1 ABBREVIATIONS

NOTE: ALL ABBREVIATIONS MAY NOT BE UTILIZED FOR THIS PROJECT

A, AMP	AMMETER / AMPERE
ACV	AIR OPERATED CONTROL VALVE
AFD	ADJUSTABLE FREQUENCY DRIVE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AIC	AMPERE INTERRUPTING CAPACITY
AIT	ANALYTICAL INDICATION TRANSMITTER
AL	ALUMINUM
ARMS	ARC-FLASH REDUCTION SYSTEM
AS	AMMETER SWITCH
ATS	AUTOMATIC TRANSFER SWITCH
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE
AQD	ARC QUENCHING DEVICE
BKR	BREAKER
BLDG	BUILDING
BV	BUTTERFLY VALVE
C	CONDUIT
CAB	CABINET
CB	CIRCUIT BREAKER
CBV	CABLE BY VENDOR, INSTALLED BY CONTRACTOR
CCTV	CLOSED CIRCUIT TELEVISION
CHH	COMMUNICATION HANDHOLE
CKT	CIRCUIT
CLG	CEILING
CL2	CHLORINE
CMH	COMMUNICATION MANHOLE
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CR	CONTROL RELAY, CORROSION RESISTANT
CS	CONTROL STATION
CSH	DIAPHRAGM LEAK DETECTOR
CT	CURRENT TRANSFORMER
CTRL	CONTROL
CU	COPPER
CV	CONTROL VALVE
DB	DECIBEL
DC	DIRECT CURRENT
DCS	DISTRIBUTED CONTROL SYSTEM
DETD	DUAL ELEMENT TIME DELAY
DISC	DISCONNECT
DN	DOWN
DPDT	DOUBLE POLE DOUBLE THROW
DPSH	DIFFERENTIAL PRESSURE SWITCH
DS	DISCONNECT SWITCH
DWG	DRAWING
EC	EMPTY CONDUIT
EF	EXHAUST FAN
EHH	ELECTRICAL HANDHOLE
EL, ELEV	ELEVATION
ELTU	ELECTRONIC TRIP UNIT
EMER	EMERGENCY
EMH	ELECTRICAL MANHOLE
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
EPRF	EXPLOSION PROOF
EQUIP	EQUIPMENT
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EXIST	EXISTING
FA	FIRE ALARM
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FDR	FEEDER
FIT	FLOW INDICATION TRANSMITTER
FIXT	FIXTURE
FLA	FULL LOAD AMPS
FLOUR	FLUORESCENT
FMC	FLEXIBLE METALLIC CONDUIT
FS	FLOW SWITCH
FT	FEET OR FOOT
FUT	FUTURE
FVNR	FULL VOLTAGE NON-REVERSING STARTER
FWE	FURNISHED WITH EQUIPMENT
G, GND	GROUND
GALV	GALVANIZED
GEC	GROUNDING ELECTRODE CONDUCTOR
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER
GFIC	GROUND FAULT CIRCUIT INTERRUPTER
HDG	HOT DIPPED GALVANIZED
HH	HANDHOLE
HOA	HAND-OFF-AUTO
HP	HORSE POWER
HPF	HIGH POWER FACTOR
HPS	HIGH PRESSURE SODIUM
HTR	HEATER
HV	HIGH VOLTAGE
HZ	HERTZ
ID	INTERIOR DIAMETER
IHH	INSTRUMENTATION HANDHOLE
IMC	INTERMEDIATE METALLIC CONDUIT (GALVANIZED)
IMH	INSTRUMENTATION MANHOLE
IMT	INTERMEDIATE METALLIC
IN	INCHES
ITB	INSTRUMENT TERMINAL BOX
JB	JUNCTION BOX
K	THOUSAND
KA	KILOVOLT AMPERE
KAIC	THOUSAND AMPERES INTERRUPTING CURRENT
KCMIL	THOUSAND CIRCULAR MILLS
KVA	THOUSAND VOLT AMPERES
KW	KILOWATTS
KWH	KILOWATT-HOURS
LA	LIGHTNING ARRESTOR
LCP	LOCAL CONTROL PANEL
LED	LIGHT-EMITTING DIODE
LFMC	LIQUIDTIGHT FLEXIBLE METAL CONDUIT
LFNC	LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT
LIT	LEVEL INDICATION TRANSMITTER
LP	LIGHTING PANEL, LIGHT POLE
LS	LEVEL SWITCH
LTG	LIGHTING
LV	LOW VOLTAGE
M	MOTOR
MA	MILLIAMPERE
MB	MOTOR BEARINGDETECTOR
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MDP	MAIN DISTRIBUTION PANEL
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MS	MOISTURE SENSOR
MSB	MAIN SWITCHBOARD
MTD	MOUNTED/MOUNTING
MTG	MOUNTING
MTS	MANUAL TRANSFER SWITCH
MV	MEDIUM VOLTAGE - MOTOR VIBRATION DETECTOR
NA	NON-AUTOMATIC
N/A	NOT APPLICABLE
NC	NORMALLY CLOSE
NEC	NATIONAL ELECTRIC CODE
N, NEU	NEUTRAL
NO	NORMALLY OPEN
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
OL	OVERLOAD RELAY
P	POLE
PA	PUBLIC ADDRESS
PB	PUSH BUTTON
P/B	PULL BOX
PCP	PUMP CONTROL PANEL
PF	POWER FACTOR
PFC	POWER FACTOR CORRECTION CAPACITORS
PFD	PULL FUSE DISCONNECT
φ, PH	PHASE
PIT	PRESSURE INDICATION TRANSMITTER
PLC	PROGRAMMABLE LOGIC CONTROLLER
PNL	PANEL
PP	POWER PANEL, POWER POLE
PR	PAIR
PRI	PRIMARY
PS	PRESSURE SWITCH
PT	POTENTIAL TRANSFORMER
PTZ	PAN-TILT-ZOOM
PVC	POLYVINYL CHLORIDE
REC	RECEPTACLE
REQ'D	REQUIRED
RGS	RIGID GALVANIZED STEEL
RMC	RIGIDREMOTE TELEMETRY UNIT
R/S	RUN/STOP HAND SWITCH
RVSS	REDUCED VOLTAGE SOFT STARTER
SCCR	SHORT CIRCUIT CURRENT RATING
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
SEC	SECONDARY
SP	SPARE
SPEC	SPECIFICATION
SPD	SURGE PROTECTION DEVICE
SS	SELECTOR SWITCH
SST	STAINLESS STEEL
ST	SHUNT TRIP
SV	SOLENOID VALVE
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCH GEAR
TB	TERMINAL BOX
TEL	TELEPHONE
TEMP	TEMPERATURE
TEW	THERMOCOUPLE EXTENSION WIRE
TIT	TEMPERATURE INDICATION TRANSMITTER
TMTU	THERMAL-MAGNETIC TRIP UNIT
TS	TEMPERATURE SWITCH
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLTMETER
VAC	VOLTS ALTERNATING CURRENT
VFD	VARIABLE FREQUENCY DRIVE
VLV	MANUAL OPERATED VALVE
VS	VOLTMETER SWITCH
WS	TORQUE SWITCH
WH	WATT-HOUR
WP	WEATHERPROOF
XFMR	TRANSFORMER
XP	EXPLOSION PROOF
ZI	ZONE INTERLOCK
ZC	STROKE POSITIONER
ZS	LIMIT SWITCH
ZSC	LIMIT SWITCH CLOSED
ZSO	LIMIT SWITCH OPEN

2 CONTRACTOR RESPONSIBILITIES

2.1. CONTRACTOR SHALL REFERENCE ALL SPECIFICATIONS, DRAWINGS AND CONTRACT DOCUMENTS FOR ADDITIONAL REQUIREMENTS AND CONTRACT RESPONSIBILITIES PRIOR TO COMMENCING WORK.

2.2. CONTRACTOR SHALL COMPLY WITH ALL CFPUA STANDARDS, DETAILS, AND SPECIFICATIONS FOUND AT WWW.CFPUA.ORG

2.3. THE GENERAL NOTES AS STATED ON THIS SHEET ARE APPLICABLE TO ALL CONTRACT DOCUMENTS AND SCOPE OF WORK UNDER THIS CONTRACT UNLESS NOTED OTHERWISE.

2.4. ALL ELECTRICAL WORK SHALL COMPLY WITH THE CURRENT NFPA, NEC, NESC AND LOCAL CODES INCLUDING OWNERS STANDARDS AND REQUIREMENTS.

2.5. CONTRACTOR SHALL COORDINATE WITH THE LOCAL ELECTRICAL UTILITY TO ESTABLISH NEW ELECTRICAL SERVICE(S) AND FINAL CONNECTIONS TO PROVIDE UTILITY POWER AS REQUIRED TO INCLUDE ESTABLISHING TEMPORARY UTILITY ACCOUNT TO PROVIDE ELECTRICAL POWER FOR START-UP AND COMMISSIONING.

2.6. THE ELECTRICAL INSTALLATION SHALL MEET THE REQUIREMENTS OF ALL APPLICABLE NECA/NEIS STANDARDS TO INCLUDE OWNER CONSTRUCTION STANDARDS.

2.7. CONTRACTOR SHALL PLAN AND COORDINATE ELECTRICAL CONSTRUCTION WITH ALL CRAFT/TRADE TO ACHIEVE AN EFFICIENT AND EFFECTIVE ELECTRICAL INSTALLATION.

2.8. THE SCHEDULING AND DURATION OF ANY PROCESS OR FACILITY SHUTDOWN TO REMOVE AND/OR INSTALL EQUIPMENT SHALL BE COORDINATED IN ADVANCE WITH FACILITY MANAGEMENT, ENGINEER, OWNER OR OWNER REPRESENTATIVE.

5 ELECTRICAL EQUIPMENT

5.1. 600V RATED ELECTRICAL EQUIPMENT SHALL HAVE AN AMPERE INTERRUPTING CAPACITY (AIC) RATINGS AS SHOWN ON THE CONTRACT DRAWINGS.

5.2. EQUIPMENT SHALL BE ARRANGED AND INSTALLED TO COMPLY WITH ALL CODE-REQUIRED, MANUFACTURER-RECOMMENDED AND HEAT-DISSIPATION CLEARANCES.

5.3. EQUIPMENT INSTALLATIONS AND PLACEMENTS SHALL COMPLY WITH NEC ARTICLE 110 FOR ALL CLEARANCE REQUIREMENTS.

5.4. EQUIPMENT SHALL FIT INTO THOSE SPACES AS SHOWN ON THE CONTRACT DRAWINGS. CONTRACTOR IS RESPONSIBLE TO PROVIDE EQUIPMENT WHICH MEETS THE SPACE REQUIREMENTS.

5.5. CONTRACTOR SHALL PROVIDE ALL NECESSARY COMPONENTS REQUIRED FOR MAKING FINAL CONNECTIONS FOR ALL EQUIPMENT INSTALLED AND/OR MODIFIED UNDER CONTRACT.

8 GROUNDING AND BONDING

8.1. GROUNDING AND BONDING SYSTEMS SHALL COMPLY WITH NFPA 70 AND NFPA 780 TO INCLUDE THOSE REQUIREMENTS IN SPECIFICATION SECTION 26 05 19

8.2. REFERENCE GROUNDING INSTALLATION DETAILS AS SHOWN ON CONTRACT DOCUMENTS

8.3. ALL DIRECT-BURIED GROUNDING SYSTEM CONDUCTORS SHALL BE BARE 4/0AWG COPPER

8.4. ALL CONCRETE ENCASED GROUNDING SYSTEM CONDUCTORS SHALL BE TINNED 4/0AWG COPPER

8.5. ALL GROUNDING AND BONDING TAPS SHALL BE TINNED #2AWG COPPER MINIMUM

8.6. GROUNDING SYSTEM CONDUCTORS SHALL BE BURIED 30-INCH BELOW FINISHED GRADE

8.7. UNDERGROUND OR CONCRETE ENCASED GROUNDING SYSTEM CONNECTIONS SHALL BE MADE WITH EXOTHERMIC WELDS

8.8. CONNECTIONS TO STRUCTURAL STEEL AND/OR REBAR SHALL BE MADE WITH EXOTHERMIC WELDS

8.9. ELECTRICAL EQUIPMENT AND/OR FRAMING SUPPORTS SHALL BE BONDED TO GROUNDING SYSTEM USING TINNED #2AWG COPPER; MECHANICAL LUGS; 316L STAINLESS-STEEL, ANTI-VIBRATION FASTENERS AND BLUE 'LOCTITE' OR EQUAL THREAD COMPOUND (MINIMUM 2 LOCATIONS)

8.10. MECHANICAL EQUIPMENT AND/OR SKID FRAMING SHALL BE BONDED TO GROUNDING SYSTEM USING TINNED #2AWG COPPER; MECHANICAL LUGS; 316L STAINLESS-STEEL, ANTI-VIBRATION FASTENERS AND BLUE 'LOCTITE' OR EQUAL THREAD COMPOUND (MINIMUM 2 LOCATIONS)

8.11. MAN-WAY AND/OR EQUIPMENT HATCH FRAMES SHALL BE BONDED TO GROUNDING SYSTEM USING TINNED #2AWG COPPER; MECHANICAL LUGS; 316L STAINLESS-STEEL, ANTI-VIBRATION FASTENERS AND BLUE 'LOCTITE' OR EQUAL THREAD COMPOUND (MINIMUM 2 LOCATIONS)

8.12. GROUND TEST WELLS SHALL BE 15-INCH MINIMUM ROUND CONCRETE WITH CAST IRON COVER WITH BEAD WELDED LETTERING, "GROUND" AND RATED AASHTO H-10 LOADING

8.12.1. J&R CONCRETE PRODUCTS P/N E6-RT-BOX OR EQUAL

8.13. GROUNDING SYSTEM EXTENSIONS:

8.13.1. PROVIDE SUFFICIENT SLACK GROUNDING CABLE TO MAKE CONNECTIONS TO FUTURE GROUNDING CONDUCTORS, DUCTBANKS AND/OR EQUIPMENT

8.13.2. INSTALL 2.0-INCH PVC PIPE 48-INCH ABOVE FINISHED GRADE AT LOCATION AND INDICATE ON AS-BUILD DRAWINGS WITH A MINIMUM OF THREE (3) MEASUREMENTS FROM NEAREST STRUCTURES

9 SITE LIGHTING

9.1. CONTRACTOR SHALL REFERENCE ALL CONTRACT DRAWINGS PRIOR TO EXCAVATION AND INSTALLATION OF UNDERGROUND RACEWAYS, DUCTBANKS AND GROUNDING/BONDING COMPONENTS.

9.2. ALL SITE LIGHTING POWER "RUN" CONDUCTORS SHALL BE #6AWG STRANDED COPPER W/600V TYPE XHHW-2, 90°C INSULATION.

9.3. ALL SITE LIGHTING POWER "TAP" CONDUCTORS SHALL BE #10AWG STRANDED COPPER W/ 600V TYPE THHN/THWN, 90°C INSULATION.

9.4. ALL TAP AND RUN CONNECTIONS SHALL BE WATER-PROOF.

9.5. TRANSITIONS THROUGH FINISHED GRADE AND CONCRETE SHALL BE PVC-COATED ALUMINUM CONDUIT EXTENDING 12-INCHES ABOVE AND BELOW TRANSITION.

9.6. ALL SITE LIGHTING BRANCH CIRCUITS SHALL BE DIRECT-BURIED SCH-80 2.0" PVC CONDUIT UNLESS SHOWN OTHERWISE ON THE CONTRACT DRAWINGS.

3 POWER AND CONTROL RACEWAYS

3.1. EXPOSED CONDUIT SHALL BE RIGID ALUMINUM CONDUIT (RAC), GRS, IMC AND EMT ARE NOT ACCEPTABLE.

3.2. CONCEALED CONDUIT EMBEDDED IN CONCRETE SHALL BE SCH-40 PVC

3.3. DIRECT-BURIED CONDUIT SHALL BE DIRECT-BURIED SCH-80 PVC

3.4. TRANSITIONS THROUGH FINISHED GRADE AND/OR CONCRETE SHALL BE PVC-COATED RAC CONDUIT.

3.5. DRAWINGS DEPICT MAJOR DUCTBANK, CABLE-TRAY, BUS-DUCT, WIRE-WAY, TRENCH/FLOOR DUCTS, RACEWAY, CONDUIT, ETC., TO INCLUDE CABLE, CONDUCTOR AND WIRING IN SCHEMATIC AND/OR DIAGRAMMATIC FORMATS. THE CONTRACTOR SHALL REFERENCE ALL EQUIPMENT SPECIFICATIONS AND MANUFACTURER INSTRUCTIONS FOR ADDITIONAL INSTALLATION REQUIREMENTS.

3.6. RACEWAY INSTALLATION AND/OR ARRANGEMENT LAYOUTS ARE NOT TYPICALLY SHOWN ON THE DRAWINGS. CONTRACTOR SHALL DEVELOP LOGICAL GROUPINGS, ROUTING AND MARSHALLING OF DUCTBANK, CABLE-TRAY, BUS-DUCT, WIRE-WAY, TRENCH/FLOOR DUCT, RACEWAY, CONDUIT, ETC., THESE SHALL NOT BE ROUTED THROUGH OR INTERFERE WITH ANY STRUCTURAL ELEMENTS. CONTRACTOR SHALL SUBMIT THESE RACEWAY INSTALLATION AND/OR ARRANGEMENT LAYOUTS PER THE SPECIFICATIONS FOR ENGINEER REVIEW PRIOR TO INSTALLATION.

3.7. RACEWAY ROUTINGS SHALL BE ORGANIZED AND GROUPED IN A PRACTICAL MANNER TO MINIMIZE CROSS-OVERS AND SADDLES. RACEWAY INSTALLATIONS SHALL BE ARRANGED TO ENTER EQUIPMENT FOR DIRECT CONDUCTOR TERMINATIONS.

3.8. RACEWAYS SHALL BE INSTALLED CONCEALED UNLESS OTHERWISE NOTED OR SHOWN. THESE SHALL RUN PARALLEL TO LANDSCAPE AND STRUCTURAL FEATURES WHILE THE BENDS AND TURNS SHALL BE MADE BY MEANS OF LARGE RADII FITTINGS.

3.9. PROVIDE FLEXIBLE RACEWAY CONNECTIONS TO ALL EQUIPMENT SUBJECT TO MOVEMENT AND/OR VIBRATION. CONTRACTOR SHALL MAKE RACEWAY CONNECTIONS COMPLETE AND IN ACCORDANCE WITH THE SPECIFICATIONS.

3.10. CONTRACTOR SHALL PROVIDE ALL REQUIRED PULL BOXES, TERMINAL BOXES AND JUNCTION BOXES FOR INSTALLATION FOR THE WIRING SYSTEMS IN ACCORDANCE WITH THE SPECIFICATIONS THOUGH ALL BOXES MAY NOT BE INDICATED ON THE DRAWINGS.

3.11. SPARE CONDUITS SHALL BE CAPPED OR PLUGGED WITH A PVC FITTING AND INCLUDE 200# TEST POLYPROPYLENE PULL STRING.

6 DUCTBANK SYSTEMS

6.1. DUCTBANK SYSTEM ROUTING AND SECTIONS ARE SHOWN ON THE CONTRACT DOCUMENTS AS DIAGRAMMATIC, CONTRACTOR SHALL SUBMIT PROPOSED DUCTBANK INSTALLATION LAYOUT DRAWINGS FOR ENGINEER REVIEW PRIOR TO EXCAVATION, FABRICATION AND/OR INSTALLATION PER SPECIFICATION SECTION 26 05 43 1.4A

6.2. DUCTBANK SYSTEMS SHALL NOT INTERFERE WITH ANY STRUCTURAL FOUNDATION AND/OR FEATURE

6.3. DUCTBANK SYSTEMS SHALL HAVE A MINIMUM OF 18-INCH OF CLEAN COMPACTED COVER UNLESS OTHERWISE STATED IN THE CONTRACT DOCUMENTS

6.4. DUCTBANK SYSTEMS ROUTED UNDER ROADWAYS SHALL BE CONSTRUCTED AND INSTALLED PER STRUCTURAL ENGINEER OF RECORD DESIGN REQUIREMENTS

6.5. DUCTBANK SYSTEMS SHALL INCLUDE A BARE 4/0AWG COPPER GROUNDING CONDUCTOR LAID 6 TO 12-INCHES ABOVE DUCTBANK AND ROUTED INTO EACH MAN-HOLE

6.6. DUCTBANK GROUNDING CONDUCTOR SHALL BE CONNECTED WITH EXOTHERMIC WELDS TO GROUNDING SYSTEMS AS SHOWN THE DRAWINGS

6.7. DUCTBANK SYSTEMS SHALL BE ARRANGED TO ALLOW 1.5 TO 2.0-INCH MINIMUM SEPARATION BETWEEN RACEWAYS

6.8. ABS PLASTIC DUCT-SPACERS SHALL BE UTILIZED AND INSTALLED TO MAINTAIN RACEWAY SEPARATION DURING PLACEMENT OF CONCRETE

6.8.1. UNDERGROUND DEVICES INC. P/N DUCT DONUT 2C OR APPROVED EQUAL

6.9. RACEWAYS SHALL BE SECURED TO PREVENT FLOATATION DURING CONCRETE PLACEMENT WITH METALLIC HOLD-DOWN ASSEMBLIES

6.9.1. UNDERGROUND DEVICES, INC. P/N HOLD-DOWN BAR H5X-XX-2X OR APPROVED EQUAL

6.10. ALL RACEWAYS BENDS SHALL BE MADE WITH LARGE SWEEP RADII

6.11. ALL RACEWAYS SHALL BE REAMED, DE-BURRED AND CLEAN PRIOR TO COUPLING

6.12. ALL PVC RACEWAYS SHALL BE JOINED WITH GREY HEAVY-BODIED PVC CEMENT AND FULLY SEATED IN SLIP-COUPLING OR FITTING

6.13. ALL PVC RACEWAYS SHALL ENTER MAN-HOLE WALLS PERPENDICULAR AND HAVE BELL-END FITTINGS INSTALLED PRIOR TO DRAWING WIRES OR CABLES

6.14. RACEWAY ARRANGEMENTS SHALL BE MADE TO MAXIMUM THE DISTANCE BETWEEN 480/277V AND 208/120V FEEDER AND BRANCH CONDUCTORS FROM LOW-VOLTAGE AND FIBER OPTIC SIGNAL CABLING

6.15. DUCTBANK EXTENSIONS:

6.15.1. BULK-HEAD DUCTBANK CONCRETE POUR AND REMOVE ALL FORM WORK

6.15.2. EXTEND ALL REBAR AND CONDUITS 24" MINIMUM FROM END OF CONCRETE DUCTBANK

6.15.3. GLUE PVC END CAPS ON ALL CONDUITS. SLEEVE REBAR WITH PVC PIPE

6.15.4. INSTALL 2.0-INCH PVC PIPE 48-INCH ABOVE FINISHED GRADE AT LOCATION AND INDICATE ON AS-BUILD DRAWINGS WITH A MINIMUM OF THREE (3) MEASUREMENTS FROM NEAREST STRUCTURES

10 WIRING DEVICES

10.1. GENERAL

10.1.1. INDOORS OR NON PROCESS AREAS SHALL BE INSTALLED CONCEALED AND FLUSH WITH STAINLESS-STEEL DEVICE COVER PLATES.

10.1.2. OUTDOORS OR IN PROCESS AREAS SHALL BE INSTALLED WITHIN WEATHER-PROOF, CORROSION RESISTANT DEVICE BOXES WITH METALLIC IN-USE AND/OR WATER-TIGHT DEVICE COVER PLATES.

10.2. RECEPTACLES/GROUND FAULT CURRENT INTERRUPTING (GFCI)

10.2.1. SHALL BE INDIVIDUAL GFCI RECEPTACLE DEVICES RATED FOR 20A/120V WITH LED POWER INDICATOR.

10.2.2. GFCI RECEPTACLE DEVICES SHALL NOT SHARE NEUTRAL CONDUCTORS ON THREE-PHASE SYSTEMS

4 CABLE TRAY

4.1. THE CABLE TRAY INSTALLATION SHALL MEET ALL THE REQUIREMENTS OF ALL APPLICABLE NECA/NEIS STANDARDS. THESE INCLUDE BUT ARE NOT LIMITED TO THE FOLLOWING:

4.1.1. NECA 1: STANDARD PRACTICES FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION

4.1.2. NECA/NEMA 105-2015: STANDARD FOR INSTALLING METAL CABLE TRAY

4.2. ALL CABLE TRAYS SHALL BE ALUMINUM LADDER TYPE WITH 4-INCH SIDE WALLS AND 12-INCH RUNG SPACING.

4.3. THE MANUFACTURER'S RECOMMENDED MECHANICAL LOADING SHALL NOT BE EXCEEDED.

4.4. THE CABLE TRAY SHALL BE CAREFULLY ALIGNED AND LEVELED PLUMB AND TRUE. CABLE TRAY SECTIONS AND FITTINGS SHALL BE ASSEMBLED ON THEIR SUPPORTS AND JOINED TOGETHER, USING MANUFACTURER'S STANDARD CONNECTOR UNITS, PROPERLY ALIGNED AND SECURED.

4.5. SPLICES SHOULD BE LOCATED AS CLOSE AS POSSIBLE TO POINTS ONE-THIRD THE DISTANCE BETWEEN SUPPORT AND MIDPOINT OF THE SPAN. STRAIGHT SECTION LENGTHS SHOULD BE EQUAL TO OR GREATER THAN THE SPAN LENGTH TO ENSURE NOT MORE THAN ONE SPLICE PLATE BETWEEN SUPPORTS.

4.6. ALL METALLIC CABLE TRAYS ARE TO BE GROUNDED IN ACCORDANCE WITH NEC ARTICLE 392.60 AND BEST INDUSTRIAL PRACTICES.

4.7. ALUMINUM CABLE TRAY SYSTEMS OR SECTIONS, CONDUCTIVITY SHALL BE ESTABLISHED AND MAINTAINED BY PERFORMING THE FOLLOWING OPERATION AT EACH BONDING JUMPER LUG CONNECTION:

4.7.1. WIRE-BRUSH ALUMINUM SURFACES TO EXPOSE A BRIGHT 'WHITE' METAL SURFACE.

4.7.2. CLEAN BRUSHED SURFACES WITH DENATURED ALCOHOL.

4.7.3. APPLY ANTI-OXIDIZING COMPOUND (BURNDY PENTROX OR APPROVED EQUAL) TO CLEAN, BRUSHED SURFACES. A TIME PERIOD OF LESS THAN 5 MINUTES MUST NOT ELAPSE BETWEEN STEPS 'A' AND 'C'.

4.8. RE-APPLY ANTI-OXIDIZING COMPOUND AS REQUIRED AND BOLT LUG COMPONENTS.

4.9. SUFFICIENT SPACE SHALL BE PROVIDED AND MAINTAINED ABOUT THE CABLE TRAYS TO ALLOW ADEQUATE ACCESS FOR INSTALLING AND MAINTAINING CABLING.

4.10. ALL CABLES AND CABLE TIES SHALL BE SECURED TO CABLE TRAY RUNGS. UV-RESISTANT NYLON 'TY-WRAPS' ARE ACCEPTABLE FOR HORIZONTAL RUNS AND STAINLESS-STEEL 'TY-WRAPS' SHOULD BE USED IN VERTICAL RUNS. MAXIMUM TIE SPACING SHALL BE 12-INCHES FOR CABLES IN VERTICAL CABLE TRAYS AND 36-INCHES FOR CABLES IN HORIZONTAL. CABLE TIES SHALL BE OF SUFFICIENT TENSILE STRENGTH AND RIGIDITY TO PREVENT "SNAKING" OF CABLES.

4.11. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL NECESSARY COMPONENTS REQUIRED FOR MAKING FINAL CONNECTIONS OF CABLE TRAYS TO ALL ELECTRICAL EQUIPMENT AS REQUIRED PER CONTRACT.

4.12. MANUFACTURED STRUT-CHANNEL BRACES, BRACKETS, FITTINGS OR POST BASES SHALL BE PROVIDED AND INSTALLED WITH ASSOCIATED HARDWARE AND FASTENERS FOR CABLE TRAY SUPPORTS.

4.13. STRUT-CHANNEL SHALL NOT BE BENT, DRILLED, MITER-CUT OR OTHERWISE MODIFIED TO PRODUCE FITTINGS, BRACES OR BRACKETS FOR CABLE TRAY SUPPORTS.

7 CABLES/ CONDUCTORS/ WIRES

7.1. QUANTITY AND SIZING OF CONDUCTORS, CABLING, WIRING AND RESPECTIVE RACEWAYS DEPICTED ON THE CONTRACT DOCUMENTS ARE SELECTED UPON THE BASIS OF DESIGN, STANDARD ELECTRICAL COMPONENTS AND/OR STANDARD EQUIPMENT WITH DIRECT ROUTED CONNECTIONS.

7.2. CONTRACTOR MAY SUBMIT FOR REVIEW BY ENGINEER AND PRIOR TO INSTALLATION, LOGICAL CONDUCTOR AND RACEWAY GROUPINGS IN COMPLIANCE WITH APPLICABLE CODES, STANDARDS AND SPECIFICATIONS WITHOUT ADDITIONAL COST TO OWNER.

7.3. CONTRACTOR SHALL PROVIDE A CIRCUIT IDENTIFICATION LABEL AT EACH END OF EACH POWER, BRANCH, CONTROL AND INSTRUMENTATION CIRCUIT CABLE ASSEMBLY, CONDUCTOR OR WIRE.

7.4. POWER/FEEDER

7.4.1. CONTRACTOR SHALL NOT EXCEED CABLE MANUFACTURER SPECIFICATIONS FOR SIDE-WALL AND TENSION LIMITS WHEN DRAWING POWER CABLES INTO RACEWAYS.

7.4.2. CONTRACTOR SHALL DRAW POWER CABLES AND CONDUCTORS WITHIN RACEWAYS UTILIZING POLYWATER LUBRICANT J OR APPROVED EQUAL.

7.4.3. NO SPLICES TO POWER CONDUCTORS AND/OR CABLING SHALL BE MADE WITHOUT ENGINEER APPROVAL. NO JUNCTIONS SHALL BE MADE BELOW GRADE WITHOUT APPROVAL OF ENGINEER.

7.5. POWER/BRANCH

7.5.1. RACEWAY AND WIRING FOR LIGHTING, RECEPTACLES AND BRANCH CIRCUITS ARE NOT TYPICALLY SHOWN ON THE CONTRACT DRAWINGS BUT SHALL BE PROVIDED AS REQUIRED UNDER THIS CONTRACT

11 HARDWARE AND SUPPORTS

11.1. ALL FASTENERS AND HARDWARE SHALL BE STAINLESS-STEEL 316L.

11.2. STRUT-CHANNEL SHALL NOT BE BENT, DRILLED, CUT OR OTHERWISE MODIFIED TO PRODUCE FITTINGS, BRACES OR BRACKETS FOR CONDUIT AND EQUIPMENT SUPPORTS.

11.3. MANUFACTURED STRUT-CHANNEL BRACES, BRACKETS, FITTINGS OR POST BASES SHALL BE PROVIDED AND INSTALLED WITH ASSOCIATED HARDWARE AND FASTENERS FOR CONDUIT AND EQUIPMENT SUPPORTS.

11.4. CONTRACTOR SHALL PROVIDE ALL SUPPORTS AND FASTENING HARDWARE FOR SWITCHBOARDS, PANELBOARDS, TRANSFORMERS, CONTROL PANELS, ETC., AS REQUIRED IN THE SPECIFICATIONS.

11.5. CONTRACTOR SHALL PROVIDE AND INSTALL CONCRETE EMBEDDED LEVELING CHANNEL SUPPORTS FOR FLOOR MOUNTED EQUIPMENT SPANNING DISTANCES 48" AND GREATER IN LENGTH OR 36" AND GREATER IN DEPTH.

11.6. STRUCTURAL MEMBERS SHALL NOT BE DRILLED, CUT, WELDED TO, OR OTHERWISE MODIFIED WITHOUT PRIOR APPROVAL OF THE ENGINEER OF RECORD.

REV.NO.	DESCRIPTION	DATE
*	****	****

REVISIONS

SEAL

AUBREY A. HAUDRICOURT, P.E.
No. 66861

McKIM&CREED
1365 Hamlet Avenue
Clearwater, Florida 33756-3331
Phone: (727) 442-7196, Fax: (727) 461-3827

CA Lic. No. 29588
www.mckimcreed.com

Manatee County FLORIDA

CORTEZ BOOSTER PUMP STATION UPGRADES

ELECTRICAL

GENERAL NOTES AND ABBREVIATIONS

PROJ. START DATE:	MAR. 2020
MCE PROJ. #	01024-0193
DRAWN	JG
DESIGNED	AAH
CHECKED	MAC
PROJ. MGR.	BP

SCALE
HORIZONTAL: TBD
VERTICAL: TBD

E001
DRAWING NUMBER

REVISION

STATUS: **ISSUED FOR BID**

1 GENERAL ELECTRICAL SYMBOLS

- LIGHTING, INSTRUMENT OR RECEPTACLE PANELBOARD
- POWER PANELBOARD
- CP — CONTROL PANEL
- MCC — MOTOR CONTROL CENTER
- PM — POWER MONITOR
- A — AMMETER
- AS — AMMETER SWITCH
- V — VOLTMETER
- VS — VOLTMETER SWITCH
- FS — FLOAT/FLOW SWITCH
- LS — LIMIT SWITCH
- PS — PRESSURE SWITCH
- T — THERMOSTAT
- JB — JUNCTION BOX, SIZE PER NEC
- E — ELECTRICAL EQUIPMENT CONNECTION
- XXX — ELECTRICAL MANHOLE / HANDHOLE AND THE LETTERS INDICATE THE TYPE OF THE HOLE
- DB110 — RACEWAY SYSTEM CALL-OUTS:
  - CT - CABLE TRAY
  - BD - BUS DUCT
  - DB - DUCTBANK
  - EC - EXPOSED CONDUIT
  - WW - WIRE WAY/TROUGH
- 042000 — RACEWAY AND/OR CABLE ID NUMBER
- LP-3 — RACEWAY HOMERUN TO EQUIPMENT ID TAG AS SHOWN. LINE TYPE DESIGNATES CONCEALED, EXPOSED, ETC. NUMBERS/TEXT DESIGNATE HOMERUN EQUIPMENT (I.E. PANEL BOARD CIRCUIT NUMBER).
- TO PLC-1 / 9#14 #12G 0.75"C — CONDUCTOR/CABLE CALL-OUT WITHIN RACEWAY
- CONCEALED CONDUIT IN FLOOR SLAB, UNDERGROUND, ETC.
- EXISTING CABLE OR CONDUIT
- CONDUIT TURNED DOWN
- CONDUIT TURNED UP
- CONDUIT TURNED UP
- CONDUIT TURNED UP
- E — SITE ELECTRICAL
- E — EXISTING SITE ELECTRICAL
- T — SITE TELEPHONE
- T — EXISTING SITE TELEPHONE
- OHE — OVERHEAD ELECTRICAL UTILITY
- OHT — OVERHEAD TELEPHONE UTILITY
- UGE — UNDERGROUND ELECTRICAL UTILITY
- UGT — UNDERGROUND TELEPHONE UTILITY
- G — SITE GROUND
- G — EXISTING SITE GROUND

2 POWER SYMBOLS

- CLASS 1/2 DIVISION I/II CONDUIT SEAL-OFF FITTING
- LOCAL CONTROL STATION WITH THREE OR MORE SELECTOR/PUSH SWITCHES LOWER-RIGHT SYMBOL INDICATES MOUNTING LOCATION
- LOCAL CONTROL STATION WITH TWO SELECTOR/PUSH SWITCHES LOWER-RIGHT SYMBOL INDICATES MOUNTING LOCATION
- LOCAL CONTROL STATION WITH ONE SELECTOR/PUSH SWITCH LOWER-RIGHT SYMBOL INDICATES MOUNTING LOCATION
  - □ LOCATED AT FIELD DEVICE
  - △ LOCATED AT MAIN CONTROL PANEL
  - ◕ LOCATED AT LOCAL CONTROL PANEL
  - ○ MOUNTED ON DOOR
- PSR / EO — 1200AT / 1600AF — DRAW-OUT POWER CIRCUIT BREAKER WITH PROGRAMMABLE SOLID STATE RELAY 'EO' DENOTES ELECTRICALLY OPERATED
- ASR — 1200AT / 1600AF — FIXED-MOUNT POWER CIRCUIT BREAKER WITH ADJUSTABLE SOLID STATE RELAY
- 300AT / 300AF / TMTU — CIRCUIT BREAKER, GENERIC FIXED-MOUNT
  'TMTU' THERMAL-MAGNETIC TRIP UNIT
  'ELTU' ELECTRONIC TRIP UNIT
- CB1 — CIRCUIT BREAKER, GENERIC
- CB2 — CIRCUIT BREAKER, THERMAL
- CB3 — CIRCUIT BREAKER, MOTOR CIRCUIT PROTECTOR
- 3R — 175AT / 200AF — CIRCUIT BREAKER, THERMAL ENCLOSED
  TOP NUMBER DENOTES TRIP
  BOTTOM NUMBER DENOTES FRAME SIZE
  UPPER LEFT NUMBER DENOTES NUMA ENCLOSURE RATING
- FU1 — FUSE, GENERIC
- 30AT / 600V / RK1 — FUSE, GENERIC
  TOP NUMBER DENOTES TRIP
  BOTTOM NUMBER DENOTES VOLTAGE CLASS
  MIDDLE NUMBER DENOTES TYPE
- L21-30 — WIRING DEVICE, POWER RECEPTACLE WITH INTEGRAL DISCONNECT / LOAD BREAK NEMA CONFIGURATION SHOWN LOWER RIGHT
- PR1 / L21-30 — WIRING DEVICE, POWER RECEPTACLE NEMA CONFIGURATION SHOWN LOWER RIGHT

- XF1 — TRANSFORMER, POWER TYPE AND RATINGS AS NOTED ON THE DRAWINGS
- XF2 — TRANSFORMER, SHIELDED ISOLATION TYPE AND RATINGS AS NOTED ON THE DRAWINGS
- CT1 / 100/5 — TRANSFORMER, CURRENT 'CT' TYPE AND RATINGS AS NOTED ON THE DRAWINGS
- PT1 / 100:1 — TRANSFORMER, POTENTIAL 'PT' OR 'VT' TYPE AND RATINGS AS NOTED ON THE DRAWINGS
- N / E / L — AUTOMATIC OR MANUAL TRANSFER SWITCH, STAND-ALONE TYPE AND RATINGS AS NOTED ON THE DRAWINGS
- F — 100AT / 200AF / 4X/SS — SAFETY / DISCONNECT SWITCH
  TOP NUMBER DENOTES FUSE SIZE (NF=NON-FUSED)
  BOTTOM NUMBER DENOTES FRAME SIZE
  RIGHT NUMBER DENOTES NEMA ENCLOSURE RATING
- 00 / FVNR / 12 — 21-70AT / 7AF — MOTOR CONTROLLER, STAND-ALONE WITH EXTERNAL DISCONNECT:
  UPPER LEFT NUMBER DENOTES NEMA FRAME SIZE
  UPPER RIGHT NUMBERS DENOTE AMPERE AND FRAME RATINGS
  CENTER RIGHT NUMBER DENOTES NEMA ENCLOSURE RATING
  LETTERS WITHIN THE SYMBOL DENOTE THE FOLLOWING:
  - FVNR FULL VOLTAGE NON-REVERSE
  - FVR FULL VOLTAGE REVERSIBLE
  - TS1W TWO SPEED - SINGLE WINDING
  - TS2W TWO SPEED - DUAL WINDING
  - RVSS REDUCED VOLTAGE SOFT STARTER
  - RVAT REDUCED VOLTAGE AUTO TRANSFORMER
  - VFD VARIABLE FREQUENCY DRIVE
- 00 / RVAT — MOTOR CONTROLLER, FULL-VOLTAGE MCC UNIT:
  UPPER LEFT NUMBER DENOTES NEMA FRAME SIZE
  LETTERS WITHIN THE SYMBOL DENOTE THE FOLLOWING:
  - FVNR FULL VOLTAGE NON-REVERSE
  - FVR FULL VOLTAGE REVERSIBLE
- 2 / TS2W — MOTOR CONTROLLER, PART-WINDING MCC UNIT:
  UPPER LEFT NUMBER DENOTES NEMA FRAME SIZE
  LETTERS WITHIN THE SYMBOL DENOTE THE FOLLOWING:
  - TS1W TWO SPEED - SINGLE WINDING
  - TS2W TWO SPEED - DUAL WINDING
- 1 / RVAT — MOTOR CONTROLLER, REDUCED-VOLTAGE MCC UNIT:
  UPPER LEFT NUMBER DENOTES NEMA FRAME SIZE
  LETTERS WITHIN THE SYMBOL DENOTE THE FOLLOWING:
  - RVSS REDUCED VOLTAGE SOFT STARTER
  - RVAT REDUCED VOLTAGE AUTO TRANSFORMER
- 1 / VFD — MOTOR CONTROLLER, VARIABLE FREQUENCY DRIVE, MCC UNIT:
  UPPER LEFT NUMBER DENOTES NEMA FRAME SIZE
  LETTERS WITHIN THE SYMBOL DENOTE THE FOLLOWING:
  - VFD VARIABLE FREQUENCY DRIVE
- 3% — LINE OR LOAD REACTOR
  CENTER RIGHT NUMBER DENOTES PERCENT IMPEDANCE
- dV/dT — MOTOR PROTECTION FILTER
- M / 1 ~ — 15HP / 460V / 21.0 FLA — AC MOTOR
  SINGLE OR THREE PHASE AS NOTED
- CABLE-TRAY
  TYPE AS NOTED ON THE DRAWINGS

NOTES:
ALL SYMBOLS MAY NOT BE UTILIZED FOR THIS PROJECT.
ADDITIONAL SYMBOLS NOT SHOWN ON THIS DRAWING MAY BE SHOWN ELSEWHERE ON THE ELECTRICAL DRAWINGS. IF REQUIRED, IEC RATINGS WILL INCLUDE THE "IEC" AND "IP" PREFIX.

3 SCHEMATIC SYMBOLS

- PB1 — MOMENTARY PUSH BUTTON NORMALLY OPENED
- PB2 — MOMENTARY PUSH BUTTON NORMALLY CLOSED
- PB3 — MUSHROOM PUSH BUTTON NORMALLY OPENED
- PB4 — MUSHROOM PUSH BUTTON NORMALLY CLOSED
- TG1 — TOGGLE SWITCH NORMALLY OPENED
- TG2 — TOGGLE SWITCH NORMALLY CLOSED
- SS1 — TWO-POSITION SWITCH NORMALLY OPENED
- SS2 / H / A — THREE-POSITION BUTTON NORMALLY OPENED
- LS1 — LIMIT SWITCH NORMALLY OPENED
- LS2 — LIMIT SWITCH NORMALLY CLOSED
- LS3 — LIMIT SWITCH HELD OPENED
- LS4 — LIMIT SWITCH HELD CLOSED
- TS1 — TEMPERATURE SWITCH NORMALLY OPENED
- TS2 — TEMPERATURE SWITCH NORMALLY CLOSED
- FLS1 — FLOAT SWITCH NORMALLY OPENED
- FLS2 — FLOAT SWITCH NORMALLY CLOSED
- FS1 — FLOW SWITCH NORMALLY OPENED
- FS2 — FLOW SWITCH NORMALLY CLOSED
- PS1 — PRESSURE SWITCH NORMALLY OPENED
- PS2 — PRESSURE SWITCH NORMALLY CLOSED
- TD1 — ON DELAY TIME RELAY NORMALLY OPENED TIMED CLOSED NOTC
- TD2 — ON DELAY TIME RELAY NORMALLY CLOSED TIMED OPENED NCTO
- TD3 — OFF DELAY TIME RELAY NORMALLY OPENED TIMED OPENED NOTO
- TD4 — OFF DELAY TIME RELAY NORMALLY CLOSED TIMED CLOSED NCTC
- LT1 / B — INDICATION LIGHT
  W - WHITE G - GREEN A - AMBER
  R - RED B - BLUE C - CLEAR
- LT2 / R — INDICATION LIGHT, PUSH-TO-TEST
  W - WHITE G - GREEN A - AMBER
  R - RED B - BLUE C - CLEAR

- CR1 — CONTROL RELAY, GENERIC DESIGNATIONS:
  - CR CONTROL RELAY
  - MX AUXILIARY RELAY
  - TR TIMING RELAY
  - AR ALARM RELAY
  - RR READY RELAY
- LR1 / L — CONTROL RELAY, LATCHING
- CR1 — CONTACT, NORMALLY OPENED TOP ID TAG DENOTES PARENT RELAY
- LR1 — CONTACT, NORMALLY CLOSED TOP ID TAG DENOTES PARENT RELAY
- SOL1 — SOLENOID, GENERIC
- R1 — HEATING ELEMENT, GENERIC
- ETM — ELAPSED TIME METER, ELECTRONIC
- AH1 — HORN, ALARM
- AH2 / A/V — HORN, ALARM AUDIO AND VISUAL ANNUNICATION
- XF3 — TRANSFORMER, CONTROL POWER RATINGS AS NOTED ON THE DRAWINGS
- BAT1 — BATTERY OR DC POWER SOURCE
- M / O/C — MOTOR ACTUATED VALVE
  - M MODULATING
  - O/C OPEN/CLOSE
- S — MOTOR ACTUATED VALVE
  - M MODULATING
  - O/C OPEN/CLOSE

NOTES:
ALL SYMBOLS MAY NOT BE UTILIZED FOR THIS PROJECT.
ADDITIONAL SYMBOLS NOT SHOWN ON THIS DRAWING MAY BE SHOWN ELSEWHERE ON THE ELECTRICAL DRAWINGS. IF REQUIRED, IEC RATINGS WILL INCLUDE THE "IEC" AND "IP" PREFIX.

REV NO.	DESCRIPTION	DATE
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REVISIONS

SEAL

AUBREY A. HAUDRICOURT, P.E.
No. 66861

McKIM&CREED
1365 Hamlet Avenue
Clearwater, Florida 33756-3331
Phone: (727) 442-7196, Fax: (727) 461-3827
CA Lic. No. 29588
www.mckimcreed.com

Manatee County FLORIDA

CORTEZ BOOSTER PUMP STATION UPGRADES

ELECTRICAL

ELECTRICAL SYMBOLS 1 OF 2

PROJ. START DATE:	MAR. 2020
MCE PROJ. #	01024-0193
DRAWN	JG
DESIGNED	AAH
CHECKED	MAC
PROJ. MGR.	BP

SCALE
HORIZONTAL: TBD
VERTICAL: TBD

E002
DRAWING NUMBER
----- REVISION

STATUS: ISSUED FOR BID

4 LIGHTING SYMBOLS

1-3 / a — FLUORESCENT LIGHTING FIXTURE - SURFACE OR PENDANT MOUNTED. FIRST NUMERAL DENOTES LIGHTING PANEL (LP1), SECOND NUMBER DENOTES BRANCH CIRCUIT NUMBER. LOWER CASE LETTER DENOTES SWITCHED CIRCUIT.

EM — FLUORESCENT LIGHTING FIXTURE WITH BATTERY PACK SURFACE OR PENDANT.

PENDANT OR CEILING MOUNTED LIGHTING FIXTURE.

WALL MOUNTED LIGHTING FIXTURE.

POLE OR STANCHION MOUNTED LIGHTING FIXTURE.

TWO (2) POLE OR STANCHION MOUNTED LIGHTING FIXTURES

GF — POLE MOUNTED FIXTURE WITH GF RECEPTACLE

EM — 2 LAMP SELF CONTAINED DC EMERGENCY LIGHTING UNIT. LETTER DENOTES FIXTURE TYPE.

EXIT SIGN WALL MOUNTED (SINGLE FACE WITH INDICATING ARROWS) WITH BATTERY PACK ARROW INDICATES DIRECTION OF EXIT DOOR

EXIT SIGN PENDANT MOUNTED (DOUBLE FACE WITH INDICATING ARROWS) WITH BATTERY PACK ARROWS INDICATE DIRECTION OF EXIT DOOR

D / 150 / 10'-0" AFF — FIXTURE DESIGNATION SYMBOL. SEE LIGHTING FIXTURE SCHEDULE FOR DESCRIPTION AND TYPE. ALL FIXTURES SHOWN IN A ROOM WITH THIS SYMBOL SHALL BE OF TYPE INDICATED BY LETTER; NUMBER IN SYMBOL INDICATES LAMP WATTAGE AND NUMBER OF LAMPS WHERE MORE THAN ONE (UNLESS OTHERWISE NOTED). NUMBER BELOW SYMBOL INDICATES MOUNTING HEIGHT ABOVE FINISHED FLOOR OR AS NOTED.

I-2 / GF/SS — DUPLEX CONVENIENCE RECEPTACLE, 2 POLE, 3 WIRE, 120 VOLTS A.C. 20 AMP RECEPTACLE DESIGNATIONS, FIRST NUMBER DENOTES PANEL, SECOND NUMBER DENOTES CIRCUIT NUMBER. GF-DENOTES GROUND FAULT TYPE. SS-DENOTES SURGE SUPPRESSION TYPE WP-DENOTES WEATHERPROOF ENCLOSURE

SINGLE CONVENIENCE RECEPTACLE, 2 POLE, 3 WIRE; 120 VOLTS AC. 20 AMP UNLESS NOTED OTHERWISE ON DRAWINGS.

POWER RECEPTACLE, 2 POLE, 3 WIRE 250 VOLTS A.C. 20 AMP UNLESS NOTED OTHERWISE ON DRAWINGS.

CLASS 1 DIV 2 WALL OUTLET BOX AND SPECIAL PURPOSE RECEPTACLE, NEMA 7, 20A.

QUADRAPLEX RECEPTACLE

HEAT-TRACE OR SPECIAL PURPOSE RECEPTACLE
REFERENCE DRAWINGS FOR ADDITIONAL DETAILS

PU — PAGING UNIT

LS — PAGING UNIT SPEAKER

a / S / D — LIGHTING CONTROL SWITCHES:
UPPER-LEFT CHARACTER "a" DENOTES SWITCH DESIGNATION. LOWER-RIGHT CHARACTER "4" DENOTES SWITCH CONTROL
1-SINGLE POLE
2 - TWO POLE
3 - THREE-WAY SWITCH CONTROL
4 - FOUR-WAY SWITCH CONTROL
D - DIMMER CONTROL
OS - OCCUPANCY SENSOR
M - MOTOR RATED SWITCH
T - 24V DC MOMENTARY CONTACT SWITCH
V - VARIABLE SPEED FAN SWITCH

a b / S S / 4

a b c / S S S / 3

LP1-2 — BRANCH CIRCUIT HOME RUN TO PANELBOARD LETTERS AND NUMERALS INDICATE PANEL AND CIRCUIT NUMBER. AS A MINIMUM, ALL WIRING SHALL BE 3#12 AWG IN 3/4" CONDUIT. #10 AWG WIRE SHALL BE USED FOR RUNS BETWEEN PANEL AND FIRST LIGHTING FIXTURE OR RECEPTACLE EXCEEDING 50 FEET, UNLESS OTHERWISE NOTED ON DRAWING.

LP1-2 / J / 10 — LETTERS AND NUMBERS INDICATE PANEL AND CIRCUIT NUMBER (LP1-2). CROSS LINES INDICATE NUMBER OF CONDUCTORS. HALF HASH MARKS INDICATES NEUTRAL. NUMBER (10) DENOTES WIRE SIZE WHEN NOT #12 AWG. CONTINUE CONDUIT AND WIRE RUN FROM BOX TO DEVICE IN ROOM OR AREA AS NOTED BY BRANCH CIRCUIT NUMBER. #10 AWG WIRING SHALL BE USED FOR RUNS BETWEEN PANEL AND FIRST LIGHTING FIXTURE OR RECEPTACLE EXCEEDING 50 FEET, UNLESS OTHERWISE NOTED ON DRAWING.

INDICATES GROUND CONDUCTOR

INDICATES HOMERUN AND CONDUIT TAG OR CONDUCTORS WITHIN RACEWAY

042000 — 9#14 #12G 0.75"C

5 FIRE ALARM SYSTEM

A/V 110 — AUDIO/VISUAL ALARM INDICATOR (HORN/STROBE) NUMBER INDICATES STROBE CANDELLA RATING WHEN OTHER THAN 15

H — HORN

F — MANUAL PULL STATION

FACP — FIRE ALARM CONTROL PANEL

B — BELL

FAAS — FIRE ALARM ANNUNCIATOR STATION

FS — FLOW SWITCH (AIR)

TS — VALVE TAMPER SWITCH

END OF LINE RESISTOR

FD — FLAME DETECTOR

SD / X — SMOKE DETECTOR, MULTISENSOR
I — SMOKE DETECTOR IONIZATION
P — SMOKE DETECTOR PHOTOELECTRIC
D — DUCT MOUNTED SMOKE DETECTOR
H — THERMAL DETECTOR (FIXED AND RATE OF RISE) H-HIGH TEMPERATURE

CT — SIGNAL INPUT MODULE

CC1 — SIGNAL MODULE

6 GROUND SYMBOLS

CADWELD

GROUNDING ROD

GROUND TEST WELL

GROUNDING

POWER

7 AUXILIARY SYSTEMS

XX — AUXILIARY DETECTOR
DC DOOR CONTACT
GD GLASS-BREAK DETECTOR
MS MOTION SENSOR
CR CARD READER

XXXX — CONTROL PANEL. THE MIDDLE LETTERS DENOTE AS THE FOLLOWING:
IACP INTRUSION ALARM CONTROL PANEL
ACP ALARM CONTROL PANEL
FOPP FIBER OPTIC PATCH PANEL

OR CCTV — CAMERA

R — ALARM BEACON
LETTER INDICATES COLOR

X — SPEAKER\HORN
H = HORN
PS = PAGING SPEAKER

C — CEILING MOUNTED SPEAKER

VOICE/DATA COMBINATION OUTLETS:
WIRING DEVICE NOTES: IF SHOWN, UPPER-LEFT CHARACTERS DENOTE PANEL BOARD CIRCUIT FOR POWER OUTLETS. IF SHOWN, LOWER-RIGHT CHARACTERS DENOTE NEMA PLUG AND/OR RECEPTACLE CONFIGURATION.

DATA OUTLET

FLOOR MOUNTED DATA OUTLET

SOUND POWERED TELEPHONE

TB — FLAT CABLE TRANSITION BOX

TELEPHONE PUNCH DOWN BLOCK

PBX — PRIVATE BRANCH EXCHANGE

EPN — EXTERNAL PORT NODE

F/C — FIBER CONVERTER

LE — LINE EXTENDER

PCC — PAGING CONTROL CABINET

MUX — MULTIPLEXOR

XCR — TRANSCEIVER

MONITOR

T — T1 DEMARCATION

UPS — UNINTERRUPTIBLE POWER SUPPLY

REV.NO.	DESCRIPTION	DATE
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REVISIONS

SEAL

AUBREY A. HAUDRICOURT, P.E.
No. 66861

McKIM&CREED
1365 Hamlet Avenue
Clearwater, Florida 33756-3331
Phone: (727) 442-7196, Fax: (727) 461-3827
CA Lic. No. 29588
www.mckimcreed.com

Manatee County FLORIDA

CORTEZ BOOSTER PUMP STATION UPGRADES

ELECTRICAL

ELECTRICAL SYMBOLS 2 OF 2

PROJ. START DATE:	MAR. 2020
MCE PROJ. #	01024-0193
DRAWN	JG
DESIGNED	AAH
CHECKED	MAC
PROJ. MGR.	BP

SCALE
HORIZONTAL: TBD
VERTICAL: TBD

E003
DRAWING NUMBER

REVISION

STATUS: ISSUED FOR BID

\\MCKIMCREED.COM\NASUNI\DATA\PROJ\01024\0193\ENG\80-DRAWINGS\ELECTRICAL\E003.DWG 01/18/2023 13:14:02 JOSEPHINE W. GARAS

NORTH

20 0 20 40

SCALE: 1" = 40'

NOTES:
1. CONTRACTOR TO PROVIDE TEMPORARY POWER FOR PUMP #1 (125HP)USING TEMPORARY MOTOR STARTER. USE ACROSS THE LINE STARTER.
2. SCADA PANEL TO BE REMOVED AND REPLACED AS PART OF SEPARATE CONTRACT IN NEW LOCATION SEE E1.02.
3. REMOVE ANY USED CONDUIT AND WIRE DURING INSTALLATION. UNDER GROUND OR SLAB CONDUIT CAP AND ABANDON AFTER EXTRACTING WIRE.

DEMOLITION LEGEND

REMOVE AND REPLACE.

EXISTING DISCONNECT SWITCH

EXISTING POWER CONDUIT TO REMAIN

EXIST. VALVE NO.4 VAULT TO BE **(DEMOLISHED)**

EXISTING JB

EXISTING CONTROL CONDUIT TO REMAIN

24" 11.25° BEND CONNECT TO EXISTING PIPE

EXIST. TEMP. GEN.

COMMUNICATION TERMINAL CABINET

DEEP WELL 480V PANEL

AIR CONDITIONING COMPRESSOR

AIR CONDITIONING COMPRESSOR

XFRM

DS

DS

DS

MAIN CB

XFRM

AHU

VFD NO.3

VFD NO.2

VFD NO.1

MCC

MAIN BRKR

AHU

CB

CB

COMP

MTS

XFRM

CB

GEN DS

DEEP WELL INSTRUMENT ROOM

LP

PUMP ROOM

EXISTING VALVE #1

EXISTING VALVE #2

EXISTING VALVE #3

24" BFV

HIGH SERVICE PUMP

EXISTING SCADA PANEL

BOOSTER PUMP #2

BOOSTER PUMP #1

(SEE NOTE 2)

REV.NO.	DESCRIPTION	DATE
1	ADDENDUM - REMOVAL OF PROPOSED VALVES	11-14-22

REVISIONS

SEAL

AUBREY A. HAUDRICOURT, P.E. No. 66861

McKIM&CREED

1365 Hamlet Avenue
Clearwater, Florida 33756-3331
Phone: (727) 442-7196, Fax: (727) 461-3827

CA Lic. No. 29588
www.mckimcreed.com

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CORTEZ BOOSTER PUMP STATION UPGRADES

ELECTRICAL

SITE AND PUMP ROOM DEMOLITION PLAN

PROJ. START DATE:	MAR. 2020
MCE PROJ. #	01024-0193
DRAWN	JG
DESIGNED	AAH
CHECKED	MAC
PROJ. MGR.	BP

SCALE
HORIZONTAL: TBD
VERTICAL: TBD

E1.01
DRAWING NUMBER

REVISION

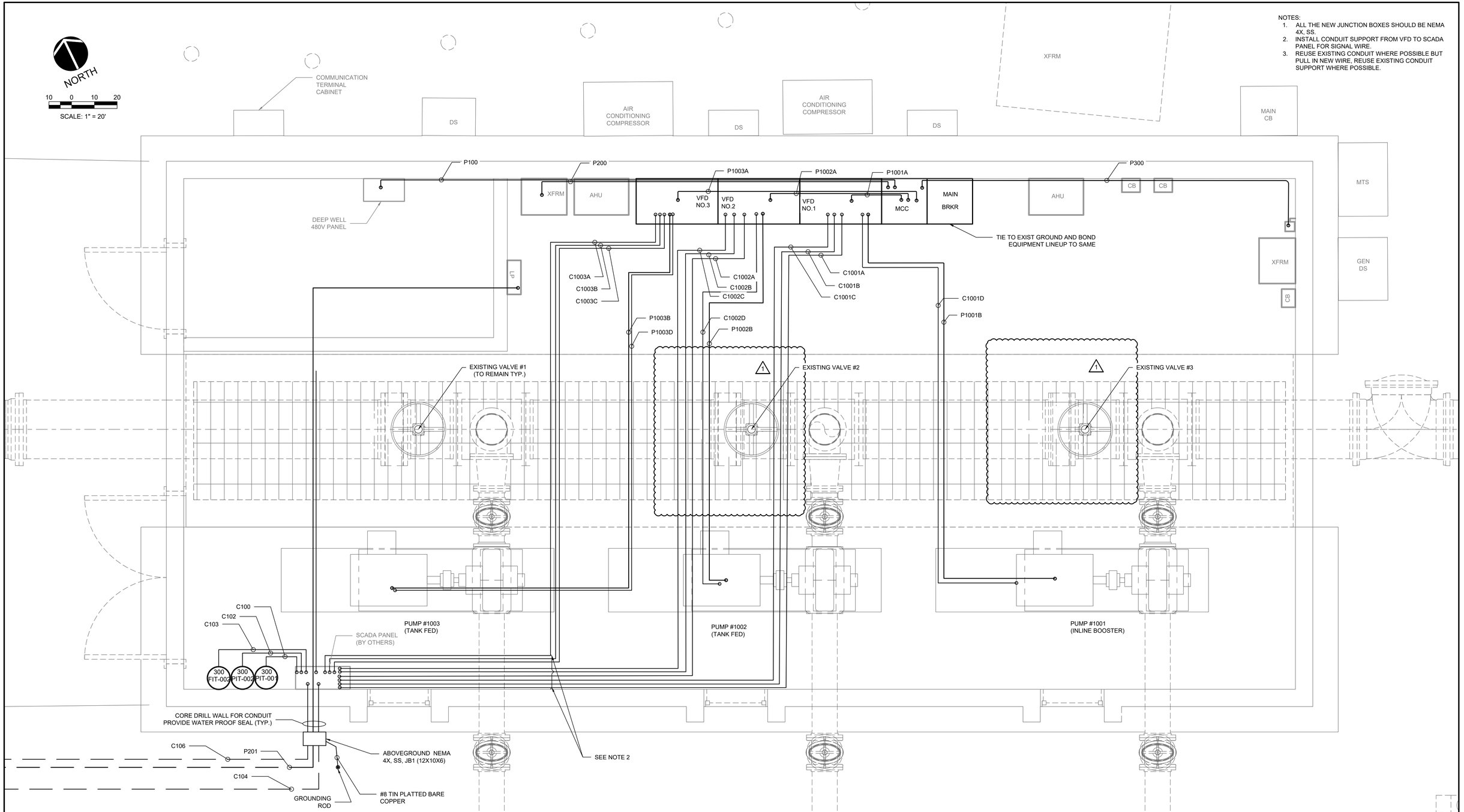
STATUS: ISSUED FOR BID

NOTES:
1. ALL THE NEW JUNCTION BOXES SHOULD BE NEMA 4X, SS.
2. INSTALL CONDUIT SUPPORT FROM VFD TO SCADA PANEL FOR SIGNAL WIRE.
3. REUSE EXISTING CONDUIT WHERE POSSIBLE BUT PULL IN NEW WIRE, REUSE EXISTING CONDUIT SUPPORT WHERE POSSIBLE.

NORTH

10 0 10 20

SCALE: 1" = 20'



PROPOSED ELECTRICAL PUMP ROOM PLAN

SCALE: 1"=20'-0"

REV.NO.	DESCRIPTION	DATE
1	ADDENDUM - REMOVAL OF PROPOSED VALVES	11/14/2022

REVISIONS

SEAL

AUBREY A. HAUDRICOURT, P.E.
No. 66861

McKIM&CREED
1365 Hamlet Avenue
Clearwater, Florida 33756-3331
Phone: (727) 442-7196, Fax: (727) 461-3827

CA Lic. No. 29588
www.mckimcreed.com

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CORTEZ BOOSTER PUMP STATION UPGRADES

ELECTRICAL

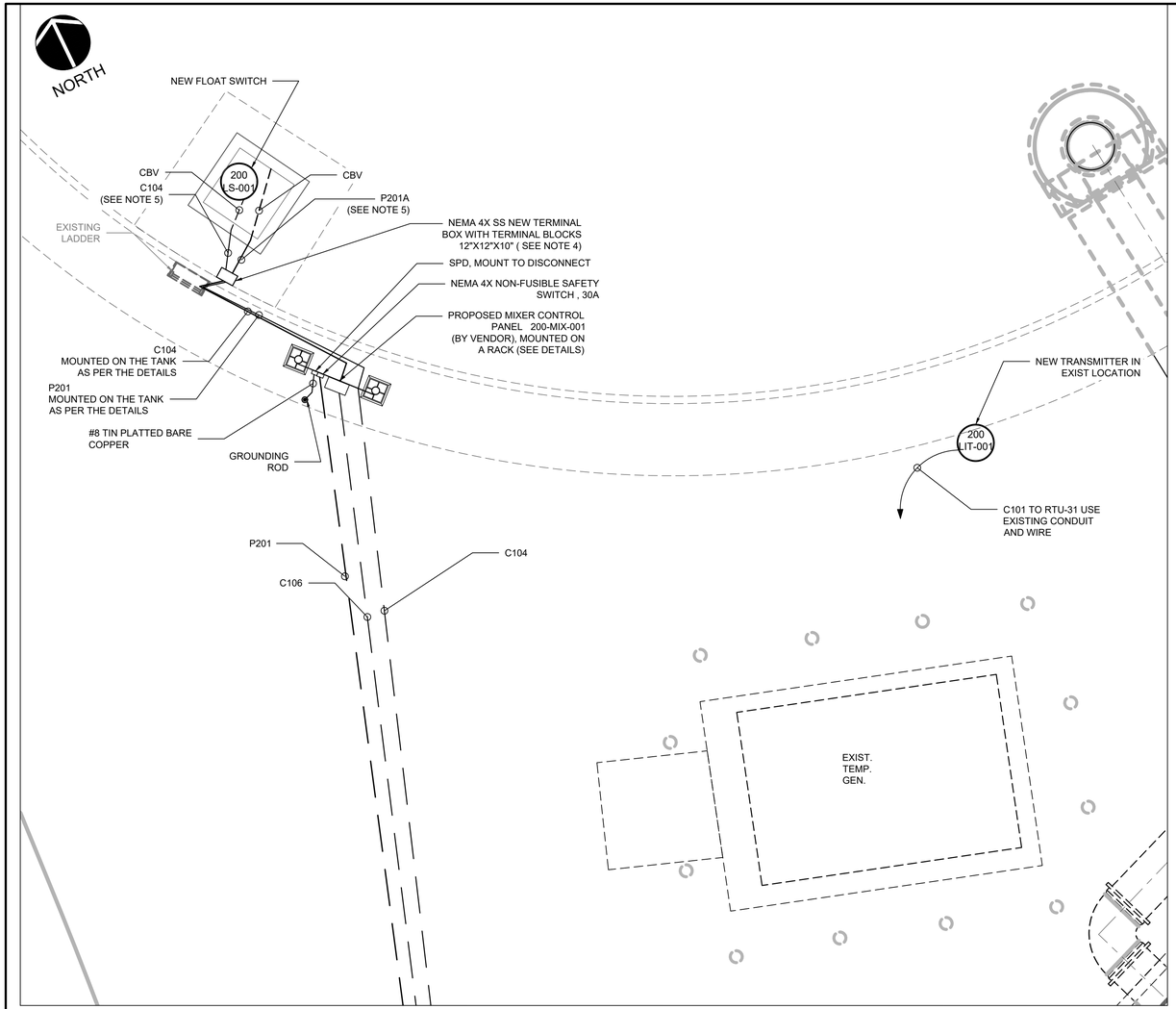
PROPOSED ELECTRICAL BUILDING PLAN

PROJ. START DATE:	MAR. 2020
MCE PROJ. #	01024-0193
DRAWN	JG
DESIGNED	AAH
CHECKED	MAC
PROJ. MGR.	BP

SCALE
HORIZONTAL: TBD
VERTICAL: TBD

E1.02
DRAWING NUMBER
1
REVISION

STATUS: ISSUED FOR BID

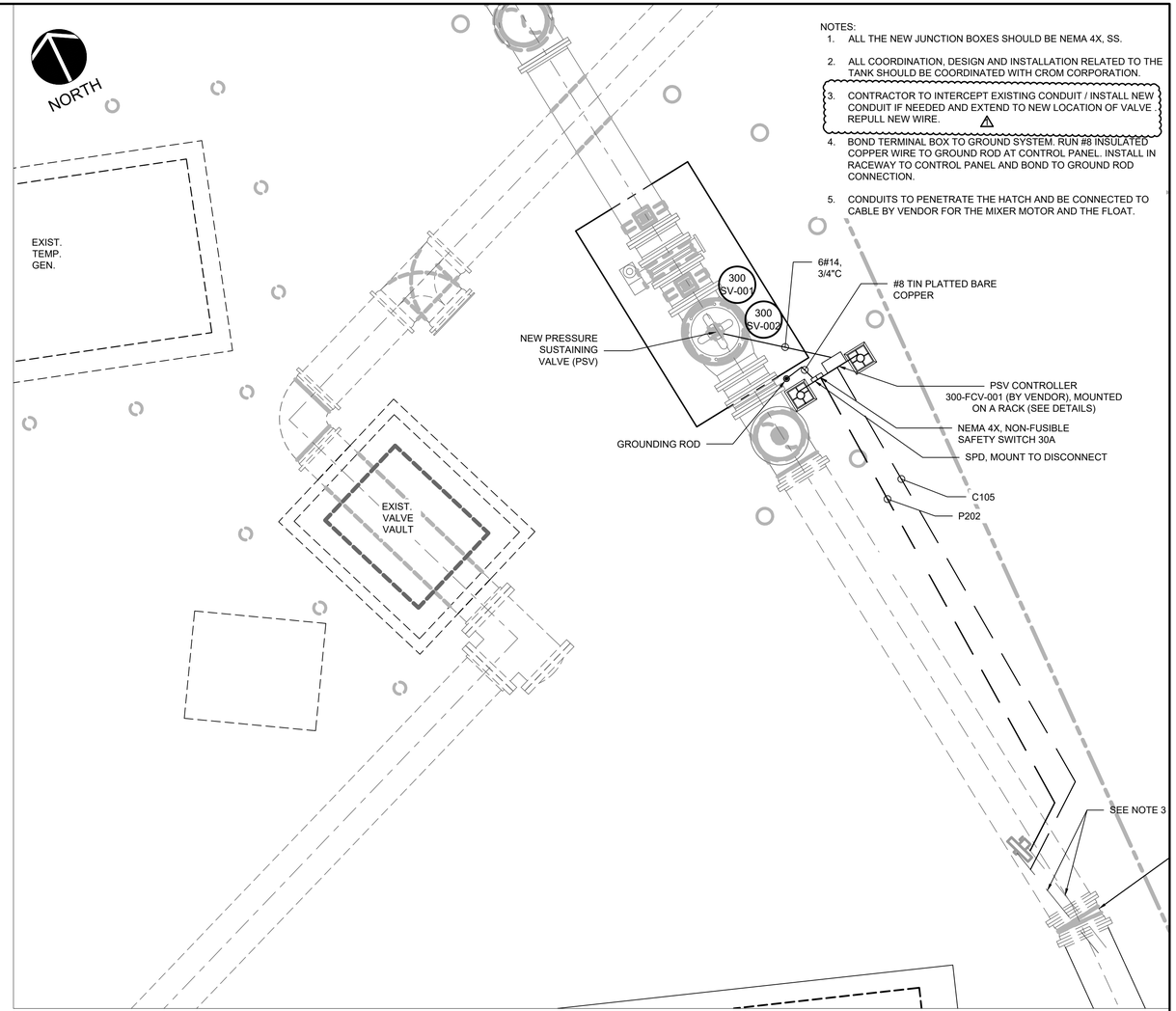


PROPOSED PARTIAL ELECTRICAL SITE PLAN 1

SCALE: 1"=40'-0"

20 0 20 40

SCALE: 1" = 40'



PROPOSED PARTIAL ELECTRICAL SITE PLAN 2

SCALE: 1"=40'-0"

20 0 20 40

SCALE: 1" = 40'

REV NO.	DESCRIPTION	DATE
1	ADDENDUM - REMOVAL OF PROPOSED VALVES	11/14/2022

REVISIONS

SEAL

AUBREY A. HAUDRICOURT, P.E.
No. 66861

McKIM&CREED
1365 Hamlet Avenue
Clearwater, Florida 33756-3331
Phone: (727) 442-7196, Fax: (727) 461-3827

CA Lic. No. 29588
www.mckimcreed.com

Manatee County FLORIDA

CORTEZ BOOSTER PUMP STATION UPGRADES

ELECTRICAL

PROPOSED PARTIAL ELECTRICAL SITE PLAN

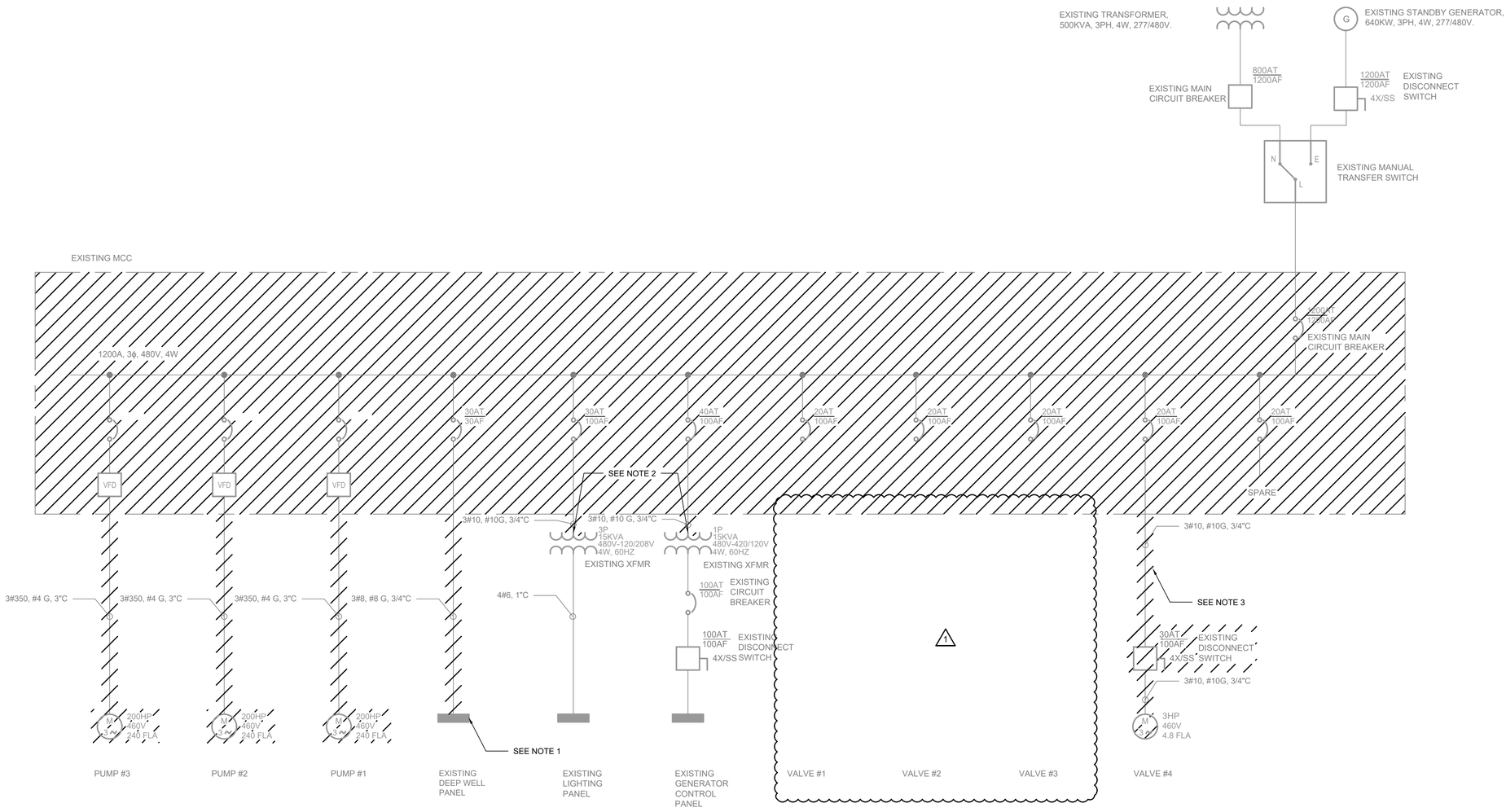
PROJ. START DATE:	MAR. 2020
MCE PROJ. #	01024-0193
DRAWN	JG
DESIGNED	AAH
CHECKED	MAC
PROJ. MGR.	BP

SCALE
HORIZONTAL: TBD
VERTICAL: TBD

E1.03
DRAWING NUMBER
1
REVISION

STATUS: **ISSUED FOR BID**

NOTES:
1. PANEL TO REMAIN. REUSE THE EXISTING CONDUIT.
2. XFMR TO REMAIN. REUSE THE EXISTING CONDUIT.
3. CONDUIT TO REMAIN. REPULL NEW WIRE, REFER TO SHEET E1.01 FOR ADDITIONAL INFORMATION.



REV NO.	DESCRIPTION	DATE
1	ADDENDUM - REMOVAL OF PROPOSED VALVES	11/14/2022

REVISIONS

SEAL

AUBREY A. HAUDRICOURT, P.E.
No. 66861

McKIM&CREED
1365 Hamlet Avenue
Clearwater, Florida 33756-3331
Phone: (727) 442-7196, Fax: (727) 461-3827

CA Lic. No. 29588
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CORTEZ BOOSTER PUMP STATION UPGRADES

ELECTRICAL

EXISTING & DEMOLITION ONE LINE

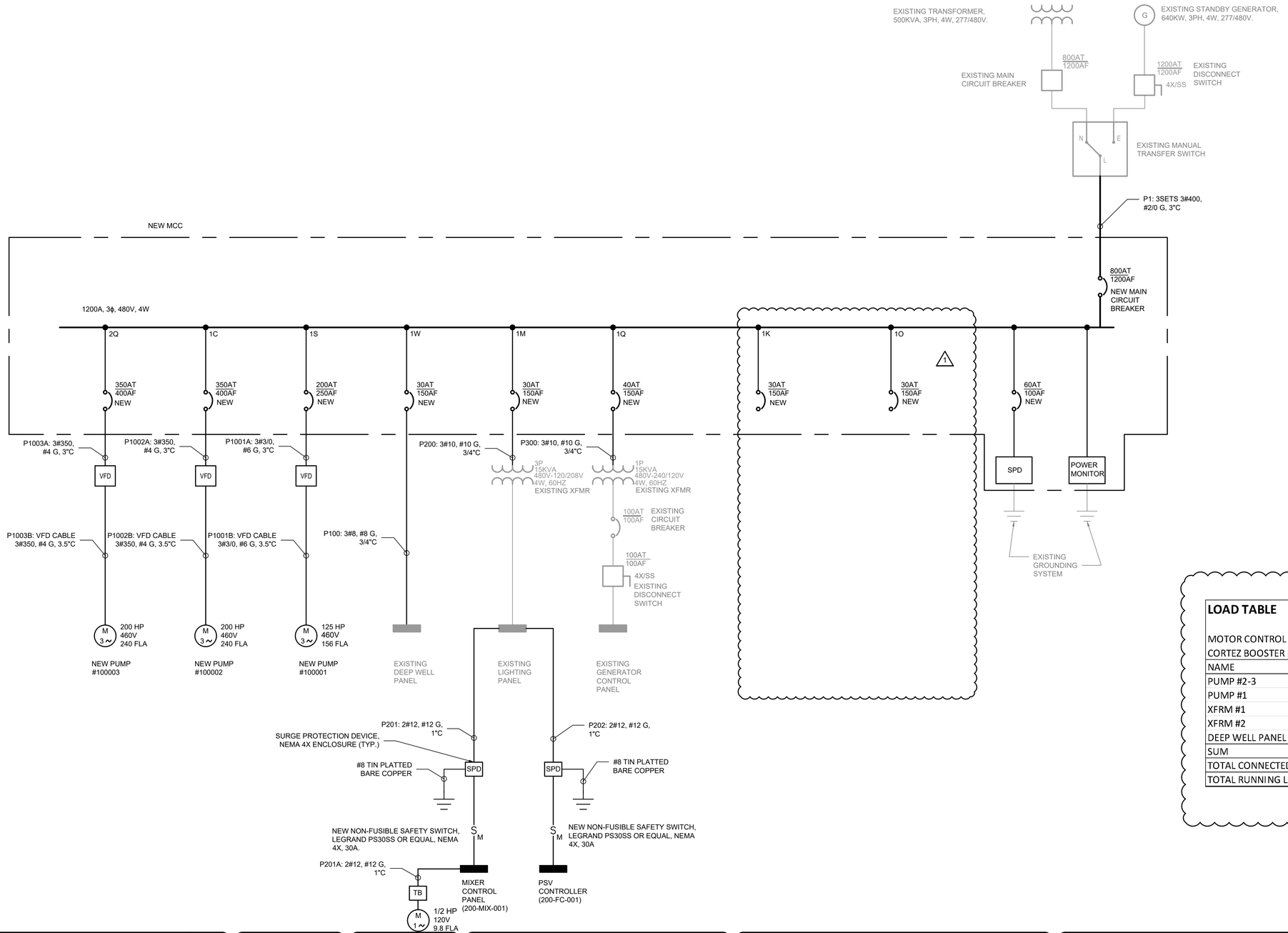
PROJ. START DATE:	MAR. 2020
MCE PROJ. #	01024-0193
DRAWN	JG
DESIGNED	AAH
CHECKED	MAC
PROJ. MGR.	BP

SCALE
HORIZONTAL: TBD
VERTICAL: TBD

E2.01
DRAWING NUMBER
1
REVISION

STATUS: ISSUED FOR BID

NOTES:
1. ALL THE VFDS ARE SIZED FOR 200HP WITH ADJUSTING SETTINGS FOR 125HP FOR ANY FUTURE UPGRADES.



1

LOAD TABLE		480V	500 KVA	XFR	106%
			640 KW	GEN	66%
MOTOR CONTROL CENTER		3 Ph	800 AT	MCB	80%
CORTEZ BOOSTER PUMP		3 WIRE	1200 AF	BUSS	53%
NAME	CONT?	#DUTY	#CON	KVA	HP	FLA
PUMP #2-3	Y	2	2		200.0	480.0
PUMP #1	Y	0	1		125	0.0
XFRM #1	Y	1	1	15		18.0
XFRM #2	Y	1	1	15		18.0
DEEP WELL PANEL	Y	1	1	23		27.6
SUM		DUTY: 0.6819		53.0	540.0	564.6
TOTAL CONNECTED LOAD (A)						564.6
TOTAL RUNNING LOAD				531.9		640.5

DUTY: 1.134431 NEC 230.42 SE: 700.5 A

REV.NO.	DESCRIPTION	DATE
1	ADDENDUM - REMOVAL OF PROPOSED VALVES	11/14/2022

REVISIONS

SEAL

AUBREY A. HAUDRICOURT, P.E. No. 66861

McKIM&CREED
1365 Hamlet Avenue
Clearwater, Florida 33756-3331
Phone: (727) 442-7196, Fax: (727) 461-3827
CA Lic. No. 29588
www.mckimcreed.com

Manatee County FLORIDA

CORTEZ BOOSTER PUMP STATION UPGRADES

ELECTRICAL

PROPOSED ONE LINE

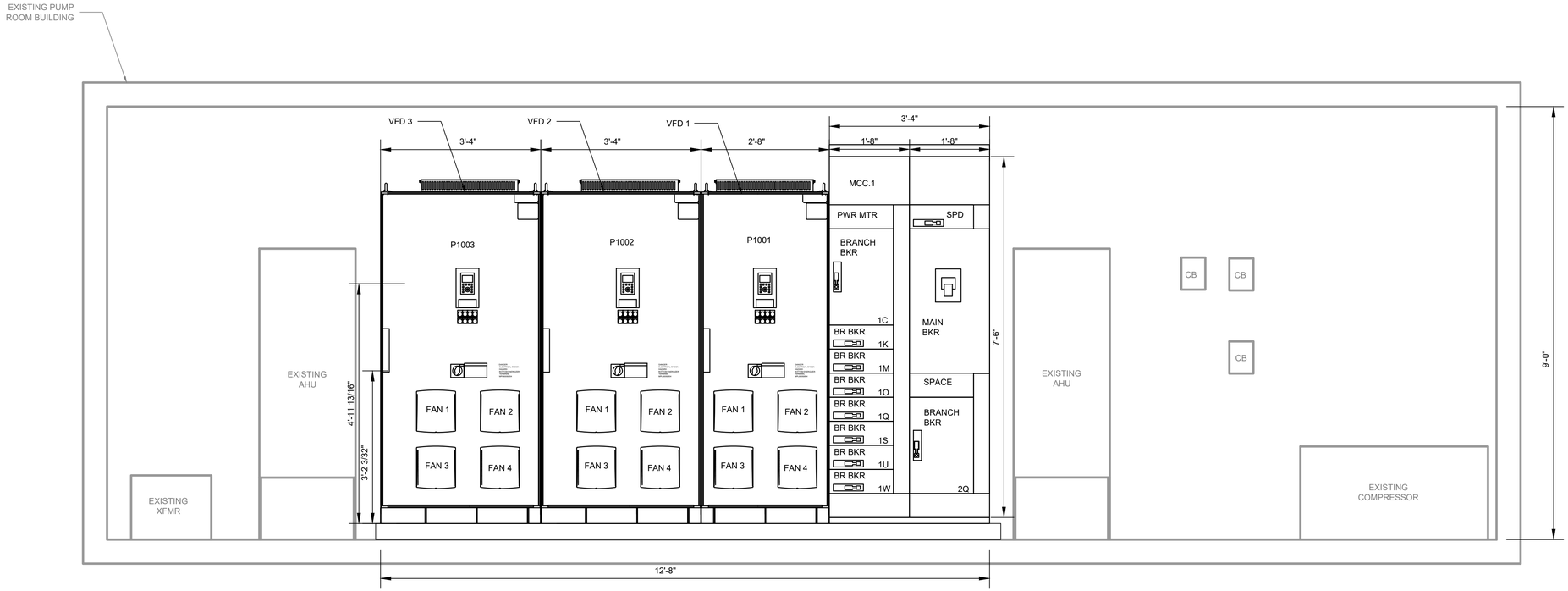
PROJ. START DATE:	MAR. 2020
MCE PROJ. #	01024-0193
DRAWN	JG
DESIGNED	AAH
CHECKED	MAC
PROJ. MGR.	BP

SCALE
HORIZONTAL: TBD
VERTICAL: TBD

E2.02
DRAWING NUMBER

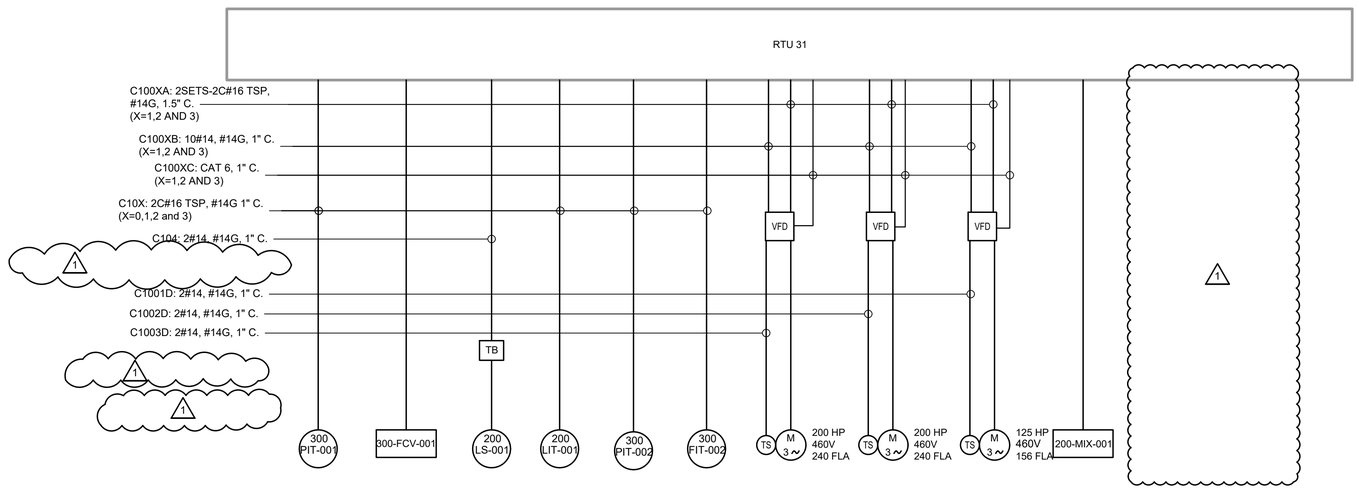
1
REVISION

STATUS: ISSUED FOR BID



ELEVATION

SCALE: 3/4"=1'-0"



ELECTRICAL INTERCONNECTION DIAGRAM

SCALE: NTS

REV.NO.	DESCRIPTION	DATE
1	ADDENDUM - REMOVAL OF PROPOSED VALVES	11/14/2022

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CORTEZ BOOSTER PUMP STATION UPGRADES

ELECTRICAL

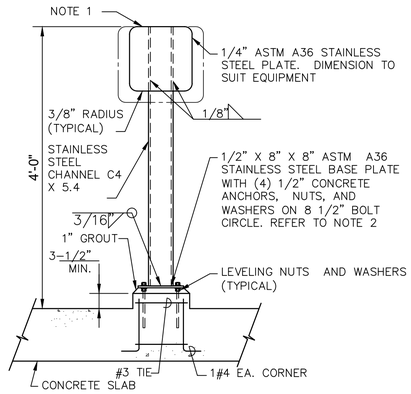
ELEVATION AND INTERCONNECT

PROJ. START DATE:	MAR. 2020
MCE PROJ. #	01024-0193
DRAWN	JG
DESIGNED	AAH
CHECKED	MAC
PROJ. MGR.	BP

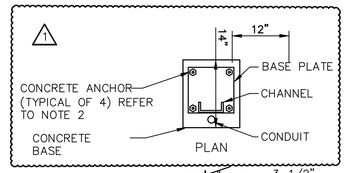
SCALE
HORIZONTAL: TBD
VERTICAL: TBD

E3.01
DRAWING NUMBER
1
REVISION

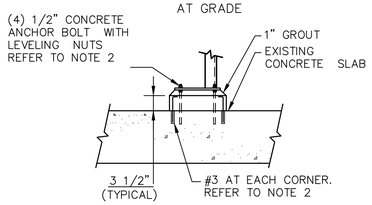
STATUS: ISSUED FOR BID



AT NEW CONCRETE SLAB



AT GRADE



AT EXISTING CONCRETE SLAB

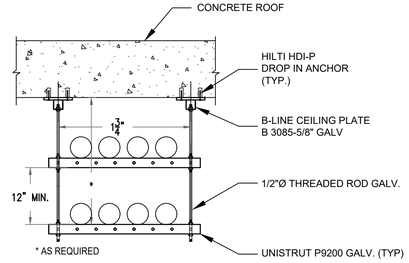
NOTES:

1. MOUNTING STAND PLATE: 2'X2' MAXIMUM
   A. DRILL PLATE FOR NUMBER OF HOLES REQUIRED.
   B. REMOVE ALL SHARP EDGES.
   C. CLEAN AND HOT DIP GALVANIZE AFTER FABRICATION.
2. SEE TYPICAL CONCRETE ANCHOR OR THREADED ROD DETAIL FOR CONCRETE ANCHOR REQUIREMENTS.
3. PROVIDE 316 STAINLESS STEEL ANCHOR BOLTS AND HARDWARE
4. ALUMINUM SYSTEM MAY SUBSTITUTE STAINLESS STEEL AS AN ALTERNATE MATERIAL

CONTROL STATION OR INSTRUMENT STAND

SCALE: N.T.S.

DETAIL A TYP



CONDUIT SUPPORT DETAIL (SUSPENDED SUPPORT)

SCALE: N.T.S.

CONDUIT SUPPORT TO THE TANK

SCALE: N.T.S.

CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD KVA	AMPS	POLES	KVA PER PHASE A	B	C	POLES	AMPS	LOAD KVA	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1	20	CHART REC/RTU	0.18	1.5	1	1.1			1	7.2	0.87	OUTSIDE BYPASS VALVE	20	2
3	50	WELL TRANSFORMER ROOM	3	28.8	2		3.6		1	4.7	0.56	LIGHTS	20	4
			3					3.6	1	4.7	0.56	LIGHTS	20	6
7	50	WELL RW XFMR	3	28.8	2	4.7			1	14.2	1.7	SUMP PUMP REC.	20	8
			3				3.2		1	1.5	0.18	OUTLET WELL ROOM	20	10
11	20	RTU RADIO	0.9	7.5	1			1.4	1	4.2	0.5	LIGHT WELL ROOM	20	12
13	20	VEEDER ROOT	0.9	7.5	1	1.1			1	1.5	0.18	OUTLET EAST & SOUTH WALL	20	14
15	50	AIR HANDLER #1	0.3	2.9	2		0.5		1	1.5	0.18	OUTLET OUTSIDE VAULT'S	20	16
			0.3					1.7	3	11.7	1.4	AIR COMP #1	30	18
19	**30**	**MIXER CONTROL PANEL(200-MIX-001)**	**0.58**	**4.8**	**1**	2.0					1.4			
21	**30**	**PSV CONTROLLER (200-FC-001**	**0.6**	**5.0**	**1**		2.0				1.4			
23					1			0.0	1					24
25					1	0.3			2	2.9	0.3	NEW AIR HANDLER	20	26
27					1		0.3				0.3			
29					1			2.1	3	17.5	2.1	NEW COMP	30	30
31					1	2.1					2.1			
33					1		2.1				2.1			
35					1			0.0	1					36
37					1	0.0			1					38
39					1		0.0		1					40

PANEL **LP - EXISTING**

LOCATION

BUILDING

NOTES:

TOTAL KVA	11.2	11.6	8.8
GRAND CONNECTED TOTAL KVA		31.6	

SERVICE CHARACTERISTICS

VOLTS: 208/120

PHASE: 3

WIRE: 4

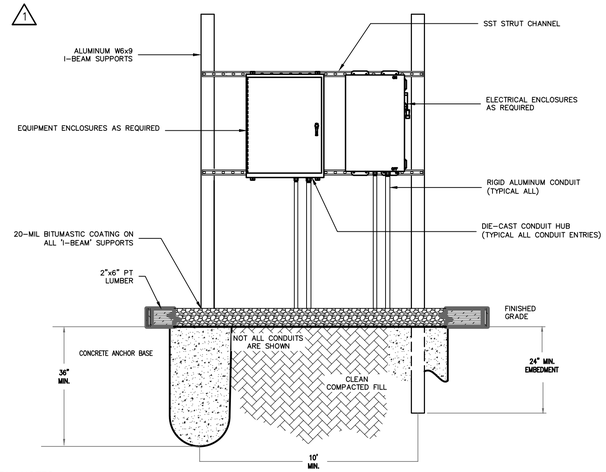
22K MIN AIC SYMM, FULLY RATED ASSEMBLY

0 A MLO

150 A MCB

EXISTING LIGHTING PANEL -LP

N.T.S.

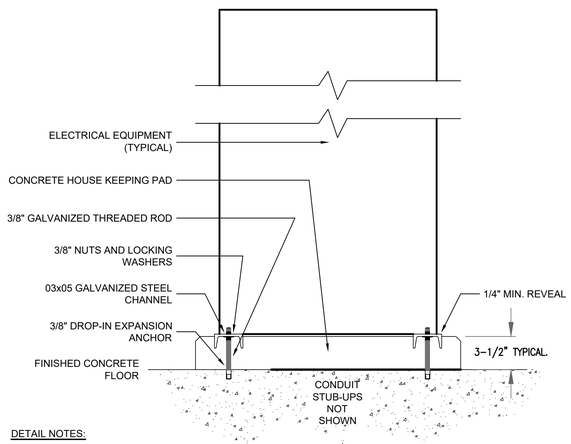


DETAIL NOTES:

1. CONDUIT(S) DEPICTED ON FRONT ELEVATIONS ARE SHOWN TO CONVEY DESIGN INTENT AND DO NOT DEPICT ACTUAL SIZES OR QUANTITIES. CONTRACTOR SHALL REFERENCE ALL CONTRACT DRAWINGS FOR MINIMUM CONDUIT AND CONDUCTOR REQUIREMENTS.
2. ALL EXPOSED CONDUIT SHALL BE RIGID ALUMINUM CONDUIT.
3. ALL CONDUIT(S) SHALL ENTER THE BOTTOM OF ALL ENCLOSURES WITH DIE-CAST ALUMINUM CONDUIT HUBS - CHASE/CLOSE CONDUIT NIPPLES AND SIDE ENTRIES ARE NOT ACCEPTABLE.
4. ALL CONDUIT ENTRIES SHALL HAVE MOISTURE SEALANT APPLIED AFTER ACCEPTED START-UP AND COMMISSIONING WITH IDEAL INDUSTRIES DUCT-SEAL OR APPROVED EQUAL.
5. ALL CONDUIT SUPPORTS, CLAMPS, HANGERS, ETC. SHALL BE STAINLESS STEEL.
6. ALL STRUT-CHANNEL SHALL BE STAINLESS-STEEL.
7. STRUT-CHANNEL SHALL NOT BE BENT, DRILLED, CUT OR OTHERWISE MODIFIED TO PRODUCE FITTINGS, BRACES OR BRACKETS FOR CONDUIT AND EQUIPMENT SUPPORTS.
8. MANUFACTURED STRUT-CHANNEL BRACES, BRACKETS, FITTINGS OR POST BASES SHALL BE PROVIDED AND INSTALLED WITH ASSOCIATED HARDWARE AND FASTENERS FOR CONDUIT AND EQUIPMENT SUPPORTS.
9. ALL FASTENERS, BOLTS, NUTS, SCREWS, WASHERS, ETC. SHALL BE STAINLESS STEEL
10. ALL THROUGH-BOLT FASTENINGS SHALL HAVE SST. FENDER AND LOCK WASHERS.
11. I-BEAM SUPPORT POSTS SHALL BE ALUMINUM W6x9 120" MINIMUM.
    A. ALL DRILLED HOLES SHALL BE DE-BURRED, FILED SMOOTH, CLEANED, DE-GREASED AND OIL FREE PRIOR TO APPLYING ZINC RICH AEROSOL SPRAY
    B. I-BEAM SUPPORT POSTS SHALL HAVE 20-MIL CURED COAL-TAR EPOXY COATING PRIOR TO EMBEDMENT INTO CONCRETE ANCHOR BASE. BITUMASTIC 50 OR APPROVED EQUAL
    C. ALL I-BEAM SUPPORT POSTS SHALL BE CONNECTED TO "GROUNDING RING" WITH MECHANICAL LUG CONNECTIONS WITH ANTI-VIBRATION SST. FASTENERS.
12. ALL DEVICE BOXES SHALL BE CAST ALUMINUM WITH CAST ALUMINUM WEATHER-PROOF, IN-USE DEVICE COVERS.
13. BRANCH CIRCUIT FOR RECEPTACLE SHALL BE USED TO FEED SUN/WEATHER HOOD LIGHT FIXTURE.

TYPICAL ELECTRICAL EQUIPMENT RACK (FRONT ELEVATION)

SCALE: N.T.S.



DETAIL NOTES:

1. CHANNELS SHALL BE MADE CONTINUOUS IN REQUIRED LENGTHS
2. INSTALL CHANNELS PRIOR TO PLACING HOUSE KEEPING CONCRETE
3. INSTALL CHANNELS LEVEL WITHIN (+/-) 1/16" THROUGHOUT SPAN
4. CHANNEL SHALL BE 1/4" MINIMUM ABOVE HOUSE KEEPING CONCRETE FINISH
5. PROVIDE CHANNELS AS REQUIRED TO SUPPORT THE FULL LENGTH AND DEPTH OF EQUIPMENT
6. TOUCH-UP CHANNELS WITH ZINC RICH PAINT PRIOR TO PLACING CONCRETE AND AFTER INSTALLING EQUIPMENT

TYPICAL FLOOR-MOUNTED ELECTRICAL EQUIPMENT PAD DETAIL

SCALE: N.T.S.

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ELECTRICAL

DETAILS AND PANEL SCHEDULE

PROJ. START DATE:	MAR. 2020
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CHECKED	MAC
PROJ. MGR.	BP

SCALE

HORIZONTAL: TBD

VERTICAL: TBD

E3.02

DRAWING NUMBER

REVISION

STATUS: **ISSUED FOR BID**