

GENERAL:

1. REFER TO THE WESTERN VIRGINIA REGIONAL DESIGN AND CONSTRUCTION STANDARDS, LATEST EDITION FOR ADDITIONAL REQUIREMENTS NOT HEREIN SPECIFIED. CONTRACTOR RESPONSIBLE FOR COMPLYING WITH ALL REQUIREMENTS THAT MAY BE APPLICABLE TO THE WORK.

SOLID STATE-REDUCED VOLTAGE MOTOR STARTER:

1. CODES AND MATERIALS: ALL MATERIALS AND WORKMANSHIP SHALL COMPLY WITH NEMA IEC 947 AND NETA STD ATS.
2. SUBMITTALS: PROVIDE CATALOG SHEETS SHOWING VOLTAGE, CONTROLLER SIZE, RATINGS AND SIZE OF SWITCHING AND OVERCURRENT PROTECTIVE DEVICES, SHORT CIRCUIT RATINGS, DIMENSIONS, AND ENCLOSURE DETAILS.
3. SOLID STATE-REDUCED VOLTAGE MOTOR STARTER REQUIREMENTS:
- a. SOLID STATE-REDUCED VOLTAGE MOTOR STARTER: ENCLOSED CONTROLLER SUITABLE FOR OPERATION IN THE INDICATED LOADS, IN CONFORMANCE WITH REQUIREMENTS OF NEMA IEC 947.
- b. ENCLOSURES: PROVIDE ENCLOSURES PER MANUFACTURER RECOMMENDATIONS.
4. INSTALLATION:
- a. INSTALL IN ACCORDANCE WITH NEMA IEC 947 AND MANUFACTURER'S INSTRUCTIONS.
- b. SELECT AND INSTALL OVERLOAD HEATER ELEMENTS IN MOTOR CONTROLLERS TO MATCH INSTALLED MOTOR CHARACTERISTICS.
- c. PROVIDE ENGRAVED PLASTIC NAMEPLATE.
- d. NEATLY TYPE LABEL INSIDE EACH MOTOR CONTROLLER DOOR IDENTIFYING MOTOR SERVED, NAMEPLATE HORSEPOWER, FULL LOAD AMPERES, CODE LETTER, SERVICE FACTOR, AND VOLTAGE/PHASE RATING; PLACE IN CLEAR PLASTIC HOLDER.
- e. COORDINATE OPERATION WITH MOTORS PROVIDED AND CONTROL EQUIPMENT PROVIDED.

STANDBY GENERATOR SYSTEM:

1. CODES AND MATERIALS: ALL MATERIALS AND WORKMANSHIP SHALL COMPLY WITH NECA/EGSA 404, NEMA MG 1, NFPA 30, AND NFPA 110.
2. SUBMITTALS: INDICATE ELECTRICAL CHARACTERISTICS AND CONNECTION REQUIREMENTS. SHOW PLAN AND ELEVATION VIEWS WITH OVERALL AND INTERCONNECTION POINT DIMENSIONS, FUEL CONSUMPTION RATE CURVES AT VARIOUS LOADS, VENTILATION AND COMBUSTION AIR REQUIREMENTS, ELECTRICAL DIAGRAMS INCLUDING SCHEMATIC AND INTERCONNECTION DIAGRAMS. PROVIDE DATA SHOWING DIMENSIONS, WEIGHTS, RATINGS, INTERCONNECTION POINTS, AND INTERNAL WIRING DIAGRAMS FOR ENGINE, GENERATOR, CONTROL PANEL, BATTERY, BATTERY RACK, BATTERY CHARGER, EXHAUST SILENCER, AND VIBRATION ISOLATORS. INDICATE RESULTS OF PERFORMANCE TESTING. INCLUDE INSTRUCTIONS FOR NORMAL OPERATION. INCLUDE INSTRUCTIONS FOR ROUTINE MAINTENANCE REQUIREMENTS, OIL SAMPLING AND ANALYSIS FOR ENGINE WEAR, AND EMERGENCY MAINTENANCE PROCEDURES.
3. MANUFACTURER: ONAN, CATERPILLAR, OR KOHLER
4. STANDBY GENERATOR SYSTEM REQUIREMENTS:
- a. SYSTEM: CONFORM TO NFPA 110, PROVIDE SYSTEM CAPACITY AS SPECIFIED ON DRAWINGS.
- b. ENGINE: FOUR STROKE NATURAL GAS, MEET CURRENT EPA EMISSION STANDARDS.
- b.1. TYPE: 1800 RPM WATER-COOLED INTERNAL COMBUSTION ENGINE RATED TO OPERATE UNDER 10 PERCENT OVERLOAD FOR ONE HOUR IN AMBIENT TEMPERATURE OF 90 DEGREES F AT AN ELEVATION OF 885-1740 FEET.
- b.2. FUEL SYSTEM: ENGINE SHALL OPERATE ON NATURAL GAS. A NORMALLY CLOSED 12 VDC GAS VALVE AND SECONDARY PRESSURE REGULATOR SHALL BE FACTORY INSTALLED. A BRAIDED FLEXIBLE FUEL CONNECTOR SHALL BE FURNISHED FOR INSTALLATION BETWEEN THE GAS VALVE AND GAS PIPING.
- b.3. GOVERNOR: PROVIDE ISOCHRONOUS TYPE TO MAINTAIN ENGINE SPEED WITHIN 0.5 PERCENT, STEADY STATE, AND 5 PERCENT, NO LOAD TO FULL LOAD, WITH RECOVERY TO STEADY STATE WITHIN 2 SECONDS FOLLOWING SUDDEN LOAD CHANGES.
- b.4. SAFETY DEVICES: ENGINE SHUTDOWN ON HIGH WATER TEMPERATURE, LOW OIL PRESSURE, OVERSPEED, AND ENGINE OVERCRANK. LIMITS AS SELECTED BY MANUFACTURER.
- b.5. ENGINE STARTING: DC START SYSTEM WITH POSITIVE ENGAGEMENT, NUMBER AND VOLTAGE OF STARTER MOTORS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. INCLUDE REMOTE STARTING CONTROL CIRCUIT, WITH MANUAL-OFF-REMOTE SELECTOR SWITCH ON ENGINE GENERATOR CONTROL PANEL.
- b.6. ENGINE JACKET HEATER: THERMAL CIRCULATION TYPE WATER HEATER WITH INTEGRAL THERMOSTATIC CONTROL, SIZED TO MAINTAIN ENGINE JACKET WATER AT 90 DEGREES F AND SUITABLE FOR OPERATION ON 120 VOLTS AC.
- b.7. ENGINE ACCESSORIES: LUBE OIL FILTER, INTAKE AIR FILTER, LUBE OIL COOLER, GEAR-DRIVEN WATER PUMP. INCLUDE WATER TEMPERATURE GAGE, AND LUBE OIL PRESSURE GAGE ON ENGINE/GENERATOR CONTROL PANEL.
- b.8. MOUNTING: PROVIDE UNIT WITH SUITABLE SPRING-TYPE VIBRATION ISOLATORS AND MOUNT ON STRUCTURAL STEEL BASE.
- c. GENERATOR:
- c.1. GENERATOR: NEMA MG 1, THREE PHASE, FOUR POLE, RECONNECTABLE BRUSHLESS SYNCHRONOUS GENERATOR WITH BRUSHLESS EXCITER.
- c.2. RATING: KW RATING AS SPECIFIED ON DRAWINGS, AT 0.8 POWER FACTOR, 480Y-277 VOLTS, 60 HZ AT 1800 RPM.
- c.3. INSULATION CLASS: H
- c.4. TEMPERATURE RISE: 130 DEGREES C, STANDBY.
- c.5. ENCLOSURE: NEMA MG 1, OPEN DRIP PROOF ENCLOSURE WITH CRITICAL GRADE MUFFLER IN INTERIOR APPLICATIONS AND ENCLOSED WEATHER PROTECTIVE ENCLOSURE WITH CRITICAL GRADE MUFFLER IN EXTERIOR APPLICATIONS.
- c.6. VOLTAGE REGULATION: INCLUDE GENERATOR MOUNTED VOLTS PER HERTZ EXCITER-REGULATOR TO MATCH ENGINE AND GENERATOR CHARACTERISTICS, WITH VOLTAGE REGULATION PLUS OR MINUS 1 PERCENT FROM NO LOAD TO FULL LOAD. INCLUDE MANUAL CONTROLS TO ADJUST VOLTAGE DROOP, VOLTAGE LEVEL (PLUS OR MINUS 5 PERCENT) AND VOLTAGE GAIN.
- d. ACCESSORIES
- d.1. BATTERIES: HEAVY DUTY TYPE LEAD-ACID STORAGE BATTERIES. MATCH BATTERY VOLTAGE TO STARTING SYSTEM. INCLUDE NECESSARY CABLES AND CLAMPS.
- d.2. BATTERY CHARGER: CURRENT LIMITING TYPE DESIGNED TO FLOAT AT 2.17 VOLTS PER CELL AND EQUALIZE AT 2.33 VOLTS PER CELL. INCLUDE OVERLOAD PROTECTION, FULL WAVE RECTIFIER, DC VOLT METER AND AMMETER, AND 120 VOLT AC FUSE INPUT.
- d.3. LINE CIRCUIT BREAKER: MOLDED CASE CIRCUIT BREAKER ON GENERATOR OUTPUT WITH INTEGRAL THERMAL AND INSTANTANEOUS MAGNETIC TRIP IN EACH POLE. PROVIDE SIZE AS INDICATED ON DRAWINGS. INCLUDE BATTERY-VOLTAGE OPERATED SHUNT-TRIP, CONNECTED TO CIRCUIT BREAKER ON ENGINE FAILURE.
- d.4. ENGINE CONTROL PANEL: NEMA 250, TYPE 1 GENERATOR MOUNTED CONTROL PANEL ENCLOSURE WITH ENGINE AND GENERATOR CONTROLS AND INDICATORS. INCLUDE THE FOLLOWING EQUIPMENT AND FEATURES:
- d.4.1. FREQUENCY METER: 45-65 HZ. RANGE
- d.4.2. AC OUTPUT VOLT METER: 2 PERCENT ACCURACY, WITH PHASE SELECTOR SWITCH.
- d.4.3. AC OUTPUT AMMETER: 2 PERCENT ACCURACY, WITH PHASE SELECTOR SWITCH.
- d.4.4. OUTPUT VOLTAGE ADJUSTMENT.
- d.4.5. PUSH TO TEST INDICATOR LAMPS, ONE EACH FOR LOW OIL PRESSURE, HIGH WATER TEMPERATURE, OVERSPEED, AND OVERCRANK.
- d.4.6. ENGINE START/STOP SELECTOR SWITCH.
- d.4.7. ENGINE RUNNING TIME METER.
- d.4.8. OIL PRESSURE GAUGE.
- d.4.9. WATER TEMPERATURE GAUGE.
- d.4.10. AUXILIARY RELAY: 3PDT, OPERATES WHEN ENGINE RUNS, WITH CONTACT TERMINALS PREWIRED TO TERMINAL STRIP.
- d.4.11. ADDITIONAL VISUAL INDICATORS AND ALARMS AS REQUIRED BY NFPA 110.
- d.4.12. REMOTE ALARM CONTACTS: PRE-WIRE SPDT CONTACTS TO TERMINAL STRIP FOR REMOTE ALARM FUNCTIONS AS REQUIRED BY STATION TELEMETRY PANEL.
- d.5. WEATHER-PROTECTIVE ENCLOSURE: REINFORCED STEEL HOUSING ALLOWING ACCESS TO CONTROL PANEL AND SERVICE POINTS WITH LOCKABLE DOORS AND PANELS.
5. INSTALLATION:
- a. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- b. INSTALL SECURELY, IN A NEAT AND WORKMANLIKE MANNER, AS SPECIFIED IN NECA/EGSA 404.

AUTOMATIC TRANSFER SWITCH:

1. CODES AND MATERIALS: ALL MATERIALS AND WORKMANSHIP SHALL COMPLY WITH NEMA ICS 10 AND NETA STD ATS.
2. SUBMITTALS: PROVIDE CATALOG CUTSHEETS SHOWING VOLTAGE, SWITCH SIZE, RATINGS AND SIZE OF SWITCHING, OPERATING LOGIC, SHORT CIRCUIT RATINGS, DIMENSIONS, AND ENCLOSURE DETAILS.
3. AUTOMATIC TRANSFER SWITCH REQUIREMENTS:
- a. DESCRIPTION: NEMA ICS 10, AUTOMATIC TRANSFER SWITCH SUITABLE FOR USE AS SERVICE EQUIPMENT. PROVIDE 3-POLE NON-SWITCHED NEUTRAL ATS.
- b. CONFIGURATION: ELECTRICALLY OPERATED, MECHANICALLY HELD TRANSFER SWITCH.
- c. COMPONENTS:
- c.1. INDICATING LIGHTS: MOUNT IN COVER OF ENCLOSURE TO INDICATE NORMAL SOURCE AVAILABLE, ALTERNATE SOURCE AVAILABLE, SWITCH POSITION, NORMAL BYPASS, AND ALTERNATE SOURCE BYPASS.
- c.2. TEST SWITCH: MOUNT IN COVER OF ENCLOSURE TO SIMULATE FAILURE OF NORMAL SOURCE.
- c.3. RETURN TO NORMAL SWITCH: MOUNT IN COVER OF ENCLOSURE TO INITIATE MANUAL TRANSFER FROM ALTERNATE SOURCE TO NORMAL SOURCE.
- c.4. NORMAL SOURCE MONITOR: MONITOR EACH LINE OF NORMAL SOURCE VOLTAGE AND FREQUENCY; INITIATE TRANSFER WHEN VOLTAGE DROPS BELOW 90 PERCENT OR WHEN FREQUENCY VARIES MORE THAN 3 PERCENT FROM RATED NOMINAL VALUE. PROVIDE ALARM CONTACTS TO SIGNAL LOSS OF NORMAL SOURCE.
- c.5. ALTERNATE SOURCE MONITOR: MONITOR EACH LINE OF NORMAL SOURCE VOLTAGE AND FREQUENCY; INHIBIT TRANSFER WHEN VOLTAGE IS BELOW 90 PERCENT OR WHEN FREQUENCY VARIES MORE THAN 3 PERCENT FROM RATED NOMINAL VALUE. PROVIDE ALARM CONTACTS TO SIGNAL LOSS OF ALTERNATE SOURCE.
- c.6. IN-PHASE MONITOR: INHIBIT TRANSFER UNTIL SOURCE AND LOAD ARE WITHIN 20 ELECTRICAL DEGREES.
- c.7. ENCLOSURE: ICS 10, NEMA 1 ENCLOSURE FOR INTERIOR APPLICATION AND NEMA 3R ENCLOSURE FOR EXTERIOR APPLICATION.
4. INSTALLATION:
- a. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- b. PROVIDE ENGRAVED PLASTIC NAMEPLATE.

PROGRAMMABLE LOGIC CONTROL (PLC) SYSTEM:

1. GENERAL
- a. PLC SYSTEM IS BASED ON ALLEN-BRADLEY BRAND MODULAR MICROLOGIX 1100 PROGRAMMABLE LOGIC CONTROLLER SYSTEM.
- b. EACH PLC SHALL BE PROVIDED WITH SURGE PROTECTION AND UN-INTERRUPTIBLE POWER SUPPLY (UPS) TO MAINTAIN OPERATION OF THE CONTROL SYSTEM DURING MOMENTARY AND EXTENDED (1 HOUR) LOSS OF ELECTRIC SERVICE.
2. SUBMITTALS
- a. MANUFACTURER'S CATALOG DATA
- b. DRAWINGS FOR CONTROL SYSTEM PANEL, INSTRUMENTATION WIRING, SURGE PROTECTION, AND WIRING DIAGRAMS
3. PROGRAMMABLE CONTROLLER PROCESSOR
- a. PROVIDE AN ALLEN-BRADLEY BRAND MODULAR MICROLOGIX 1100, OR APPROVED EQUAL, PROGRAMMABLE LOGIC CONTROLLER (PLC). THE CAPABILITY SHALL EXIST TO ALLOW FOR EXPANSION OF THE SYSTEM BY THE ADDITION OF HARDWARE AND/OR SOFTWARE.
- a.1. PLC SHALL HAVE DOWNWARD COMPATIBILITY WHEREBY ALL NEW MODULE DESIGNS CAN BE INTERCHANGED WITH ALL SIMILAR MODULES IN AN EFFORT TO REDUCE OBSOLESCENCE.
- a.2. PLC SHALL HAVE THE ABILITY TO BE UPDATED ELECTRONICALLY TO INTERFACE WITH NEW MODULES.
- a.3. PLC HARDWARE SHALL OPERATE AT AN AMBIENT TEMPERATURE OF 0 TO 60 DEG. C, WITH AN AMBIENT TEMPERATURE RATING FOR STORAGE OF MINUS 20 TO PLUS 85 DEG. C. PLC HARDWARE SHALL FUNCTION CONTINUOUSLY IN THE RELATIVE HUMIDITY RANGE OF 5 TO 95 PERCENT WITH NO CONDENSATION.
- a.4. EACH PLC SHALL HAVE THE CAPABILITY OF ADDRESSING UP TO 74 LOCAL DISCRETE POINTS OR 18 LOCAL ANALOG POINTS.
- a.5. EACH INPUT AND OUTPUT MODULE SHALL BE A SELF-CONTAINED UNIT HOUSED WITHIN AN ENCLOSURE. THESE INPUT/OUTPUT ENCLOSURES WITH THEIR RESPECTIVE MODULES SHALL BE FIELD EXPANDABLE UP TO 64 (4 MODULES X 16 POINTS/MODULE) UNIQUE POINTS.
- a.6. EACH PLC SHALL HAVE ONE DEDICATED SERIAL PORT, WHICH SUPPORTS RS-232-C SIGNALS. IT SHALL BE ACCESSIBLE IN CONTROL LOGIC AND PROVIDE SUPPORT FOR DFI MASTER, DFI POINT TO POINT, DFI SLAVE COMMUNICATION PROTOCOLS. ALTERNATIVELY, IT MUST BE USABLE FOR PROGRAMMING AND DATA MONITORING PURPOSES.
- b. PROCESSOR HARDWARE
- b.1. PROCESSOR SHALL BE A SELF-CONTAINED UNIT AND WILL PROVIDE CONTROL PROGRAM EXECUTION AND SUPPORT REMOTE OR LOCAL PROGRAMMING. DEVICE WILL ALSO SUPPLY I/O SCANNING AND INTER-PROCESSOR AND PERIPHERAL COMMUNICATION FUNCTIONS.
- b.2. USER PROGRAM AND DATA SHALL BE CONTAINED IN NON-VOLATILE, BATTERY BACKED MEMORY. THE OPERATING SYSTEM SHALL BE CONTAINED IN NON-VOLATILE FIRMWARE.
- b.3. PROCESSOR SHALL CONTAIN 4 KB OF BASE MEMORY. PROCESSOR SHALL INCLUDE A HOLDER AND A CONNECTOR FOR A LITHIUM BATTERY. BATTERY SHALL PROVIDE POWER BACKUP FOR USER PROGRAMS AND DATA WHEN THE MAIN POWER SUPPLY IS NOT AVAILABLE.
- b.5. PROCESSOR SHALL INCLUDE A 8-PIN MINI-DIN SERIAL RS232 PORT, WHICH SUPPORTS DFI, AND AN ETHERNET PORT.
- c. NETWORK COMMUNICATIONS
- c.1. PLC SYSTEM SHALL HAVE COMMUNICATION INTERFACE FOR ETHERNET AND SERIAL DFI.
- d. DIGITAL AC INPUT MODULE
- d.1. OPERATING VOLTAGE: 79-132 VOLTS AC
- d.2. REMOVABLE TERMINAL BLOCK
- d.3. NUMBER OF INPUTS: 8
- d.4. POINTS PER COMMON: 8
- d.5. OFF STATE CURRENT (MAX): 2.5 MILLIAMPERES
- d.6. 25 PERCENT SPARE
- d.7. AMBIENT OPERATING TEMPERATURE: 0 DEG. C TO 60 DEG. C
- d.8. WIRING: TWO NO. 16 AWG WIRES PER TERMINAL
- e. DIGITAL AC TRIAC OUTPUT MODULE
- e.1. OPERATING VOLTAGE: 79-132 VOLTS AC
- e.2. REMOVABLE TERMINAL BLOCK
- e.3. NUMBER OF OUTPUTS: 8
- e.4. POINTS PER COMMON: 4
- e.5. OFF STATE CURRENT (MAX): 2.5 MILLIAMPERES
- e.6. CONTINUOUS CURRENT PER POINT: 1 AMP AT 30 DEG. C, 0.5 AMP AT 60 DEG. C
- e.7. CONTINUOUS CURRENT PER MODULE: 4 AMP AT 60 DEG. C
- e.8. 25 PERCENT SPARE
- e.9. AMBIENT OPERATING TEMPERATURE: 0 DEG. C TO 60 DEG. C
- e.10. WIRING: TWO NO. 14 AWG WIRES PER TERMINAL
- f. DIGITAL CONTACT OUTPUT MODULE
- f.1. OPERATING VOLTAGE: 10 TO 265 VOLTS AC. 5 TO 150 VOLTS DC
- f.2. REMOVABLE TERMINAL BLOCK
- f.3. NUMBER OF OUTPUTS: 16
- f.4. POINTS PER COMMON: 8
- f.5. OFF STATE CURRENT (MAX): 0
- f.6. CONTINUOUS CURRENT PER POINT: 2 AMP 120/240 AC AT 30 DEG C
- f.7. CONTINUOUS CURRENT PER MODULE: NOT APPLICABLE
- f.8. 25 PERCENT SPARE
- f.9. AMBIENT OPERATING TEMPERATURE: 0 TO 60 DEG. C
- f.10. WIRING: TWO NO. 14 AWG WIRES PER TERMINAL
- g. ANALOG INPUT MODULE
- g.1. INPUT TYPE: DIFFERENTIAL, VOLTAGE, OR CURRENT, SELECTABLE PER CHANNEL
- g.2. NUMBER OF INPUTS: 4 DIFFERENTIAL CHANNELS
- g.3. INPUT POWER: LOOP POWER
- g.4. FIELD WIRING ISOLATION: 500 VOLTS DC
- g.5. CURRENT/VOLTAGE RANGES: 0-10 DC OR 4-20 mA
- g.6. RESOLUTION: 15 BITS
- g.7. 25 PERCENT SPARE
- g.8. AMBIENT OPERATING TEMPERATURE: 0 TO 60 DEG. C
- g.9. REMOVABLE TERMINAL BLOCK
- h. ANALOG OUTPUT MODULE
- h.1. INPUT TYPE: DIFFERENTIAL, VOLTAGE, OR CURRENT, SELECTABLE PER CHANNEL
- h.2. NUMBER OF OUTPUTS: 4 ISOLATED CHANNELS
- h.3. OUTPUT POWER: PROVIDED BY MODULE
- h.4. FIELD WIRING ISOLATION: 500 VOLTS DC
- h.5. CURRENT/VOLTAGE RANGE: 0-10 DC OR 0-20.5 mA
- h.6. RESOLUTION: 12 BITS
- h.7. 25 PERCENT SPARE
- h.8. AMBIENT OPERATING TEMPERATURE: 0 TO 60 DEG. C
- h.9. REMOVABLE TERMINAL BLOCK
3. HUMAN MACHINE INTERFACE TERMINAL
- a. PROVIDE ALLEN-BRADLEY PANELVIEW PLUS 600 HUMAN MACHINE INTERFACE (HMI) TERMINAL, OR APPROVED EQUAL.
- a.1. TERMINAL SHALL BE POWERED BY 85-264 VAC, SINGLE-PHASE.
- a.2. HMI SHALL BE TOUCH-SCREEN ONLY.
- a.3. HMI SHALL PROVIDE FOR ADVANCED HISTORICAL ALARMING AND SCREEN SECURITY.
- a.4. DISPLAY SHALL BE MONOCHROME PASSIVE MATRIX FILM COMPENSATED SUPER-TWIST NEMATIC (FSTN).
- a.5. TERMINAL SHALL BE PROVIDED WITH ETHERNET/IP AND SERIAL COMMUNICATION PORTS.
- a.6. TERMINAL SHALL HAVE A 5-YEAR BATTERY-BACKED REAL TIME CLOCK.
4. DC POWER SUPPLIES
- a. MANUFACTURERS
- a.1. ALLEN-BRADLEY
- a.2. B&K PRECISION
- a.3. PHOENIX
- b. REGULATED: SOLID-STATE, LINEAR POWER
- c. INPUT: 120 VAC, SINGLE PHASE, 60 HZ
- d. OUTPUT CURRENT: 2.0A
- e. REGULATION: PLUS OR MINUS 0.5 PERCENT, NO LOAD TO FULL LOAD.
- f. OUTPUT RIPPLE: NO GREATER THAN 0.1 PERCENT AT FULL LOAD.
- g. EFFICIENCY: GREATER THAN 50 PERCENT.
- h. MOUNTING: DIN RAIL PREFERRED. PANEL-MOUNT ACCEPTABLE.
- i. PRIMARY PROTECTION: INTERNAL FUSE OR EXTERNAL SINGLE-POLE CIRCUIT BREAKER.
- j. SECONDARY PROTECTION: INTERNAL FUSE OR EXTERNAL SINGLE-POLE CIRCUIT BREAKER.
5. TERMINALS
- a. PROVIDE SINGLE-CIRCUIT FEED-THROUGH TERMINAL BLOCKS.
- a.1. MANUFACTURERS
- a.1.1. ALLEN-BRADLEY
- a.1.2. PHOENIX
- a.1.3. WEIDMULLER
- a.2. VOLTAGE RATING: 600 VOLTS AC/DC MAX
- a.3. DENSITY: 0.24 INCH WIDE OR 50 TERMINALS PER FOOT DENSITY. NO HIGH-DENSITY OR DOUBLE STACK TERMINALS ARE ALLOWED.
- a.4. MOUNTING: DIN RAIL ONLY
- a.5. CLAMP TYPE: SCREWS ONLY
- a.6. COLORS: GRAY OR BLACK FOR CONDUCTORS. GREEN OR YELLOW FOR ALL GROUNDS.
- a.7. MARKERS: ALL TERMINALS SHALL HAVE PRE-PRINTED SNAP-IN MARKERS FOR EACH TERMINAL. HANDWRITTEN MARKERS NOT ALLOWED.
- a.8. ACCESSORIES: ALL END BARRIERS, DIVIDERS, PARTITIONS, CENTER JUMPERS, AND SNAP-IN MARKERS BY THE SAME MANUFACTURER
6. CONTROL RELAYS
- b. MANUFACTURERS
- b.1. PHOENIX
- b.2. SQUARE-D
- b.3. ALLEN-BRADLEY
- c. MOUNTING: DIN RAIL ONLY
- d. RELAY RATING: 300 VOLTS, 10 AMP
- e. CONTACTS: DPDT
- f. COIL VOLTAGE: 120 VAC
- g. INDICATION: NEON INDICATION OF POWER ON COIL
- h. BASE: PLUG-IN DESIGN FOR EASY REPLACEMENT
7. ANALOG SIGNAL ISOLATION
- i. PROVIDE SIGNAL ISOLATION ON 4-20mA INPUTS
- j. MANUFACTURERS
- j.1. PHOENIX
- j.2. CABUR
- k. RATED MAXIMUM VOLTAGE: 30 VOLTS DC
- l. OPERATING CURRENT: 50 mA MAX
- m. MOUNTING: DIN RAIL ONLY
- n. TERMINALS: SCREWS ONLY
8. AC POWER SURGE PROTECTION
- a. PROVIDE SURGE PROTECTOR ON 120 V POWER FEEDS TO CONTROL SYSTEM PANELS.
- b. MANUFACTURERS
- b.1. TRANSISTECTOR
- b.2. PHOENIX
- b.3. WEIDMULLER
- c. VOLTAGE RATING: 140 VAC RMS MAXIMUM
- d. CLAMPING VOLTAGE: 145 VOLTS MAX
- e. MOUNTING: DIN RAIL MOUNTING ONLY
9. CIRCUIT BREAKERS
- a. PROVIDE SINGLE-POLE BREAKERS FOR ALL CONTROL SYSTEM PANELS.
- b. MANUFACTURERS
- b.1. ALLEN-BRADLEY
- b.2. SQUARE-D
- b.3. SIEMENS
- c. TYPE: "ENERGY LIMITING" THERMAL MAGNETIC
- d. VOLTAGE: 277V AC, 65V DC AT STANDARD TRIP CHARACTERISTICS
- e. MOUNTING: DIN RAIL ONLY
- f. CLAMP TYPE: SCREWS ONLY
- g. TRIP CHARACTERISTICS: STANDARD DUTY LOADS "G" TYPE OR 6-10 X LN MAXIMUM INRUSH CURRENT.
- h. APPROVALS: UL, CSA, VDE
10. FUSED TERMINALS
- a. PROVIDE SINGLE-FEED-THROUGH INDIVIDUALLY FUSED TERMINAL BLOCKS FOR CONTROL SYSTEM PANELS
- b. MANUFACTURERS
- b.1. ALLEN-BRADLEY
- b.2. PHOENIX
- b.3. WEIDMULLER
- c. VOLTAGE RATING: 300 VAC/DC MAX
- d. CURRENT RATING: 12A MAX
- e. DENSITY: 0.36 INCH WIDE. NO HIGH DENSITY OR DOUBLE STACKS ALLOWED
- f. MOUNTING: DIN RAIL ONLY
- g. CLAMP TYPE: SCREWS ONLY
- h. COLORS: BLACK
- i. IDENTIFICATION MARKERS: PRE-PRINTED FOR EACH TERMINAL. HANDWRITTEN MARKERS NOT ALLOWED.
- j. FUSE SIZE: 1/4 INCH BY 1-1/4 INCH GLASS 1A TIME-DELAY
- k. APPROVALS: UL, CSA

RENOVATION OF CLEARBROOK LIFT STATION

SPECIFICATIONS

|               |                |
|---------------|----------------|
| PROJECT NO:   | 60153682.0001  |
| CAD DWG FILE: | C:\JL\0004     |
| DESIGNED BY:  | IPC            |
| DRAWN BY:     | IPC            |
| DEPT CHECK:   | WCH            |
| PROJ CHECK:   | DMH            |
| DATE:         | SEPT. 17, 2014 |
| SCALE:        | N/A            |

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