PACKAGE DIESEL GENERATOR 80 KW

1 GENERAL

1.1 REFERENCES AND STANDARDS

THE GENERATOR SET COVERED BY THESE SPECIFICATIONS SHALL BE DESIGNED, TESTED, RATED, ASSEMBLED AND INSTALLED IN STRICT ACCORDANCE WITH ALL APPLICABLE STANDARDS BELOW:

- CSA C22.2 NO14
- CSA 282
- CSA 100
- EN61000-6
- EN55011
- FCC PART 15 SUBPART B
- ISO8528
- IEC61000
- UL508
- UL2200
- UL142
- DESIGNED TO ALLOW FOR INSTALLED COMPLIANCE TO NFPA 70, NFPA99 AND NFPA 110

1.2 RELATED SECTIONS

1.2.1 DIVISION 3 – STRUCTURAL CONCRETE

1.2.2 DIVISION 15 – MECHANICAL

1.3 WORK INCLUDED

1.3.1 INSTALLATION

THE WORK INCLUDES SUPPLYING AND INSTALLING A COMPLETE INTEGRATED GENERATOR SYSTEM. THE SYSTEM CONSISTS OF A DIESEL GENERATOR SET WITH RELATED COMPONENT ACCESSORIES AND AUTOMATIC TRANSFER SWITCH(ES) SPECIFIED UNDER A SEPARATE SECTION.

1.3.2 FUEL SYSTEM

THE CONTRACTOR SHALL PROVIDE A FULL TANK OF DIESEL FUEL AFTER THE COMPLETION OF ALL TESTING.

1.3.3 SYSTEM TEST

A COMPLETE SYSTEM LOAD TEST SHALL BE PERFORMED AFTER ALL EQUIPMENT IS INSTALLED. GUIDELINES IN THE START-UP SECTION.

1.3.4 REQUIREMENTS, CODES AND REGULATIONS

THE EQUIPMENT SUPPLIED AND INSTALLED SHALL MEET THE REQUIREMENTS OF THE NEC AND ALL APPLICABLE LOCAL CODES AND REGULATIONS. ALL EQUIPMENT SHALL BE OF NEW AND CURRENT PRODUCTION BY A MANUFACTURER WHO HAS 25 YEARS OF EXPERIENCE BUILDING THIS TYPE OF EQUIPMENT. MANUFACTURER SHALL BE ISO9001 CERTIFIED.

1.3.5 APPROVED MANUFACTURES

THE STANDBY DIESEL GENERATOR SHALL BE SUPPLIED BY:

- LOFTIN – KOHLER
- ONAN – CUMMINS
- HOLT – CATERPILLAR
- ENERGY SYSTEMS – GENERAC

2

OR BY ALTERNATE MANUFACTURES WHO SHALL SUBMIT A REQUEST TWO WEEKS PRIOR TO BID AND INCLUDE A WRITTEN LIST OF DEVIATIONS FROM THIS SPECIFICATION TO BE CONSIDERED FOR APPROVAL.

1.4 SUBSTITUTION

PROPOSED DEVIATIONS FROM THE SPECIFICATIONS SHALL BE TREATED AS FOLLOWS:

1.4.1 SUBSTITUTION TIME REQUIREMENT

REQUESTS FOR SUBSTITUTIONS SHALL BE MADE A MINIMUM OF TWO WEEKS PRIOR TO BID DATE. MANUFACTURERS CATALOG DATA SHALL ACCOMPANY EACH REQUEST AND AUTHORIZED ACCEPTANCE SHALL BE ADDENDA ONLY.

1.4.2 SUBSTITUTION RESPONSIBILITY

THE POWER SYSTEM HAS BEEN DESIGNED TO SOUTHERN PLAINS/CUMMINS ELECTRICAL AND PHYSICAL CHARACTERISTICS. THE EQUIPMENT SIZING, SPACING, AMOUNTS, ELECTRICAL WIRING, VENTILATION EQUIPMENT, FUEL AND EXHAUST COMPONENTS HAVE ALL BEEN SIZED AND DESIGNED AROUND SOUTHERN PLAINS/CUMMINS SUPPLIED EQUIPMENT. SHOULD ANY OF THE OTHER APPROVED MANUFACTURER SUBSTITUTIONS BE MADE, THE CONTRACTOR SHALL BEAR RESPONSIBILITY FOR THE INSTALLATION, COORDINATION AND OPERATION OF THE SYSTEM AS WELL AS ANY ENGINEERING AND REDESIGN COSTS, WHICH MAY RESULT FROM SUCH SUBSTITUTIONS.

1.5 SUBMITTALS

ENGINE-GENERATOR SUBMITTALS SHALL INCLUDE THE FOLLOWING INFORMATION:

1. FACTORY PUBLISHED SPECIFICATION SHEET.
2. MANUFACTURER'S CATALOG CUT SHEETS OF ALL AUXILIARY COMPONENTS SUCH AS BATTERY CHARGER, CONTROL PANEL, ENCLOSURE, ETC.
3. DIMENSIONAL ELEVATION AND LAYOUT DRAWINGS OF THE GENERATOR SET, ENCLOSURE AND TRANSFER SWITCHGEAR AND RELATED ACCESSORIES.
4. WEIGHTS OF ALL EQUIPMENT.
5. CONCRETE PAD RECOMMENDATION, LAYOUT AND STUB-UP LOCATIONS OF ELECTRICAL AND FUEL SYSTEMS.
6. INTERCONNECT WIRING DIAGRAM OF COMPLETE EMERGENCY SYSTEM, INCLUDING GENERATOR, SWITCHGEAR, DAY TANK, REMOTE PUMPS, BATTERY CHARGER, CONTROL PANEL, AND REMOTE ALARM INDICATIONS.
7. ENGINE MECHANICAL DATA, INCLUDING HEAT REJECTION, EXHAUST GAS FLOWS, COMBUSTION AIR AND VENTILATION AIR FLOWS, FUEL CONSUMPTION, ETC.
8. GENERATOR ELECTRICAL DATA INCLUDING TEMPERATURE AND INSULATION DATA, COOLING REQUIREMENTS, EXCITATION RATINGS, VOLTAGE REGULATION, VOLTAGE REGULATOR, EFFICIENCIES, WAVEFORM DISTORTION AND TELEPHONE INFLUENCE FACTOR.
9. GENERATOR RESISTANCES, REACTANCES AND TIME CONSTANTS.
10. GENERATOR LOCKED ROTOR MOTOR STARTING CURVES.
11. MANUFACTURER'S DOCUMENTATION SHOWING MAXIMUM EXPECTED TRANSIENT VOLTAGE AND FREQUENCY DIPS, AND RECOVERY TIME DURING OPERATION OF THE GENERATOR SET AT THE SPECIFIED SITE CONDITIONS WITH THE SPECIFIED LOADS.
12. MANUFACTURER'S AND DEALER'S WRITTEN WARRANTY.

1.7 SYSTEM RESPONSIBILITY

1.7.1 GENERATOR SET DISTRIBUTOR

THE COMPLETED ENGINE GENERATOR SET SHALL BE SUPPLIED BY THE MANUFACTURER'S AUTHORIZED DISTRIBUTOR ONLY.

- LOFTIN – KOHLER
- ONAN – CUMMINS
- HOLT – CATERPILLAR
- ENERGY SYSTEMS – GENERAC

2

1.7.2 REQUIREMENTS, CODES AND REGULATIONS

THE EQUIPMENT SUPPLIED AND INSTALLED SHALL MEET THE REQUIREMENTS OF NEC AND ALL-APPLICABLE LOCAL CODES AND REGULATIONS. ALL EQUIPMENT SHALL BE NEW, OF CURRENT PRODUCTION. THERE SHALL BE ONE SOURCE RESPONSIBILITY FOR WARRANTY; PARTS AND SERVICE THROUGH A LOCAL REPRESENTATIVE WITH FACTORY TRAINED SERVICE PERSONNEL.

1.7.3 AUTOMATIC TRANSFER SWITCH(ES)

THE AUTOMATIC TRANSFER SWITCH(ES) SPECIFIED IN ANOTHER SECTION SHALL BE SUPPLIED BY THE GENERATOR SET MANUFACTURER IN ORDER TO ESTABLISH AND MAINTAIN A SINGLE SOURCE OF SYSTEM RESPONSIBILITY AND COORDINATION.

1.8 WARRANTY

1.8.1 TWO YEAR STANDBY (ISO 8528-1: ESP) GENERATOR SET WARRANTY

THE MANUFACTURER'S STANDARD WARRANTY SHALL IN NO EVENT BE FOR A PERIOD OF LESS THAN TWO (2) YEARS FROM DATE OF INITIAL START-UP OF THE SYSTEM AND SHALL INCLUDE REPAIR PARTS, LABOR, REASONABLE TRAVEL EXPENSE NECESSARY FOR REPAIRS AT THE JOB SITE, AND EXPENDABLES (LUBRICATING OIL, FILTERS, ANTIFREEZE, AND OTHER SERVICE ITEMS MADE UNUSABLE BY THE DEFECT) USED DURING THE COURSE OF REPAIR. RUNNING HOURS SHALL BE LIMITED TO 500 HOURS ANNUALLY FOR THE SYSTEM WARRANTY BY BOTH THE MANUFACTURER AND SERVICING DISTRIBUTOR. SUBMITTALS RECEIVED WITHOUT WRITTEN WARRANTIES AS SPECIFIED WILL BE REJECTED IN THEIR ENTIRETY.

1.9 PARTS AND SERVICE QUALIFICATIONS

1.9.1 SERVICE FACILITY

THE ENGINE-GENERATOR SUPPLIER SHALL MAINTAIN 24 HOUR PARTS AND SERVICE CAPABILITY WITHIN 100 MILES OF THE PROJECT SITE. THE DISTRIBUTOR SHALL STOCK PARTS AS NEEDED TO SUPPORT THE GENERATOR SET PACKAGE FOR THIS SPECIFIC PROJECT. THE SUPPLIER MUST CARRY SUFFICIENT INVENTORY TO COVER NO LESS THAN 80% PARTS SERVICE WITHIN 24 HOURS AND 95% WITHIN 48 HOURS.

THE LIFT STATION SHALL OPERATE PER THE SEQUENCE OF OPERATIONS AS NOTED ON THE CIVIL DRAWINGS AND SPECIFICATIONS. PLEASE NOTIFY THE ENGINEER IMMEDIATELY IF THERE ARE ANY DISCREPANCIES.

1.9.2 SERVICE PERSONNEL

THE DEALER SHALL MAINTAIN QUALIFIED FACTORY TRAINED SERVICE PERSONNEL.

2 PRODUCT SPECIFICATIONS

2.1 GENERAL REQUIREMENTS

2.1.1 GENSET REQUIREMENTS

THE GENERATOR SET SHALL BE STANDBY DUTY RATED AT 80 KW, 100 KVA, 1800 RPM, 0.8 POWER FACTOR, 480/277 V, 3-PHASE, 60 HERTZ, INCLUDING RADIATOR FAN AND ALL PARASITIC LOADS. GENERATOR SET SHALL BE SIZED TO OPERATE AT THE SPECIFIED LOAD AT A MAXIMUM AMBIENT OF 115F (46.1C) AND ALTITUDE OF 1,000.0 FEET (304.8 M).

STANDBY RATING AS DEFINED BY THE FOLLOWING:
TYPICAL LOAD FACTOR = 70% OR LESS WITH VARIABLE LOAD
TYPICAL HOURS PER YEAR = 200 HOURS
MAXIMUM EXPECTED USAGE = 500 HOURS/YEAR
TYPICAL APPLICATION – STANDBY
TYPICAL PEAK DEMAND = 80% OF ESP RATED KW WITH 100% OF RATING AVAILABLE FOR THE DURATION OF AN EMERGENCY OUTAGE

2.1.2 MATERIAL AND PARTS

ALL MATERIALS AND PARTS COMPRISING THE UNIT SHALL BE NEW AND UNUSED.

2.1.3 ENGINE

THE ENGINE SHALL BE DIESEL FUELED, FOUR (4) CYCLE, WATER-COOLED, WHILE OPERATING WITH NOMINAL SPEED NOT EXCEEDING 1800 RPM. THE ENGINE WILL UTILIZE IN-CYLINDER COMBUSTION TECHNOLOGY, AS REQUIRED, TO MEET APPLICABLE EPA NON-ROAD MOBILE REGULATIONS AND/OR THE EPA NSPS RULE FOR STATIONARY RECIPROCATING COMPRESSION IGNITION ENGINES. ADDITIONALLY, THE ENGINE SHALL COMPLY WITH THE STATE EMISSION REGULATIONS AT THE TIME OF INSTALLATION/COMMISSIONING. ACTUAL ENGINE EMISSIONS VALUES MUST BE IN COMPLIANCE WITH APPLICABLE EPA EMISSIONS STANDARDS PER ISO 8178 – D2 EMISSIONS CYCLE AT SPECIFIED EKW / BHP RATING. UTILIZATION OF THE "TRANSITION PROGRAM FOR EQUIPMENT MANUFACTURERS" (ALSO KNOWN AS "FLEX CREDITS") TO ACHIEVE EPA CERTIFICATION IS NOT ACCEPTABLE. THE IN-CYLINDER ENGINE TECHNOLOGY MUST NOT PERMIT UNFILTERED EXHAUST GAS TO BE INTRODUCED INTO THE COMBUSTION CYLINDER. EMISSIONS REQUIREMENTS / CERTIFICATIONS OF THIS PACKAGE: EPA TIER 3

2.1.3.1 ENGINE GOVERNING

THE ENGINE WILL BE EQUIPPED WITH AN ISOCHRONOUS ELECTRONIC GOVERNOR TO MAINTAIN +/- 0.25% STEADY STATE FREQUENCY VARIATION FROM STEADY STATE NO LOAD TO STEADY STATE FULL LOAD.

2.2 GENERATOR

2.2.1 GENERATOR SPECIFICATIONS

THE SYNCHRONOUS THREE PHASE GENERATOR SHALL BE A SINGLE BEARING, SELF-VENTILATED, DRIP-PROOF DESIGN IN ACCORDANCE WITH NEMA MG 1 AND DIRECTLY CONNECTED TO THE ENGINE FLYWHEEL HOUSING WITH A FLEX COUPLING. THE GENERATOR SHALL MEET PERFORMANCE CLASS G2 OF ISO 8528. THE EXCITATION SYSTEM SHALL ENABLE THE ALTERNATOR TO SUSTAIN 300% (250% FOR 50HZ) OF RATED CURRENT BASED ON THE 125C (CLASS H) OR 105C (CLASS F) RISE RATING FOR TEN SECONDS DURING A FAULT CONDITION AND SHALL IMPROVE THE IMMUNITY OF THE VOLTAGE REGULATOR TO NON-LINEAR DISTORTING LOADS. THE EXCITATION SYSTEM SHALL BE OF BRUSHLESS CONSTRUCTION AND BE INDEPENDENT OF MAIN STATOR WINDINGS, PERMANENT MAGNET.

2.2.2 VOLTAGE REGULATOR

2.2.2.1 AUTOMATIC VOLTAGE REGULATOR

THE AUTOMATIC VOLTAGE REGULATOR (AVR) SHALL MAINTAIN GENERATOR OUTPUT VOLTAGE WITHIN +/- 0.5% FOR ANY CONSTANT LOAD BETWEEN NO LOAD AND FULL LOAD. THE REGULATOR SHALL BE A TOTALLY SOLID STATE DESIGN, WHICH INCLUDES ELECTRONIC VOLTAGE BUILDUP, VOLTS PER HERTZ REGULATION, OVER-EXCITATION PROTECTION, SHALL LIMIT VOLTAGE OVERSHOOT ON STARTUP, AND SHALL BE ENVIRONMENTALLY SEALED.

2.2.3 MOTOR STARTING

PROVIDE LOCKED ROTOR MOTOR STARTING CAPABILITY OF 306 SKVA AT 20% INSTANTANEOUS VOLTAGE DIP AS DEFINED PER NEMA MG 1. SUSTAINED VOLTAGE DIP DATA IS NOT ACCEPTABLE.

2.3 CIRCUIT BREAKER

2.3.1 CIRCUIT BREAKER SPECIFICATIONS

PROVIDE A GENERATOR MOUNTED 100% CIRCUIT BREAKER, MOLDED CASE, QTY. (1) 125 AMP TRIP, 3 POLE, NEMA 1/IP22. BREAKER SHALL UTILIZE A SOLID STATE TRIP UNIT. THE BREAKER SHALL BE UL/CSA LISTED OF IEC CONSTRUCTION AND CONNECTED TO ENGINE/GENERATOR SAFETY SHUTDOWNS. BREAKER SHALL BE HOUSED IN AN EXTENSION TERMINAL BOX WHICH IS ISOLATED FROM VIBRATIONS INDUCED BY THE GENERATOR SET. MECHANICAL TYPE LUGS, SIZED FOR THE CIRCUIT BREAKER FEEDERS SHOWN ON DRAWING, SHALL BE SUPPLIED ON THE LOAD SIDE OF BREAKER.

2.4 CONTROLS – GENERATOR SET MOUNTED

PROVIDE A FULLY SOLID-STATE, MICROPROCESSOR BASED, GENERATOR SET CONTROL. THE CONTROL PANEL SHALL BE DESIGNED AND BUILT BY THE ENGINE MANUFACTURER. THE CONTROL SHALL PROVIDE ALL OPERATING, MONITORING, AND CONTROL FUNCTIONS FOR THE GENERATOR SET. THE CONTROL PANEL SHALL PROVIDE REAL TIME DIGITAL COMMUNICATIONS TO ALL ENGINE AND REGULATOR CONTROLS.

2.4.1 ENVIRONMENTAL

THE GENERATOR SET CONTROL SHALL BE TESTED AND CERTIFIED TO THE FOLLOWING ENVIRONMENTAL CONDITIONS.

1. -40°C TO +70C OPERATING RANGE
2. 95% HUMIDITY NON-CONDENSING, 30C TO 60C
3. IP22 PROTECTION FOR REAR OF CONTROLLER; IP55 WHEN INSTALLED IN CONTROL PANEL
4. 5% SALT SPRAY, 48 HOURS, +38C, 36.8V SYSTEM VOLTAGE
5. SINUSOIDAL VIBRATION 4.3G'S RMS, 24-1000HZ
6. ELECTROMAGNETIC CAPABILITY (89/336/EEC, 91/368/EEC, 93/44/EEC, 93/68/EEC, BS EN 50081-2, 50082-2)
7. SHOCK: WITHSTAND 15G

2.4.2 FUNCTIONAL REQUIREMENTS

THE FOLLOWING FUNCTIONALITY SHALL BE INTEGRAL TO THE CONTROL PANEL.

1. THE CONTROL SHALL INCLUDE A 33 X 132 PIXEL, 24MM X 95MM, POSITIVE IMAGE, TRANSFLECTIVE LCD DISPLAY WITH TEXT BASED ALARM/EVENT DESCRIPTIONS.
2. AUDIBLE HORN FOR ALARM AND SHUTDOWN WITH HORN SILENCE SWITCH
3. STANDARD ISO LABELING
4. MULTIPLE LANGUAGE CAPABILITY
5. REMOTE START/STOP CONTROL
6. LOCAL RUN/OFF/AUTO CONTROL INTEGRAL TO SYSTEM MICROPROCESSOR
7. COOLDOWN TIMER
8. SPEED ADJUST
9. LAMP TEST
10. PUSH BUTTON EMERGENCY STOP BUTTON
11. PASSWORD PROTECTED SYSTEM PROGRAMMING

2.4.3 DIGITAL MONITORING CAPABILITY

THE CONTROLS SHALL PROVIDE THE FOLLOWING DIGITAL READOUTS FOR THE ENGINE AND GENERATOR.
ALL READINGS SHALL BE INDICATED IN EITHER METRIC OR ENGLISH UNITS

ENGINE

1. ENGINE OIL PRESSURE
2. ENGINE OIL TEMPERATURE
3. ENGINE COOLANT TEMPERATURE
4. ENGINE RPM
5. BATTERY VOLTS

GENERATOR

1. GENERATOR AC VOLTS (LINE TO LINE, LINE TO NEUTRAL AND AVERAGE)
2. GENERATOR AC CURRENT (AVG AND PER PHASE)
3. GENERATOR AC FREQUENCY
4. GENERATOR KW (TOTAL AND PER PHASE)
5. GENERATOR KVA (TOTAL AND PER PHASE)
6. GENERATOR KVAR (TOTAL AND PER PHASE)
7. POWER FACTOR (AVG AND PER PHASE)
8. TOTAL KW-HR
9. TOTAL KVAR-HR
10. % KW
11. % KVA
12. % KVAR

2.4.4 ALARMS AND SHUTDOWNS

THE CONTROL SHALL MONITOR AND PROVIDE ALARM INDICATION AND SUBSEQUENT SHUTDOWN FOR THE FOLLOWING CONDITIONS. ALL ALARMS AND SHUTDOWNS ARE ACCOMPANIED BY A TIME, DATE, AND ENGINE HOUR STAMP THAT ARE STORED BY THE CONTROL PANEL FOR FIRST AND LAST OCCURRENCE:

ENGINE ALARM/SHUTDOWN

1. LOW OIL PRESSURE ALARM/SHUTDOWN
2. HIGH COOLANT TEMPERATURE ALARM/SHUTDOWN
3. LOSS OF COOLANT SHUTDOWN
4. OVERSPEED SHUTDOWN
5. OVERCRANK SHUTDOWN
6. LOW COOLANT LEVEL ALARM
7. LOW FUEL LEVEL ALARM
8. EMERGENCY STOP DEPRESSED SHUTDOWN
9. LOW COOLANT TEMPERATURE ALARM
10. LOW BATTERY VOLTAGE ALARM
11. HIGH BATTERY VOLTAGE ALARM
12. CONTROL SWITCH NOT IN AUTO POSITION ALARM
13. BATTERY CHARGER FAILURE ALARM

GENERATOR ALARM/SHUTDOWN

1. GENERATOR OVER VOLTAGE
2. GENERATOR UNDER VOLTAGE
3. GENERATOR OVER FREQUENCY
4. GENERATOR UNDER FREQUENCY
5. GENERATOR REVERSE POWER
6. GENERATOR OVERCURRENT

2.4.5 INPUTS AND OUTPUTS

PROGRAMMABLE DIGITAL INPUTS
THE CONTROLLER SHALL INCLUDE THE ABILITY TO ACCEPT SIX (6) DIGITAL INPUT SIGNALS. THE SIGNALS MAY BE PROGRAMMED FOR EITHER HIGH OR LOW ACTIVATION USING PROGRAMMABLE NORMALLY OPEN OR NORMALLY CLOSED CONTACTS.

DIGITAL OUTPUTS
THE CONTROL SHALL INCLUDE THE ABILITY TO OPERATE SIX (6) PROGRAMMABLE RELAY OUTPUT SIGNALS, INTEGRAL TO THE CONTROLLER. THE OUTPUT RELAYS SHALL BE RATED FOR 2A @ 30VDC.

DISCRETE OUTPUTS
THE CONTROL SHALL INCLUDE THE ABILITY TO OPERATE ONE (1) DISCRETE OUTPUTS, INTEGRAL TO THE CONTROLLER, WHICH ARE CAPABLE OF SINKING UP TO 300MA.

2.4.6 MAINTENANCE

ALL ENGINE, VOLTAGE REGULATOR, CONTROL PANEL AND ACCESSORY UNITS SHALL BE ACCESSIBLE THROUGH A SINGLE ELECTRONIC SERVICE TOOL. THE FOLLOWING MAINTENANCE FUNCTIONALITY SHALL BE INTEGRAL TO THE GENERATOR SET CONTROL:

1. ENGINE RUNNING HOURS DISPLAY
2. SERVICE MAINTENANCE INTERVAL (RUNNING HOURS OR CALENDAR DAYS)
3. ENGINE CRANK ATTEMPT COUNTER
4. ENGINE SUCCESSFUL STARTS COUNTER
5. 20 EVENTS ARE STORED IN CONTROL PANEL MEMORY
6. PROGRAMMABLE CYCLE TIMER THAT STARTS AND RUNS THE GENERATOR FOR A PREDETERMINED TIME. THE TIMER SHALL USE 14 USER-PROGRAMMABLE SEQUENCES THAT ARE REPEATED IN A 7-DAY CYCLE. EACH SEQUENCE SHALL HAVE THE FOLLOWING PROGRAMMABLE SET POINTS:

A. DAY OF WEEK
B. TIME OF DAY TO START
C. DURATION OF CYCLE

2.4.7 REMOTE COMMUNICATIONS

REMOTE COMMUNICATIONS
THE CONTROL SHALL INCLUDE MODBUS RTU COMMUNICATIONS AS STANDARD VIA RS-485 HALF DUPLEX WITH CONFIGURABLE BAUD RATES FROM 2.4K TO 57.6K.

REMOTE ANNUNCIATOR (NFPA 99/110, CSA 282)
PROVIDE A REMOTE ANNUNCIATOR TO MEET THE REQUIREMENTS OF NFPA 110, LEVEL 1.

1. THE ANNUNCIATOR SHALL PROVIDE REMOTE ANNUNCIATION OF ALL POINTS STATED ABOVE AND SHALL INCORPORATE RING-BACK CAPABILITY SO THAT AFTER SILENCING THE INITIAL ALARM, ANY SUBSEQUENT ALARMS WILL SOUND THE HORN.
2. ABILITY TO BE LOCATED UP TO 800 FT FROM THE GENERATOR SET

REMOTE MONITORING SOFTWARE
THE CONTROL SHALL PROVIDE MONITORING SOFTWARE WITH THE FOLLOWING FUNCTIONALITY:

1. PROVIDE ACCESS TO ALL DATE AND EVENTS ON GENERATOR SET COMMUNICATIONS NETWORK
2. PROVIDE REMOTE CONTROL CAPABILITY FOR THE GENERATOR SET
3. ABILITY TO MONITOR UP TO 12 GENERATOR SETS
4. ABILITY TO COMMUNICATE VIA MODBUS RTU OR REMOTE MODEM

ETHERNET/IP COMMUNICATION:

1. GENERATOR PERCENT LOAD
2. GENERATOR ENGINE SPEED
3. GENERATOR ENGINE HOURS
4. GENERATOR COOLANT TEMPERATURE
5. GENERATOR OIL PRESSURE
6. GENERATOR L1-L2 VOLTAGE
7. GENERATOR L2-L3 VOLTAGE
8. GENERATOR L3-L1 VOLTAGE
9. GENERATOR L1-N VOLTAGE
10. GENERATOR L2-N VOLTAGE
11. GENERATOR L3-N VOLTAGE
12. GENERATOR L1 CURRENT
13. GENERATOR L2 CURRENT
14. GENERATOR L3 CURRENT

2.5 COOLING SYSTEM

THE GENERATOR SET SHALL BE EQUIPPED WITH A RAIL-MOUNTED, ENGINE-DRIVEN RADIATOR WITH BLOWER FAN AND ALL ACCESSORIES. THE COOLING SYSTEM SHALL BE SIZED TO OPERATE AT FULL LOAD CONDITIONS AND 110 F° AMBIENT AIR ENTERING THE ROOM OR ENCLOSURE (IF AN ENCLOSURE IS SPECIFIED). THE GENERATOR SET SUPPLIER IS RESPONSIBLE FOR PROVIDING A PROPERLY SIZED COOLING SYSTEM BASED ON THE ENCLOSURE STATIC PRESSURE RESTRICTION.

2.6 FUEL SYSTEM

2.6.1 FUEL SYSTEM SPECIFICATIONS

THE FUEL SYSTEM SHALL BE INTEGRAL WITH THE ENGINE. IN ADDITION TO THE STANDARD FUEL FILTERS PROVIDED BY THE ENGINE MANUFACTURER, THERE SHALL ALSO BE INSTALLED A PRIMARY FUEL FILTER/WATER SEPARATOR IN THE FUEL INLET LINE TO THE ENGINE. ALL FUEL PIPING SHALL BE BLACK IRON OR FLEXIBLE FUEL HOSE RATED FOR THIS SERVICE. NO GALVANIZED PIPING WILL BE PERMITTED. FLEXIBLE FUEL LINES SHALL BE MINIMALLY RATED FOR 300 DEGREES F AND 100 PSI.

2.6.2 FUEL SUB BASE TANK

PROVIDE A DOUBLE WALL SUB-BASE TANK CONSTRUCTED TO MEET ALL LOCAL CODES AND REQUIREMENTS. A FUEL TANK BASE OF 48 HOUR CAPACITY SHALL BE PROVIDED AS AN INTEGRAL PART OF THE ENCLOSURE. IT SHALL BE CONTAINED IN A RUPTURE BASIN WITH 110% CAPACITY. THE TANK SHALL MEET UL142 STANDARDS. A LOCKING FILL CAP, A MECHANICAL READING FUEL LEVEL GAUGE, LOW FUEL LEVEL ALARM CONTACT, AND FUEL TANK RUPTURE ALARM CONTACT SHALL BE PROVIDED.

2.7 EXHAUST SYSTEM

2.7.1 SILENCER

A CRITICAL GRADE SILENCER, COMPANION FLANGES, AND FLEXIBLE EXHAUST FITTING PROPERLY SIZED SHALL BE FURNISHED AND INSTALLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATION. MOUNTING SHALL BE PROVIDED BY THE CONTRACTOR AS SHOWN ON THE DRAWINGS (INDOOR INSTALLATIONS ONLY). THE SILENCER SHALL BE MOUNTED SO THAT ITS WEIGHT IS NOT SUPPORTED BY THE ENGINE NOR WILL EXHAUST SYSTEM GROWTH DUE TO THERMAL EXPANSION BE IMPOSED ON THE ENGINE. EXHAUST PIPE SIZE SHALL BE SUFFICIENT TO ENSURE THAT EXHAUST BACKPRESSURE DOES NOT EXCEED THE MAXIMUM LIMITATIONS SPECIFIED BY THE ENGINE MANUFACTURER.

2.8 STARTING SYSTEM

2.8.1 STARTING MOTOR

A DC ELECTRIC STARTING SYSTEM WITH POSITIVE ENGAGEMENT SHALL BE FURNISHED. THE MOTOR VOLTAGE SHALL BE AS RECOMMENDED BY THE ENGINE MANUFACTURER.

2.8.2 JACKET WATER HEATER

JACKET WATER HEATER SHALL BE PROVIDED AND SHALL BE SIZED TO INSURE THAT GENSET WILL START WITHIN THE SPECIFIED TIME PERIOD AND AMBIENT CONDITIONS.

2.8.3 BATTERIES

BATTERIES – A LEAD-ACID STORAGE BATTERY SET OF THE HEAVY-DUTY STARTING TYPE SHALL BE PROVIDED. BATTERY VOLTAGE SHALL BE COMPATIBLE WITH THE STARTING SYSTEM. THE BATTERIES SUPPLIED SHALL MEET NFPA 110 CRANKING REQUIREMENTS OF 90 SECONDS MINIMUM OF TOTAL CRANKING TIME. BATTERY SPECIFICATIONS (TYPE, AMP-HOUR RATING, COLD CRANKING AMPS) TO BE PROVIDED IN THE SUBMITTAL.

S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 2390824

NO.	REVISION	DATE
2	ADDENDUM 2	03/11/26

2390824
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
11/24/25

PAPE-DAWSON
1672 INDEPENDENCE DR, STE 102 | NEW BRAUNFELS, TX 78132 | 830.632.5533
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

MAYFAIR LIFT STATION #3 AND FORCE MAIN
NEW BRAUNFELS, TEXAS

GENERATOR SPECIFICATIONS

PLAT NO.
JOB NO. 30002-74
DATE SEPTEMBER 2025
DESIGNER PD
CHECKED SK DRAWN PD
SHEET E1.2

Date: Mar 12, 2026, 1:18pm User ID: mmontoya
File: K:\Projects\2024\2390824-Page Dawson-Mayfair Lift Station #3\01 Design Phase_CAD\2390824-E12.dwg

SCADA SYSTEM – GENERAL PROVISIONS

PART 1: GENERAL

1.01 SCOPE OF WORK:

A. THE PROJECT SHALL CONSIST OF A COMPLETE AND OPERATING SCADA SYSTEM FOR THE FOLLOWING SITES:

- MAYFAIR LIFT STATION #3

THE COMPLETE SYSTEM SHALL INCLUDED BUT NOT LIMITED TO ALL HARDWARE, SOFTWARE, LABOR, AND COAX CABLE AS LISTED IN THIS PERFORMANCE SPECIFICATION. THE CONTRACTOR SHALL VISIT EACH SITE PRIOR TO SUBMITTING THEIR BID.

B. A SINGLE PRE-APPROVED SCADA SYSTEM INTEGRATOR (SSI) SHALL FURNISH ALL SERVICES AND EQUIPMENT DEFINED HEREIN AND IN OTHER SPECIFICATION SECTIONS AS REQUIRED TO PROVIDE A FULLY-FUNCTIONAL SCADA SYSTEM.

PRE-APPROVED SSI'S

2

1. TRAC-N-TROL (512-930-5721)
2. PRIME CONTROLS (830-358-3008)
3. TMT SOLUTIONS (512-392-9211)
4. GLX TECHNOLOGIES (713-987-7630)

C. THE SSI SHALL PROVIDE ALL MATERIALS, EQUIPMENT, LABOR, AND SERVICES REQUIRED TO ACHIEVE A FULLY INTEGRATED AND OPERATIONAL SCADA SYSTEM. THE SSI SHALL DESIGN AND COORDINATE THE CONTROL SYSTEM FOR PROPER OPERATION WITH RELATED EQUIPMENT AND MATERIALS FURNISHED BY OTHER SUPPLIERS UNDER OTHER SECTIONS OF THESE SPECIFICATIONS AND WITH RELATED EXISTING EQUIPMENT. THE SSI SHALL PROVIDE A TURNKEY SCADA SYSTEM INCLUDING ALL REQUIRED ELECTRICAL CONDUIT AND WIRE UNLESS OTHERWISE SPECIFIED.

D. TO FACILITATE THE OWNER'S FUTURE CONSTRUCTION, OPERATION, AND MAINTENANCE, PRODUCTS SHALL BE BY A MAJOR INSTRUMENTATION AND SCADA EQUIPMENT MANUFACTURERS, WITH PANEL MOUNTED DEVICES OF THE SAME TYPE AND MODEL AS FAR AS POSSIBLE.

E. ALL MATERIALS, EQUIPMENT, LABOR, AND SERVICES NECESSARY TO ACHIEVE THE MONITORING AND CONTROL FUNCTIONS DESCRIBED HEREIN SHALL BE PROVIDED IN A TIMELY MANNER SUCH THAT THE MONITORING AND CONTROL FUNCTIONS ARE AVAILABLE WHEN THE EQUIPMENT IS READY TO BE PLACED INTO SERVICE.

F. A MANDATORY PRE-BID WALK-THROUGH SHALL BE SCHEDULED FOR ALL PLAN HOLDERS BIDDING ON THE SCADA PORTION OF THIS PROJECT.

1.02 QUALIFICATIONS AND REQUIREMENTS:

A. IN ORDER TO ENSURE A COMPLETE AND SUCCESSFUL PROJECT, THE SSI'S MUST DEMONSTRATE A HISTORY OF SUCCESSFUL REFERENCES AND FINANCIAL STABILITY, AND FIVE YEARS OF SUSTAINED BUSINESS ACTIVITY IN THE SCADA INDUSTRY SERVING WATER AND WASTEWATER UTILITIES IN TEXAS.

B. IN ORDER TO ENSURE QUALITY CONTROL AND COMPATIBILITY WITH EXISTING OPERATIONS, THE INDIVIDUAL INTEGRATOR(S) TO COMPLETE THE WORK MUST BE SPECIFIED IN THE PROPOSAL AND THEIR EXPERIENCE MUST BE ACCEPTABLE, WITHOUT LIMITATION, IN THE FOLLOWING AREAS:

LIST SPECIFIC QUALIFICATIONS INCLUDING:

1. INTEGRATION EXPERIENCE OF WATER UTILITIES SERVING SIMILAR GEOGRAPHICAL OR COUNTY-WIDE AREAS OF AT LEAST TEN PROJECTS OF SUCCESSFUL REFERENCE FOR RADIO TELEMETRY SCADA WITHIN THE STATE OF TEXAS.

C. IN ORDER TO ENSURE ADEQUATE RESPONSE TO EMERGENCIES AND SERVICE NEEDS, THE SSI MUST HAVE A SERVICE FACILITY WITHIN A 150 MILE RADIUS OF THE WATER TREATMENT PLANT.

D. THE ATTACHED "SCOPE OF PROJECT AND EQUIPMENT SPECIFICATIONS" WILL BE REQUIRED AS PRESENTED. SEE SECTION ON "SUBSTITUTE EQUIPMENT".

E. THE SSI WILL SPECIFY EQUIPMENT, SIZES AND QUANTITIES WHICH ARE PROPOSED TO BE USED FOR THE PROJECT. ALL EQUIPMENT SPECIFIED SHALL BE NON-PROPRIETARY AND UNIVERSALLY AVAILABLE TO ALL SSI'S. ALL COMPUTER AND COMPUTER RELATED EQUIPMENT SHALL BE COMPLIANT FOR DATE-BASED FUNCTIONALITY. A COMPLIANCE CERTIFICATE SHALL BE REQUIRED FROM THE SSI STATING COMPLIANCE WITH THESE REQUIREMENTS.

F. THE SSI SHALL PROVIDE A SCHEDULE OF THE WARRANTY PROVIDED FOR WORK COMPLETED UNDER THIS PROPOSAL AND NON-WARRANTY SERVICE SCHEDULE WITH PRICING AND TERMS BEYOND THE WARRANTY PERIOD AS A PART OF ITS PROPOSAL.

G. THE SSI SHALL BE A "SYSTEMS HOUSE" REGULARLY ENGAGED IN THE DESIGN AND THE INSTALLATION OF COMPUTER SYSTEMS AND THEIR ASSOCIATED SUBSYSTEM AS THEY ARE APPLIED TO THE RETAIL PUBLIC WATER UTILITY INDUSTRY. FOR THE PURPOSES OF THIS SPECIFICATIONS SECTION, A "SYSTEMS HOUSE" SHALL BE INTERPRETED TO MEAN AN ORGANIZATION THAT COMPLIES WITH ALL OF THE FOLLOWING CRITERIA:

1. EMPLOYS DESIGN AND TECHNICAL PERSONNEL ON THIS PROJECT WHO HAVE SUCCESSFULLY COMPLETED A MANUFACTURER'S TRAINING COURSE ON THE CONFIGURATION AND IMPLEMENTATION OF THE SPECIFIC HARDWARE AND SOFTWARE FOR THIS PROJECT.

H. THE SSI SHALL MAINTAIN A FULLY EQUIPPED OFFICE/PRODUCTION FACILITY WITH FULL TIME EMPLOYEES CAPABLE OF, CONFIGURING, INSTALLING, CALIBRATING, TROUBLESHOOTING, AND TESTING THE SYSTEM SPECIFIED HEREIN.

I. LISTED SSI'S SHALL NOT BE REQUIRED TO SUBMIT A QUALIFICATION PROPOSAL. SSI'S INTERESTED IN BEING LISTED AS AN EQUAL SHALL SUBMIT THREE (3) COPIES OF A QUALIFICATIONS PROPOSAL, AS REQUIRED HEREIN, TO THE ENGINEER NO LATER THAN TEN (10) DAYS BEFORE THE BID OPENING DATE. A LIST OF APPROVED EQUALS WILL BE ISSUED NO LATER FIVE (5) DAYS BEFORE THE BID OPENING DATE BY ADDENDUM.

1. THE QUALIFICATIONS PROPOSAL SHALL PROVIDE DETAILS AND A DESCRIPTION OF HOW THE SSI PROPOSES TO FULFILL THE REQUIREMENTS SET FORTH IN THIS SPECIFICATION. THE SSI SHALL ALSO BE CAPABLE OF SATISFYING THE OWNER'S FUTURE NEEDS WITH REGARD TO A FULLY FUNCTIONAL SCADA SYSTEM. THE SSI SHALL PRESENT THE PROPOSAL IN SUFFICIENT DETAIL SO THAT PROPER EVALUATION REGARDING THE EXPERIENCE AND CAPABILITIES OF THE SSI CAN BE PERFORMED. ALL ITEMS LISTED AS QUALIFICATION REQUIREMENTS SET FORTH IN THIS SECTION MUST BE PROVIDED FOR PROPER EVALUATION. FAILURE TO PROVIDE SUCH DOCUMENTATION WILL DISQUALIFY THE APPLICANT.

2. THE PROPOSAL SHALL CONTAIN EVIDENCE THAT THE SSI HAS SUFFICIENT FINANCIAL RESOURCES TO MEET THE OBLIGATIONS INCIDENTAL TO THE PERFORMANCE OF THE WORK INCLUDING BONDING. (THIS REQUIREMENT MAY BE PROVIDED IN THE FORM OF A VERIFIABLE OR CERTIFIED FINANCIAL REPORT FOR THE COMPANY'S LATEST FISCAL YEAR).

3. THE PROPOSAL SHALL CONTAIN A LIST OF PERSONNEL AVAILABLE FOR ASSIGNMENT TO THE RESPONSIBLE POSITIONS OF PROJECT MANAGER, PROJECT ENGINEER, LEAD PROGRAMMER, INSTALLATION SUPERVISOR, AND AREA SERVICE REPRESENTATIVE. ALSO, INCLUDE A CONCISE RESUME OF EACH INDIVIDUAL'S EDUCATION, TRAINING, WORK EXPERIENCE, AND ACCOMPLISHMENTS.

4. THE PROPOSAL SHALL CONTAIN THE FOLLOWING SPECIFIC INFORMATION:

A. LOCATION OF SERVICE CENTER IN RELATION TO THE OWNER'S OFFICE.
B. TECHNICAL VALIDATION SAMPLES OF RECENTLY COMPLETED AND SIMILAR SCOPE PROJECTS.
C. A DESCRIPTION OF HOW THE SUPPLIER PLANS TO EXECUTE THE VARIOUS FUNCTIONS AND LOCATIONS WHERE THE VARIOUS WORK CAN BE PERFORMED, INCLUDING EXISTING LOCATIONS TO INTEGRATE INTO THE FUTURE PROJECTS AS DESIGNATED BY THE OWNER.

5. THE SSI SHALL BE REQUIRED TO PROVIDE A REFERENCE LIST OF A MINIMUM OF FIVE (5) YEARS RECENT PAST EXPERIENCE IN THE DESIGN, ASSEMBLY, AND COMMISSIONING OF INSTRUMENTATION AND CONTROL SYSTEMS OF COMPARABLE SIZE, TYPE, AND COMPLEXITY TO THE PROPOSED PROJECT. THE SSI SHALL BE REQUIRED TO HAVE HIS/HER OWN IN-HOUSE CAPABILITY TO HANDLE COMPLETE SYSTEM ENGINEERING, FABRICATION, AND TESTING.

6. THE SSI SHALL INDICATE THAT HE/SHE HAS IN HIS/HER EMPLOY CAPABLE PERSONNEL FOR DETAILED ENGINEERING, COORDINATION, DRAFTING, PROCUREMENT AND EXPEDITING, SCHEDULING, CONSTRUCTING, TESTING, INSPECTION, INSTALLATION, TRAINING, AND START-UP SERVICE FOR CALIBRATION AND COMMISSIONING AND WARRANTY COMPLIANCE FOR THE PERIOD SPECIFIED.

PART 2: SCADA SYSTEM

2.01 SCOPE OF PROJECT AND EQUIPMENT SPECIFICATIONS

A. THE SCADA SYSTEM SHALL BE A MICRO-PROCESSOR BASED MONITORING AND CONTROL-SYSTEM READY FOR COMMUNICATION WITH A MASTER TERMINAL UNIT (MTU) COMMUNICATING WITH OTHER REMOTE TERMINAL UNITS (RTU'S) VIA COMMUNICATION TECHNOLOGIES. RTU'S HEREIN SPECIFIED SHALL ALSO BE REQUIRED TO COMMUNICATE WITH OTHER RTU'S IN A PEER-TO-PEER MANNER FOR THE PURPOSE OF MEETING REGIONAL OR PRESSURE-PLANE-SPECIFIC REQUIREMENTS. PEER-TO-PEER COMMUNICATIONS BETWEEN RTU'S SHALL NOT REQUIRE PROGRAMMING AT EACH LOCATION. EACH MONITORING AND CONTROL SITE AT WHICH COMMANDS WILL BE EXECUTED SHALL BE LOCALLY CONTROLLED UTILIZING A LOGIC CONTROLLER WHICH SHALL BE PROGRAMMED ACCORDING TO IEC 61131 STANDARDS.

B. SYSTEM EQUIPMENT SPECIFICATIONS:

1. EXISTING MASTER TERMINAL UNIT (MTU): THE MTU IS A CONTROLLER/INTERPRETER WHICH IS INSTALLED AT THE EQUIPMENT RACK AND SHALL BE MODIFIED/EXPANDED AS NECESSARY TO ACHIEVE THE MONITORING AND CONTROL FUNCTIONS DESCRIBED HEREINAFTER. THE MTU SHALL COMMUNICATE WITH AN OPERATOR INTERFACE TERMINAL (OIT) CONTAINING THE HUMAN MACHINE INTERFACE (HMI) SOFTWARE (IGNITION SCADA). THE MTU SHALL INCLUDE THE REQUIRED NUMBER OF OPERATOR INTERFACE TERMINALS ALONG WITH WHATEVER IS NECESSARY IN ORDER TO EFFECT GOOD COMMUNICATIONS, DATA ACQUISITION AND SUPERVISORY CONTROL TO AND WITH THE RTU'S. THE MTU SHALL INCLUDE SCADA ALARM SOFTWARE THAT WILL PROVIDE ALARM DIALING CAPABILITY AND AN INSQL HISTORIAN WITH REPORTING CAPABILITY. THE MTU SHALL BE CAPABLE OF RECEIVING THE FOLLOWING SITES:

- MAYFAIR LIFT STATION #3

2. REMOTE TERMINAL UNIT (RTU): THE RTU IS A LOGIC CONTROLLER INSTALLED AT EACH REMOTE WELL SITE FOR THE CONTROL OF THE LOCAL EQUIPMENT AND THE MONITORING OF OPERATING PARAMETERS OF EACH SITE. EACH RTU SHALL CONTAIN A LOGIC CONTROLLER, MODEM, POWER SUPPLIES, RELAYS, WIRING, CONDUIT, CABLING, POWER/SURGE SUPPRESSION PROTECTION, UPS AND NEMA 4XSS RATED ENCLOSURES.

3. ENCLOSURES W/BACK PANELS: NEMA 4XSS RATED ELECTRICAL AND INSTRUMENTATION ENCLOSURES TO HOUSE ELECTRONIC SCADA EQUIPMENT, CONTROL AND INSTRUMENTATION DEVICES PER THE CONSULTING ENGINEERS REQUIREMENTS SHALL BE PROVIDED. THE SSI SHALL INSTALL THE SCADA RTU EQUIPMENT PER THE PLANS. THE RTU SHALL BE SUFFICIENTLY SIZED TO INCORPORATE THE SCADA HARDWARE HARDWARE. THE RTU ENCLOSURE SHALL HAVE 25% SPARE CAPACITY.

4. LOGIC CONTROLLER (LC): AN LC IS A MICRO-PROCESSOR INSTALLED AT THE MTU AND/OR EACH RTU SCADA SITE TO INTERPRET INFORMATION REGARDING THE OPERATION AT THE SITE AND TO EXECUTE LOCAL COMMANDS OR COMMANDS SENT FROM OTHER SCADA SITES.

AS SPECIFIED:
ALLEN-BRADLEY COMPACT LOGIX 5069 OR APPROVED EQUAL
NOTE: WHEREVER POSSIBLE, ALL LOGIC CONTROLLERS SHALL BE OF THE SAME MODEL AND CONFIGURATION FOR ALL SITES IN ORDER TO PROVIDE THE OWNER WITH STANDARD PARTS FOR SERVICE CONTINUITY.

5. POWER SUPPLY: EACH RTU/MTU REQUIRES ALTERNATING CURRENT CONVERSION TO DIRECT CURRENT FOR OPERATIONS OF ITS COMPONENTS. A BATTERY PACK ALLOWS FOR DIRECT CURRENT FEED IN THE EVENT OF A POWER FAILURE. THIS BATTERY PACK WILL ENSURE CONTINUED OPERATION AND FLOW OF INFORMATION FROM LOGIC CONTROLLERS AT SCADA SITES DURING SHORT TERM POWER OUTAGES AND ENSURE MTU COMPUTER POWER SUPPLY BACKUP DURING SHORT- TERM POWER OUTAGES. TYPE QUINT4-PS/1AC/24DC BY PHOENIX CONTACT.

6. CELLULAR RADIO(S): TYPE CISCO IR1101 WITH MODULE P-5GS6-FL-V02.

THE LIFT STATION SHALL OPERATE PER THE SEQUENCE OF OPERATIONS AS NOTED ON THE CIVIL DRAWINGS AND SPECIFICATIONS. PLEASE NOTIFY THE ENGINEER IMMEDIATELY IF THERE ARE ANY DISCREPANCIES.

NO.	REVISION	DATE
2	ADDENDUM 2	03/11/26

2390824
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED
PROFESSIONAL ENGINEER
11/24/25

PAPE-DAWSON
1672 INDEPENDENCE DR. STE 102 | NEW BRAUNFELS, TX 78132 | 830.632.5533
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

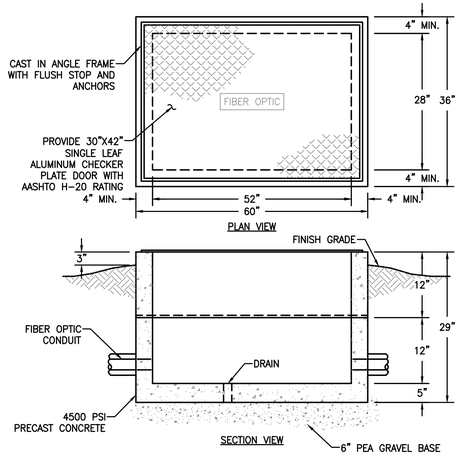
MAYFAIR LIFT STATION #3 AND FORCE MAIN
NEW BRAUNFELS, TEXAS

SCADA SPECIFICATIONS

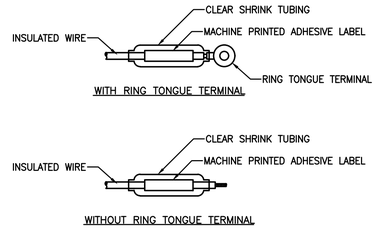
S. Kanetzky
Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 2390824

PLAT NO.
JOB NO. 30002-74
DATE SEPTEMBER 2025
DESIGNER PD
CHECKED SK DRAWN PD
SHEET E1.4

Date: Mar 12, 2026, 1:18pm User ID: mmontoya
File: K:\Projects\2024\2390824-Pape Dawson-Mayfair Lift Station #3\01 Design Phase_CAD\2390824-E14.dwg

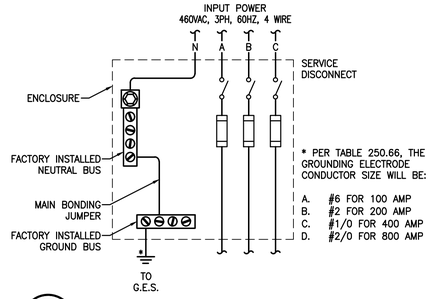


9 E4.1 DETAIL - FIBER HAND HOLE ⟨4⟩
SCALE: NTS



NOTE:
WHERE POSSIBLE RING TERMINALS SHALL BE USED. ONE OF THE ABOVE METHODS MUST BE USED ON ALL WIRE #8 AWG & SMALLER. THE SAME MUST ALSO BE USED ON LARGER WIRE UNLESS AN ALTERNATE METHOD IS SUBMITTED & APPROVED.

6 E4.1 DETAIL - WIRE TERMINATION AND MARKING
SCALE: NTS



* PER TABLE 250.66, THE GROUNDING ELECTRODE CONDUCTOR SIZE WILL BE:

A. #6 FOR 100 AMP
B. #2 FOR 200 AMP
C. #1/0 FOR 400 AMP
D. #2/0 FOR 800 AMP

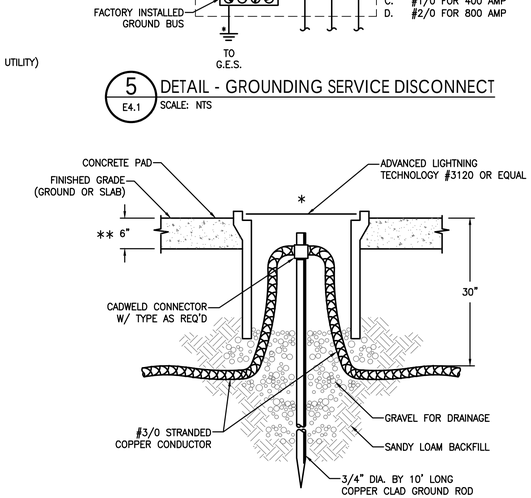
5 E4.1 DETAIL - GROUNDING SERVICE DISCONNECT
SCALE: NTS

REFERENCE NOTES

1. COORDINATE INSTALLATION OF WET WELL JUNCTION BOX WITH SITE CONDITIONS AND SHEET E2.0.
2. CONTRACTOR SHALL INSTALL NBU APPROVED SECURITY CAMERA ON TOP OF POLE LIGHT.
3. CONTRACTOR SHALL REFERENCE CIVIL AND STRUCTURAL PLANS FOR ALL WET WELL WALL TOP SLAB PENETRATION LOCATIONS AND COORDINATE WITH WET WELL MANUFACTURER.
4. PRECAST STRUCTURE SHALL BE DESIGNED TO MEET ASTM C857 AND C858.
5. SEAL-OFF FITTING SHALL BE NON-HARDENING AND RE-ENTERABLE / REPAIRABLE.

2

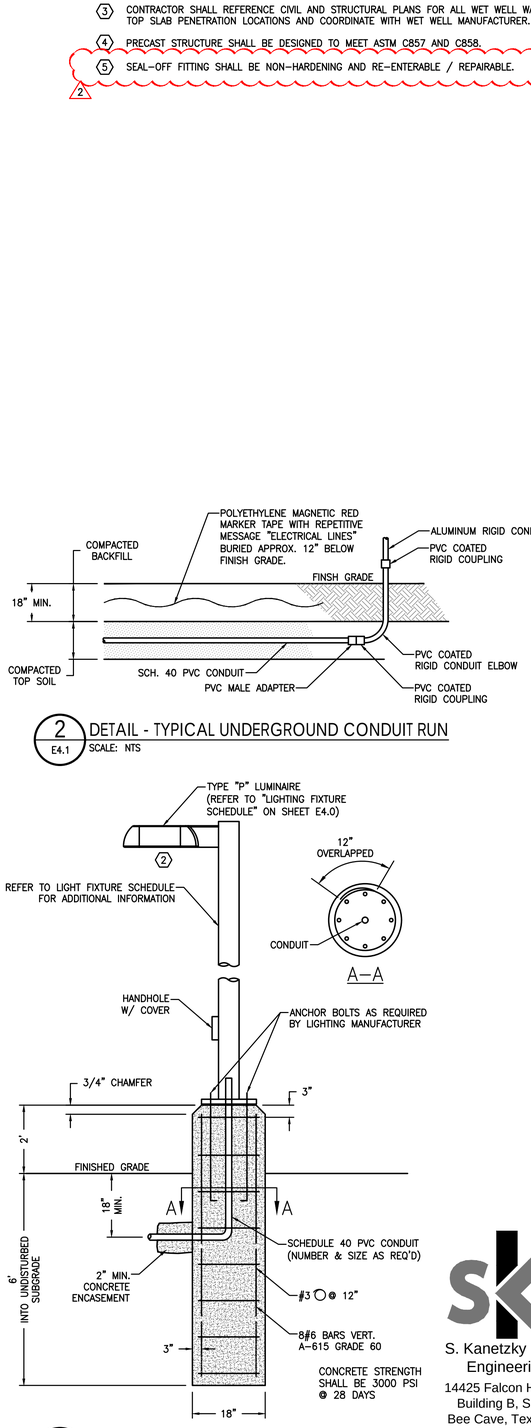
2 E4.1 DETAIL - TYPICAL UNDERGROUND CONDUIT RUN
SCALE: NTS



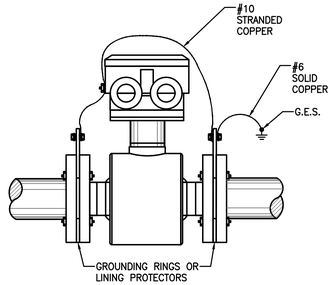
* INSTALL GROUND RODS AWAY FROM HEAVY TRAFFIC AREAS AND SIDEWALKS. COORDINATE EXACT LOCATION WITH CIVIL DRAWINGS

** INSTALL 2'X2'X6" CONCRETE PAD

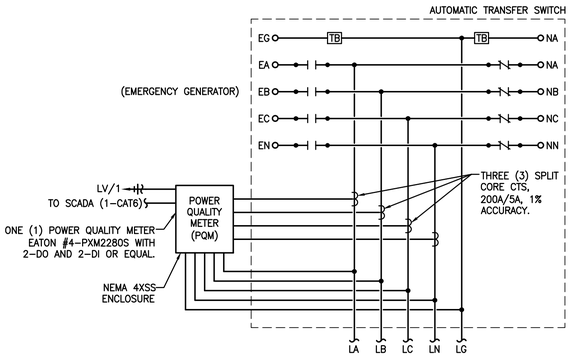
4 E4.1 DETAIL - 3/4" X 10' GROUND ROD
SCALE: NTS



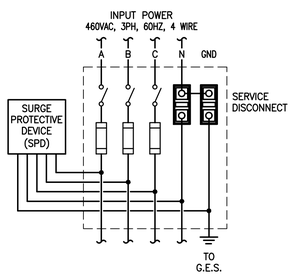
1 E4.1 DETAIL - POLE MOUNTED LIGHTING FIXTURE
SCALE: NTS



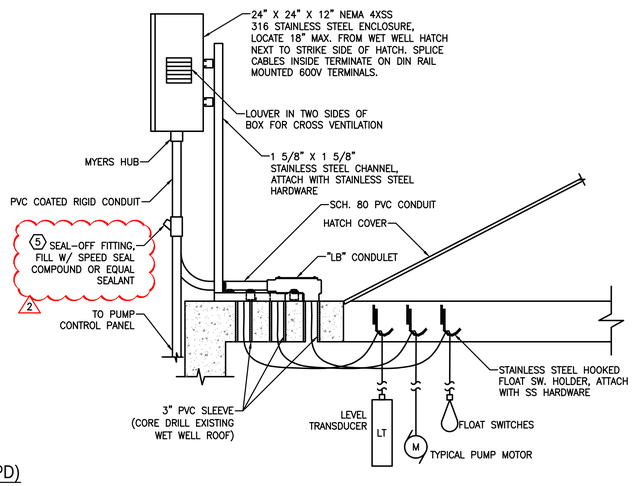
11 E4.1 DETAIL - MAGNETIC FLOWMETER - GROUNDING
SCALE: NTS



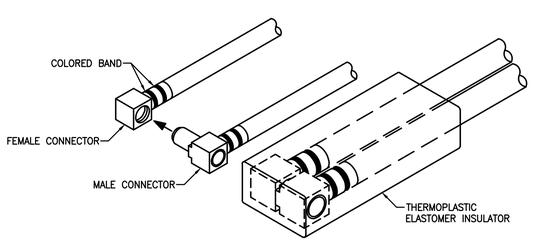
8 E4.1 DETAIL - POWER QUALITY METER (PQM)
SCALE: NTS



10 E4.1 DETAIL - SURGE PROTECTION DEVICE (SPD)
SCALE: NTS



7 E4.1 DETAIL - WET WELL JUNCTION BOX ⟨1⟩⟨3⟩
SCALE: NTS



NOTE:
MOTOR LEAD CONNECTION KIT SHALL BE TYPE ABB MDXXX-X OR EQUAL. SEE MANUFACTURER INFORMATION FOR EXACT SIZE AND TYPE

3 E4.1 DETAIL - MOTOR LEAD DISCONNECT
SCALE: NTS

THE LIFT STATION SHALL OPERATE PER THE SEQUENCE OF OPERATIONS AS NOTED ON THE CIVIL DRAWINGS AND SPECIFICATIONS. PLEASE NOTIFY THE ENGINEER IMMEDIATELY IF THERE ARE ANY DISCREPANCIES.

NO.	REVISION	DATE
2	ADDENDUM 2	03/11/26

2390824
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
11/24/25

PAPE-DAWSON
1672 INDEPENDENCE DR. STE 102 | NEW BRAUNFELS, TX 78132 | 830.632.5533
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

MAYFAIR LIFT STATION #3 AND FORCE MAIN
NEW BRAUNFELS, TEXAS

ELECTRICAL DETAILS

S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 2390824

PLAT NO.
JOB NO. 30002-74
DATE SEPTEMBER 2025
DESIGNER PD
CHECKED SK DRAWN PD
SHEET E4.1

Date: Mar 12, 2026, 1:19pm User ID: mmontoya
File: K:\Projects\2024\2390824-Pape Dawson-Mayfair Lift Station #3\01 Design Phase_CAD\2390824-E41.dwg

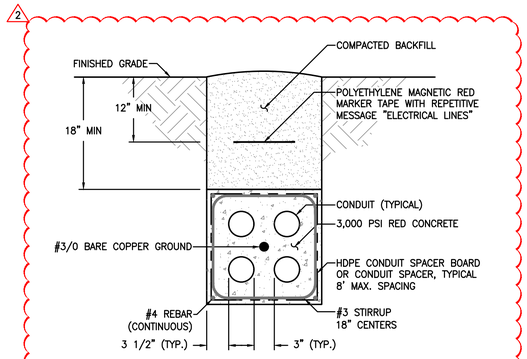
BID SET - NOT FOR CONSTRUCTION 30007-74

REFERENCE NOTES

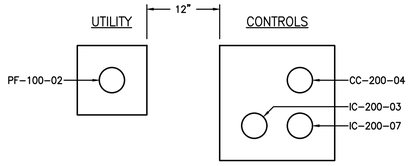
1. REFER TO UTILITY DUCTBANK SECTION DETAIL 2/E4.3 FOR CONSTRUCTION INFORMATION, TYPICAL.
2. REFER TO DUCTBANK SECTION DETAIL 1/E4.3 FOR CONSTRUCTION INFORMATION. TYPICAL.
3. REFER TO "CIRCUIT SCHEDULE" ON SHEET E4.0 FOR ADDITIONAL INFORMATION. TYPICAL.
4. REFER TO DUCTBANK SECTION DETAIL 14/E4.3 FOR CONSTRUCTION INFORMATION. TYPICAL.

GENERAL NOTE

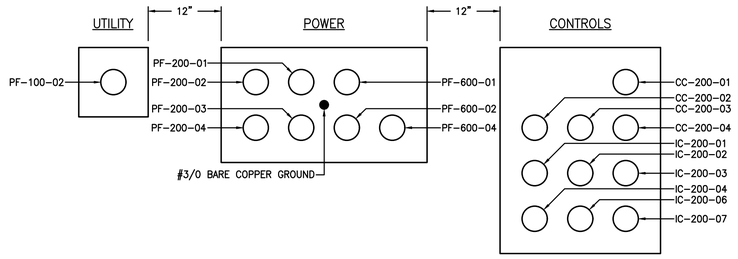
1. IT IS THE ELECTRICAL CONTRACTORS RESPONSIBILITY TO PROVIDE AND INSTALL ALL RACEWAYS AND CONDUCTORS CUMULATIVELY BETWEEN THE UNDERGROUND ELECTRICAL DETAILS, PANEL SCHEDULES, I/O SCHEDULES, AND CIRCUIT SCHEDULES. THE CIRCUIT SCHEDULES, I/O SCHEDULES AND PANEL SCHEDULES TAKE PRECEDENCE OVER THE UNDERGROUND ELECTRICAL DETAILS.



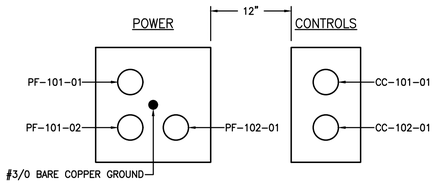
14 / E4.3 DETAIL - TYPICAL ROAD CROSSING DUCTBANK SECTION CONSTRUCTION
SCALE: NTS



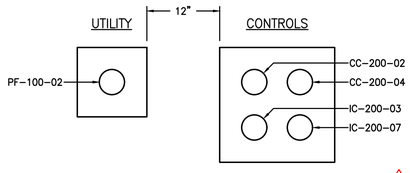
10 / E4.3 DETAIL - DUCTBANK SECTION H-H (4)(3) (2)
SCALE: NTS



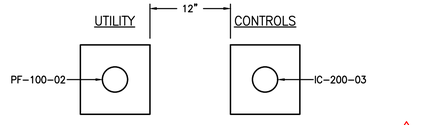
6 / E4.3 DETAIL - DUCTBANK SECTION D-D (4)(3) (2)
SCALE: NTS



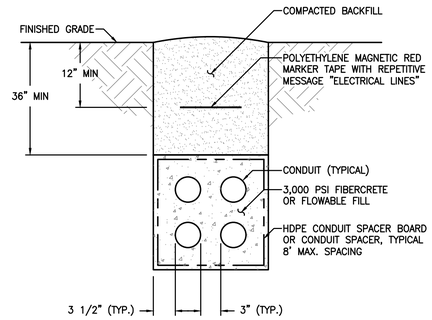
13 / E4.3 DETAIL - DUCTBANK SECTION L-L (2)(3)
SCALE: NTS



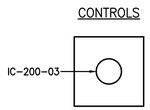
9 / E4.3 DETAIL - DUCTBANK SECTION G-G (4)(3) (2)
SCALE: NTS



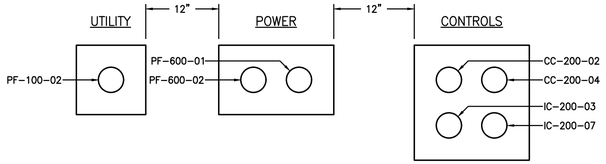
5 / E4.3 DETAIL - DUCTBANK SECTION C-C (4)(3) (2)
SCALE: NTS



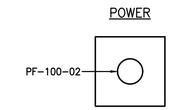
2 / E4.3 DETAIL - UTILITY DUCTBANK SECTION CONSTRUCTION, TYP.
SCALE: NTS



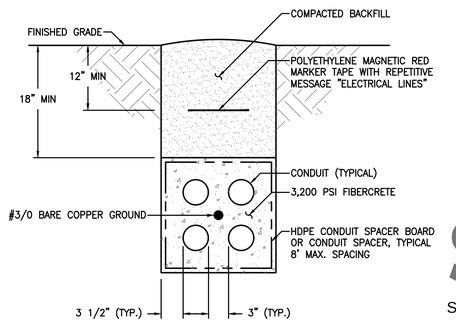
12 / E4.3 DETAIL - DUCTBANK SECTION K-K (2)(3)
SCALE: NTS



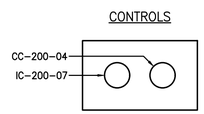
8 / E4.3 DETAIL - DUCTBANK SECTION F-F (4)(3) (2)
SCALE: NTS



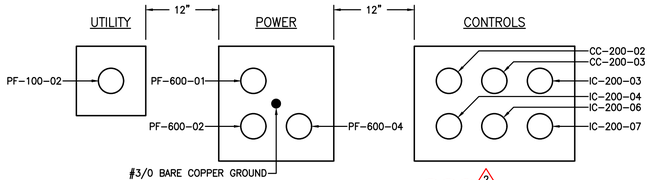
4 / E4.3 DETAIL - DUCTBANK SECTION B-B (2)(3)
SCALE: NTS



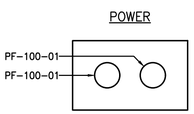
1 / E4.3 DETAIL - TYP. DUCTBANK SECTION CONSTRUCTION
SCALE: NTS



11 / E4.3 DETAIL - DUCTBANK SECTION J-J (4)(3) (2)
SCALE: NTS



7 / E4.3 DETAIL - DUCTBANK SECTION E-E (4)(3) (2)
SCALE: NTS



3 / E4.3 DETAIL - DUCTBANK SECTION A-A (1)(3)
SCALE: NTS

THE LIFT STATION SHALL OPERATE PER THE SEQUENCE OF OPERATIONS AS NOTED ON THE CIVIL DRAWINGS AND SPECIFICATIONS. PLEASE NOTIFY THE ENGINEER IMMEDIATELY IF THERE ARE ANY DISCREPANCIES.

NO.	REVISION	DATE
2	ADDENDUM 2	03/11/26

2390824
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
11/24/25

PAPE-DAWSON
1672 INDEPENDENCE DR. STE 102 | NEW BRAUNFELS, TX 78132 | 830.632.5533
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

MAYFAIR LIFT STATION #3 AND FORCE MAIN
NEW BRAUNFELS, TEXAS

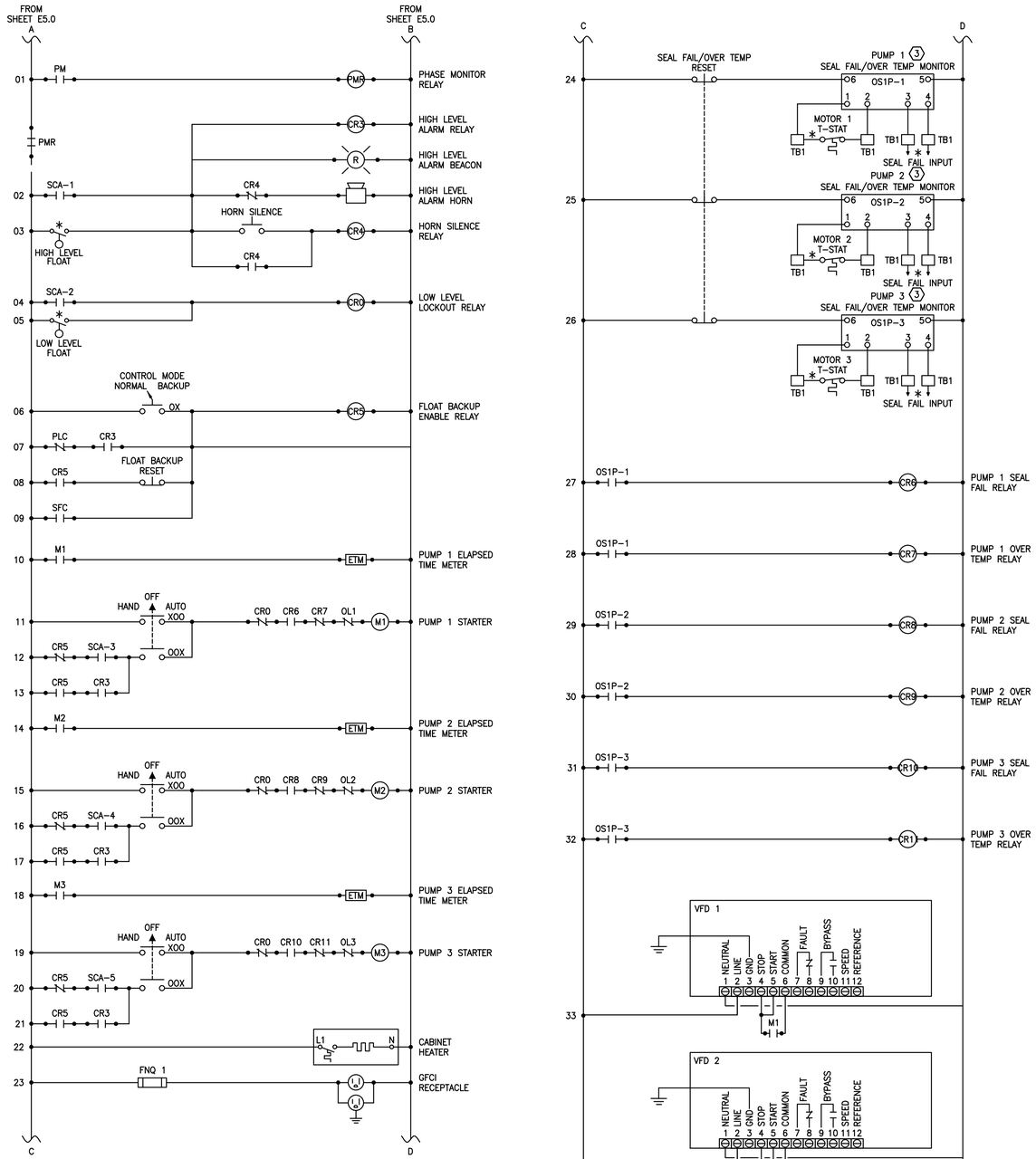
ELECTRICAL DETAILS

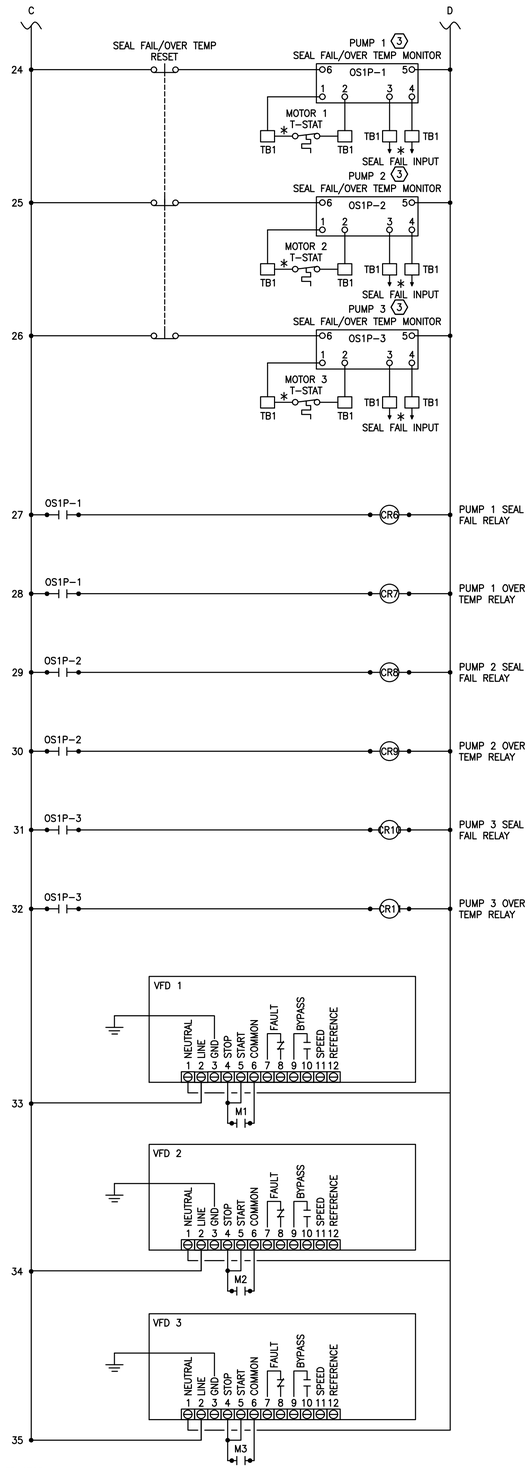
S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 2390824

PLAT NO.
JOB NO. 30002-74
DATE SEPTEMBER 2025
DESIGNER PD
CHECKED SK DRAWN PD
SHEET E4.3

Date: Mar 12, 2026, 1:19pm User ID: mmontoya
File: K:\Projects\2024\2390824-Pape Dawson-Mayfair Lift Station #3\01 Design Phase_CAD\2390824-E43.dwg

BID SET - NOT FOR CONSTRUCTION 30007-74





* = FIELD WIRED BY CONTRACTOR.

1 / E5.1 CONTROLS SCHEMATIC (1)(2)
SCALE: NTS

THE LIFT STATION SHALL OPERATE PER THE SEQUENCE OF OPERATIONS AS NOTED ON THE CIVIL DRAWINGS AND SPECIFICATIONS. PLEASE NOTIFY THE ENGINEER IMMEDIATELY IF THERE ARE ANY DISCREPANCIES.

REFERENCE NOTES

1. PUMP CONTROL PANEL WIRING DIAGRAM IS TYPICAL. FINAL HARDWARE CONFIGURATION WILL VARY ACCORDING TO PUMP CONTROL PANEL SPECIFICATIONS FOR THE SUBMERSIBLE PUMPS.
2. PROVIDE STARTUP AND MINIMUM 4 HOURS TRAINING FOR OPERATOR PERSONNEL. SUBMIT STARTUP REPORT TO ENGINEER.
3. MOISTURE/OVER TEMPERATURE MONITOR RELAY SHALL BE INTEGRATED TO THE CONTROL LOGIC TO PROVIDE FAIL SAFE OPERATION. THUS, WHEN THE MOISTURE/OVER TEMPERATURE MONITOR RELAY IS REMOVED FROM THE CONTROL CIRCUIT OR FAILS, THE CORRESPONDING PUMP WILL BE LOCKED OUT.
4. ALL SEALED FLOAT SWITCHES SHALL BE CONNECTED TO THE CONTROL LOGIC VIA INTRINSICALLY SAFE RELAYS.

SEQUENCE OF OPERATION:

LEVEL CONTROL OPERATION:

THE PUMP CONTROL PANEL SHALL UTILIZE ONE (1) LEVEL SENSOR TO CONTROL THE LEVEL IN THE WET WELL. ON SUMP LEVEL RISE TO 1ST PUMP TURN-ON LEVEL SETTING, THE CONTROLLER SHALL START THE 1ST PUMP. IF THE LEVEL CONTINUES TO RISE TO THE 2ND PUMP TURN-ON LEVEL SETTING, THE CONTROLLER SHALL START THE 2ND PUMP. SUMP LEVEL SHALL LOWER TO LOW LEVEL TURN-OFF SETTING AND ALL PUMPS SHALL STOP. ALTERNATING RELAY SHALL INDEX ON STOPPING OF PUMP SO THAT 2ND PUMP WILL START ON NEXT OPERATION AND SO FORWARD. IF LEVEL CONTINUES TO RISE AND HIGH LEVEL SETTING IS REACHED, THE CONTROLLER SHALL TRIGGER THE HIGH LEVEL ALARM. ALARM SHALL BE MANUAL RESET. LEVELS SHALL BE SET AS INDICATED IN THE SPECIFICATIONS AND SHOWN ON THE CIVIL PLANS. AN AUTOMATIC BACKUP LEVEL FLOATS SYSTEM SHALL BE PROVIDED. IF ONE PUMP SHOULD FAIL FOR ANY REASON, THE SECOND PUMP SHALL OPERATE ON THE CONTROLLER OVERRIDE SIGNAL. ALL LEVEL SETTINGS SHALL BE ADJUSTABLE FROM THE CONTROLLER SELECTABLE MENU/SCREEN. WITH THE PUMP OPERATING, THE SUMP FLUID LEVEL SHALL LOWER. WHEN THE LOW LEVEL TURN-OFF SETTING IS REACHED THE PUMP RUNNING WILL THEN CEASE TO OPERATE.

AUTOMATIC BACKUP LEVEL FLOATS OPERATION:

WHEN THE LEVEL TRANSMITTER FAILS THE PUMP CONTROL PANEL SHALL AUTOMATICALLY OPERATE BY THE LEVEL FLOATS ACCORDING TO THE FOLLOWING ORDER.

IF THE HIGH LEVEL FLOAT IS ACTIVATED IT SHOULD TRANSFER TO FLOAT MODE.

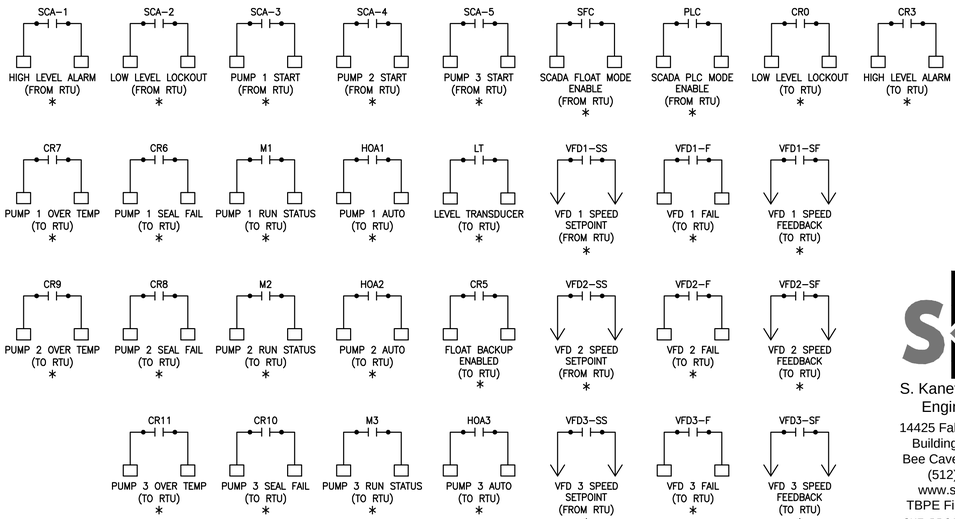
IF THE PLC HAS A HARD FAULT IT SHOULD TRANSFER TO FLOAT MODE.

2 IF THE PLC HAS AN I/O FAULT IT SHOULD TRANSFER TO FLOAT MODE.

ON SUMP LEVEL RISE, LOWER (OFF) FLOAT SWITCH SHALL FIRST BE ENERGIZED. WITH THE PUMP OPERATING, THE SUMP FLUID LEVEL SHALL LOWER. WHEN THE LEVEL CAUSES THE LOWER (OFF) MERCURY FLOAT SWITCH TO TILT BACK TOWARD HANGING VERTICAL, ITS CONTACT SHALL OPEN CAUSING THE MOTOR CONTACTOR TO LOSE POWER TO THE COIL AND THUS OPEN THE CIRCUIT TO THE PUMP MOTOR. THE PUMP OR PUMPS RUNNING WILL THEN CEASE TO OPERATE.

IF THE HIGH LEVEL FLOAT IS ACTIVATED ALL PUMPS SHALL BE CALLED TO RUN AT 100% FLOW CAPACITY.

SCADA SHALL HAVE THE ABILITY TO TURN THE BACKUP FLOAT MODE ON AND OFF REMOTELY.



NO.	REVISION	DATE
2	ADDENDUM 2	03/11/26

2390824
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED PROFESSIONAL ENGINEER
11/24/25

PAPE-DAWSON
1672 INDEPENDENCE DR. STE 102 | NEW BRAUNFELS, TX 78132 | 830.632.5533
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

MAYFAIR LIFT STATION #3 AND FORCE MAIN
NEW BRAUNFELS, TEXAS

PUMP CONTROL SCHEMATICS

S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 2390824

PLAT NO.	
JOB NO.	30002-74
DATE	SEPTEMBER 2025
DESIGNER	PD
CHECKED	SK DRAWN PD
SHEET	E5.1

Date: Mar 12, 2026, 1:19pm User ID: mmontoya
File: K:\Projects\2024\2390824-Pape Dawson-Mayfair Lift Station #3\01 Design Phase_CAD\2390824-E51.dwg

BID SET - NOT FOR CONSTRUCTION 30007-74

GENERAL NOTE

1. IT IS THE ELECTRICAL CONTRACTORS RESPONSIBILITY TO PROVIDE AND INSTALL ALL RACEWAYS AND CONDUCTORS CUMULATIVELY BETWEEN THE UNDERGROUND ELECTRICAL DETAILS, PANEL SCHEDULES, I/O SCHEDULES, AND CIRCUIT SCHEDULES. THE CIRCUIT SCHEDULES, I/O SCHEDULES AND PANEL SCHEDULES TAKE PRECEDENCE OVER THE UNDERGROUND ELECTRICAL DETAILS.

2

I/O LIST

ITEM	DESCRIPTION	TYP.	CONDUCTOR	FROM	TO
1	UTILITY POWER STATUS (FROM ATS)	DI	2#14	AUTOMATIC TRANSFER SWITCH	SCADA RTU
2	ATS IN EMERGENCY	DI	2#14	AUTOMATIC TRANSFER SWITCH	SCADA RTU
3	GENERATOR FAIL	DI	2#14	GENERATOR	SCADA RTU
4	GENERATOR LOW FUEL	DI	2#14	GENERATOR	SCADA RTU
5	GENERATOR COMMON ALARM	DI	2#14	GENERATOR	SCADA RTU
6	GENERATOR RUNNING	DI	2#14	GENERATOR	SCADA RTU
7	PHASE MONITOR ALARM	DI	2#14	PHASE MONITOR	SCADA RTU
8	HIGH LEVEL ALARM	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
9	LOW LEVEL LOCKOUT	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
10	PUMP #1 RUN STATUS	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
11	PUMP #1 AUTO	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
12	PUMP #1 OVER TEMP	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
13	PUMP #1 SEAL FAIL	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
14	PUMP #1 VFD FAIL	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
15	PUMP #2 RUN STATUS	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
16	PUMP #2 AUTO	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
17	PUMP #2 OVER TEMP	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
18	PUMP #2 SEAL FAIL	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
19	PUMP #2 VFD FAIL	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
20	PUMP #3 RUN STATUS	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
21	PUMP #3 AUTO	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
22	PUMP #3 OVER TEMP	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
23	PUMP #3 SEAL FAIL	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
24	PUMP #3 VFD FAIL	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
25	FLOAT BACKUP ENABLED	DI	2#14	PUMP CONTROL PANEL	SCADA RTU
26	SCADA PLC MODE ENABLED	DI	2#14	SCADA RTU	PUMP CONTROL PANEL
27	UPS ALARM	DI	2#14	UPS	SCADA RTU
28	CONTROL POWER	DI	1#16	CR1-12	TB#
29	PLC POWER FAIL	DI		PLC	SCADA RTU
30	SPARE	DI			
31	SPARE	DI			
32	SPARE	DI			
33	HIGH LEVEL ALARM	DO	2#14	SCADA RTU	PUMP CONTROL PANEL
34	LOW LEVEL LOCKOUT	DO	2#14	SCADA RTU	PUMP CONTROL PANEL
35	PUMP #1 START	DO	2#14	SCADA RTU	PUMP CONTROL PANEL
36	PUMP #2 START	DO	2#14	SCADA RTU	PUMP CONTROL PANEL
37	PUMP #3 START	DO	2#14	SCADA RTU	PUMP CONTROL PANEL
38	SCADA FLOAT MOAD ENABLE	DO	2#14	SCADA RTU	PUMP CONTROL PANEL
39	SPARE	DO			
40	SPARE	DO			
41	SPARE	DO			
42	SPARE	DO			
43	LEVEL TRANSDUCER	AI	1#16TSP	PUMP CONTROL PANEL	SCADA RTU
44	PUMP #1 VFD SPEED FEEDBACK	AI	1#16TSP	PUMP CONTROL PANEL	SCADA RTU
45	PUMP #2 VFD SPEED FEEDBACK	AI	1#16TSP	PUMP CONTROL PANEL	SCADA RTU
46	PUMP #3 VFD SPEED FEEDBACK	AI	1#16TSP	PUMP CONTROL PANEL	SCADA RTU
47	DISCHARGE PRESSURE	AI	1#16TSP	PRESSURE TRANSDUCER	SCADA RTU
48	DISCHARGE FLOWMETER	AI	1#16TSP	FLOW METER TRANSMITTER	SCADA RTU
49	SPARE	AI			
50	SPARE	AI			
51	PUMP #1 VFD SPEED SETPOINT	AO	1#16TSP	SCADA RTU	PUMP CONTROL PANEL
52	PUMP #2 VFD SPEED SETPOINT	AO	1#16TSP	SCADA RTU	PUMP CONTROL PANEL
53	PUMP #3 VFD SPEED SETPOINT	AO	1#16TSP	SCADA RTU	PUMP CONTROL PANEL
54	SPARE	AO			
55	SPARE	AO			
56	SPARE	AO			
57	POWER QUALITY METER	E	1-CAT6	POWER QUALITY METER	SCADA RTU
58	SECURITY CAMERA	E	1-CAT6	SECURITY CAMERA	SCADA RTU
59	PUMP #1 VFD	E	1-CAT6	PUMP #1 VFD	SCADA RTU
60	PUMP #2 VFD	E	1-CAT6	PUMP #2 VFD	SCADA RTU
61	PUMP #3 VFD	E	1-CAT6	PUMP #3 VFD	SCADA RTU
62	GENERATOR CONTROL PANEL	E	1-CAT6	GENERATOR	SCADA RTU
63	UPS	E	1-CAT6	UPS	SCADA RTU

THE LIFT STATION SHALL OPERATE PER THE SEQUENCE OF OPERATIONS AS NOTED ON THE CIVIL DRAWINGS AND SPECIFICATIONS. PLEASE NOTIFY THE ENGINEER IMMEDIATELY IF THERE ARE ANY DISCREPANCIES.

NO.	REVISION	DATE
2	ADDENDUM 2	03/11/26

2390824
STATE OF TEXAS
STEVE L. KANETZKY
84696
LICENSED
PROFESSIONAL ENGINEER
11/24/25

PAPE-DAWSON
1672 INDEPENDENCE DR. STE 102 | NEW BRAUNFELS, TX 78132 | 830.632.5533
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

MAYFAIR LIFT STATION #3 AND FORCE MAIN
NEW BRAUNFELS, TEXAS

SCADA DETAILS

S. Kanetzky Engineering, LLC.
14425 Falcon Head Blvd.
Building B, Suite 100
Bee Cave, Texas 78738
(512) 326-3380
www.skaneng.com
TBPE Firm No. F-2356
SKE PROJECT # 2390824

PLAT NO.
JOB NO. 30002-74
DATE SEPTEMBER 2025
DESIGNER PD
CHECKED SK DRAWN PD
SHEET E6.1

Date: Mar 12, 2026, 1:19pm User ID: mmontoya
File: K:\Projects\2024\2390824-Pape Dawson-Mayfair Lift Station #3\01 Design Phase_CAD\2390824-E61.dwg