d. Overcrank alarm.
- e. Overcrank shutdown device.
- f. Low-water temperature alarm.
- g. High engine temperature prealarm.
- h. High engine temperature.
- i. High engine temperature shutdown device.
- j. Overspeed alarm.
- k. Overspeed shutdown device.
- l. Low fuel main tank.

1) Low-fuel-level alarm shall be initiated when the level falls below that required for operation for duration required for the indicated EPSS class.

- m. Coolant low-level alarm.
- n. Coolant low-level shutdown device.
- o. Coolant high-temperature prealarm.
- p. Coolant high-temperature alarm.
- q. Coolant low-temperature alarm.
- r. Coolant high-temperature shutdown device.
- s. EPS load indicator.
- t. Battery high-voltage alarm.
- u. Low cranking voltage alarm.
- v. Battery-charger malfunction alarm.
- w. Battery low-voltage alarm.
- x. Lamp test.
- y. Contacts for local and remote common alarm.
- z. Remote manual stop shutdown device.
- aa. Air shutdown damper alarm when used.
- bb. Air shutdown damper shutdown device when used.
- cc. Hours of operation.
- dd. Engine generator metering, including voltage, current, hertz, kilowatt, kilovolt ampere, and power factor.

F. Connection to Datalink:

- 1. A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication.
- 2. Provide connections for datalink transmission of indications to remote data terminals via Ethernet (verify with SAWS).

G. Remote Alarm Annunciator: An LED indicator light labeled with proper alarm conditions shall identify each alarm event, and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.

- 1. Overcrank alarm.



2. Low water-temperature alarm.
3. High engine temperature prealarm.
4. High engine temperature alarm.
5. Low lube oil pressure alarm.
6. Overspeed alarm.
7. Low fuel main tank alarm.
8. Low coolant level alarm.
9. Low cranking voltage alarm.
10. Contacts for local and remote common alarm.
11. Audible-alarm silencing switch.
12. Air shutdown damper when used.
13. Run-Off-Auto switch.
14. Control switch not in automatic position alarm.
15. Fuel tank derangement alarm.
16. Fuel tank high-level shutdown of fuel supply alarm.
17. Lamp test.
18. Low-cranking voltage alarm.
19. Generator overcurrent-protective-device not-closed alarm.

- H. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator unless otherwise indicated.
- I. Remote Emergency-Stop Switch: Wall mounted unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

## 2.7 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Overcurrent protective devices shall be coordinated to optimize selective tripping when a short circuit occurs.
1. Overcurrent protective devices for the entire EPSS shall be coordinated to optimize selective tripping when a short circuit occurs. Coordination of protective devices shall consider both utility and EPSS as the voltage source.
  2. Overcurrent protective devices for the EPSS shall be accessible only to authorized personnel.
- B. Generator Overcurrent Protective Device:
1. Molded-case circuit breaker, electronic-trip type; 100 percent rated; complying with UL 489:
    - a. Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous.
    - b. Trip Settings: Selected to coordinate with generator thermal damage curve.
    - c. Shunt Trip: Connected to trip breaker when engine generator is shut down by other protective devices.
    - d. Mounting: Adjacent to, or integrated with, control and monitoring panel.

- C. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other engine generator protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector performs the following functions:
  - 1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other engine generator malfunction alarms. Contacts shall be available for load shed functions.
  - 2. Under single- or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
  - 3. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the engine generator.
  - 4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.
  
- D. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground fault.
  - 1. Indicate ground fault with other engine generator alarm indications.
  - 2. Trip generator protective device on ground fault.

## 2.8 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: Class H.
- D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required. Provide six-lead alternator.
- E. Range: Provide broad range of output voltage by adjusting the excitation level.
- F. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- G. Enclosure: Dripproof.
- H. Instrument Transformers: Mounted within generator enclosure.
- I. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified and as required by NFPA 110.

1. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.
  2. Maintain voltage within 30 percent on one step, full load.
  3. Provide anti-hunt provision to stabilize voltage.
  4. Maintain frequency within 15 percent and stabilize at rated frequency within 5 seconds.
- J. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.
- K. Subtransient Reactance: 12 percent, maximum.

## 2.9 LOAD BANK

- A. Description:
1. Permanent, outdoor, weatherproof, remote-controlled, forced-air-cooled, resistive and reactive unit capable of providing a balanced three-phase, delta-connected load to engine generator at 100 percent rated-system capacity, at 80 percent power factor, lagging. Unit shall be capable of selective control of load in 25 percent steps and with minimum step changes of approximately 5 and 10 percent available.
- B. Resistive Load Elements: Corrosion-resistant chromium alloy with ceramic and stainless-steel supports. Elements shall be double insulated and designed for repetitive on-off cycling. Elements shall be mounted in removable aluminized-steel heater cases. Galvanized steel is prohibited. Element's maximum resistance shall be between 100 and 105 percent of rated resistance.
- C. Reactive Load Elements: Epoxy-encapsulated reactor coils.
- D. Load-Bank Heat Dissipation: Integral fan with totally enclosed motor shall provide uniform cooling airflow through load elements. Airflow and coil operating current shall be such that, at maximum load, with ambient temperature at the upper end of specified range, load-bank elements operate at not more than 50 percent of maximum continuous temperature rating of resistance elements.
- E. Load-Element Switching: Remote-controlled contactors switch groups of load elements. Contactor coils are rated 120 V. Contactors shall be located in a separate NEMA 250, Type 3R enclosure within load-bank enclosure, accessible from exterior through hinged doors with tumbler locks.
- F. Contactor Enclosures: Heated by thermostatically controlled strip heaters to prevent condensation.
- G. Load-Bank Enclosures: NEMA 250, Type 3R, aluminized steel complying with NEMA ICS 6. Louvers at cooling-air intake and discharge openings shall prevent entry of rain and snow. Openings for airflow shall be screened with **1/2-inch-square**, galvanized-steel mesh. Reactive load bank shall include automatic shutters at air intake and discharge. Components other than resistive elements shall receive exterior epoxy coating with compatible primer.

- H. Protective Devices: Power input circuits to load banks shall be fused, and fuses shall be selected to coordinate with generator circuit breaker. Fuse blocks shall be located in contactor enclosure. Cooling airflow and overtemperature sensors shall automatically shut down and lock out load bank until manually reset. Safety interlocks on access panels and doors shall disconnect load power, control, and heater circuits. Fan motor shall be separately protected by overload and short-circuit devices. Short-circuit devices shall be noninterchangeable fuses with 200,000-A interrupting capacity.
- I. Load-Bank Remote-Control Panel: Separate from load bank in NEMA 250, Type 4x enclosure with a control power switch and pilot light, and switches controlling groups of load elements.
- J. Control Sequence: Control panel may be preset for adjustable single-step loading of generator during automatic exercising.

## 2.10 OUTDOOR ENGINE GENERATOR ENCLOSURE

- A. Description:
  - 1. Vandal-resistant, sound-attenuating, weatherproof steel housing; wind resistant up to 100 mph. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.
    - a. Sound Attenuation Level: Level 2.
  - 2. Prefabricated or pre-engineered, galvanized-steel-clad, integral structural-steel-framed, walk-in enclosure; erected on concrete foundation.
- B. Structural Design and Anchorage: Comply with ASCE/SEI 7 for wind loads up to 100 mph.
- C. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.
- D. Muffler Location: External to enclosure.
- E. Engine-Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for two hours with ambient temperature at top of range specified in system service conditions.
  - 1. Louvers: Fixed-engine, cooling-air inlet and discharge. Stormproof and drainable louvers prevent entry of rain and snow.
- F. Interior Lights with Switch: Factory-wired, vapor-proof luminaires within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.
  - 1. AC lighting system and connection point for operation when remote source is available.
  - 2. DC lighting system for operation when remote source and generator are both unavailable.

- G. Convenience Outlets: Factory-wired, GFCI. Arrange for external electrical connection.

## 2.11 VIBRATION ISOLATION DEVICES

- A. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
  - 1. Material: Standard neoprene or Natural rubber separated by steel shims.
- B. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

## 2.12 FINISHES

- A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

## 2.13 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine generator using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
  - 1. Tests: Comply with IEEE 115/
- B. Project-Specific Equipment Tests: Before shipment, factory test engine generator and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:
  - 1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
  - 2. Test generator, exciter, and voltage regulator as a unit.
  - 3. Full load run.
  - 4. Maximum power.
  - 5. Voltage regulation.
  - 6. Transient and steady-state governing.
  - 7. Single-step load pickup.
  - 8. Safety shutdown.
  - 9. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.
  - 10. Report factory test results within 10 days of completion of test.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine generator performance.
- B. Examine roughing-in for piping systems and electrical connections. Verify actual locations of connections before packaged engine generator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 404.
- B. Comply with packaged engine generator manufacturers' written installation and alignment instructions and with NFPA 110.
- C. Equipment Mounting:
  - 1. Install packaged engine generators on cast-in-place concrete equipment bases.
  - 2. Coordinate size and location of concrete bases for packaged engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
- D. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- E. Exhaust System: Install Schedule 40 black steel piping with welded joints and connect to engine muffler. Install thimble at wall. Piping shall be same diameter as muffler outlet.
- F. Drain Piping: Install condensate drain piping to muffler drain outlet full size of drain connection with a shutoff valve, stainless-steel flexible connector, and Schedule 40 black steel pipe with welded joints.
- G. Fuel Piping:
  - 1. Diesel storage tanks, tank accessories, piping, valves, and specialties for fuel systems shall meet all TCEQ requirements.
  - 2. Copper and galvanized steel shall not be used in the fuel-oil piping system.
- H. Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

### 3.3 CONNECTIONS

- A. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow space for service and maintenance.
- B. Connect engine exhaust pipe to engine with flexible connector.
- C. Connect fuel piping to engines with a gate valve and union and flexible connector.
- D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Provide a minimum of one 90-degree bend in flexible conduit routed to the engine generator from a stationary element.
- F. Balance single-phase loads to obtain a maximum of 10 percent unbalance between any two phases.

### 3.4 IDENTIFICATION

- A. Identify system components according to Section 260553 "Identification for Electrical Systems."

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency:
  - 1. Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Tests and Inspections:
  - 1. Perform tests recommended by manufacturer and each visual and mechanical inspection and electrical and mechanical test listed in first two subparagraphs below, as specified in NETA ATS. Certify compliance with test parameters.
    - a. Visual and Mechanical Inspection:
      - 1) Compare equipment nameplate data with Drawings and the Specifications.
      - 2) Inspect physical and mechanical condition.
      - 3) Inspect anchorage, alignment, and grounding.
      - 4) Verify that the unit is clean.
    - b. Electrical and Mechanical Tests:
      - 1) Perform insulation-resistance tests according to IEEE 43.

- a) Machines 200 hp or Less: Test duration shall be one minute. Calculate the dielectric-absorption ratio.
  - 2) Test protective relay devices.
  - 3) Verify phase rotation, phasing, and synchronized operation as required by the application.
  - 4) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.
  - 5) Perform vibration test for each main bearing cap.
  - 6) Verify correct functioning of the governor and regulator.
2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here, including, but not limited to, single-step full-load pickup test.
  3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
    - a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
    - b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
    - c. Verify acceptance of charge for each element of the battery after discharge.
    - d. Verify that measurements are within manufacturer's specifications.
  4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
  5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.
  6. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
  7. Harmonic-Content Tests: Measure harmonic content of output voltage at 25 and 100 percent of rated linear load. Verify that harmonic content is within specified limits.
- C. Coordinate tests with tests for transfer switches and run them concurrently.
  - D. Test instruments shall have been calibrated within the past 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.
  - E. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.
  - F. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.
  - G. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.



- H. Remove and replace malfunctioning units and retest as specified above.
- I. Retest: Correct deficiencies identified by tests and observations, and retest until specified requirements are met.
- J. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- K. Infrared Scanning: After Substantial Completion, but not more than 60 days after final acceptance, perform an infrared scan of each power wiring termination and each bus connection while running with maximum load. Remove all access panels so terminations and connections are accessible to portable scanner.
  - 1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan 11 months after date of Substantial Completion.
  - 2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
  - 3. Record of Infrared Scanning: Prepare a certified report that identifies terminations and connections checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

### 3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION