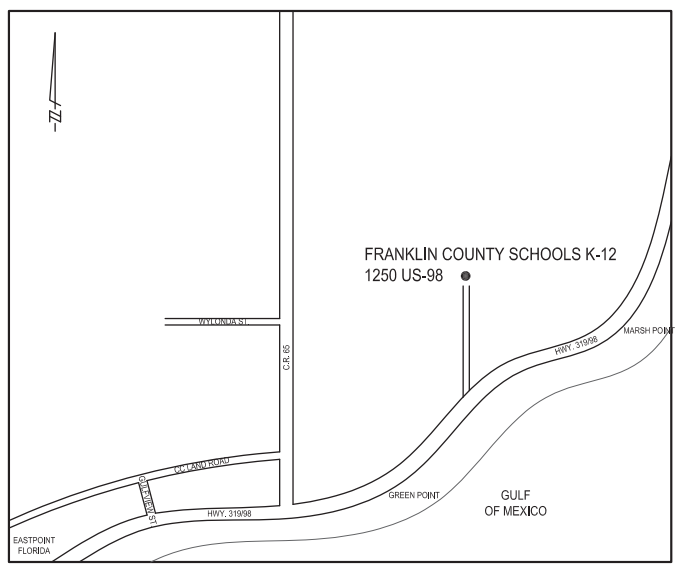
GUIDING STUDENTS TOWARD A BRIGHTER TOMORROW

FRANKLIN COUNTY SCHOOL DISTRICT
WELDING CLASSROOM ELECTRICAL EQUIPMENT

1250 HIGHWAY 98
EASTPOINT, FLORIDA 32328



CONSTRUCTION DOCUMENTS
SEPTEMBER 7, 2018

To the best of my knowledge these drawings and the project manual are complete, and comply with the State Requirements for Educational Facilities.

C. Kevin Fleming PE

McGinniss & Fleming
Engineering, Inc.

Mechanical • Electrical • Fire Protection • Plumbing
820 East Park Ave - Suite I-200
Tallahassee, Florida 32301

EB #05990

Index of Drawings:

Set No. _____

LEGEND

ABBREVIATIONS

AC	ABOVE CEILING, ABOVE CASEWORK, ALTERNATING CURRENT
AFF	ABOVE FINISHED FLOOR
BFC	BELOW FINISHED CEILING
CKT	CIRCUIT
EC	EMPTY CONDUIT (3/4" MINIMUM) WITH NYLON PULLWIRE
EM	EMERGENCY
EMCS	ENERGY MANAGEMENT CONTROL SYSTEM
ETR	EXISTING TO REMAIN
EX	EXISTING
FA	FIRE ALARM
GFI	GROUND FAULT INTERRUPTER
IC	INTERCOM
J	JUNCTION
PNL	PANEL
R	RELAY
REF	REFRIGERATOR
SC	SPEED CONTROL
T	TRANSFORMER, THERMOSTAT
VSD	VARIABLE SPEED DRIVE
WP	WEATHERPROOF (NEMA 3R)

LIGHTING CONTROLS

- S — FLUSH TYPE, 20A, 120/277V AC ONLY, QUIET TYPE, SINGLE POLE SWITCH
- S_3 — FLUSH TYPE, 20A, 120/277V AC ONLY, QUIET TYPE, 3 WAY SWITCH

CONTROLS & MECHANICAL EQUIPMENT

- N3R 30A — DISCONNECT SWITCH, NON-FUSIBLE, SIZE AND NEMA TYPE AS NOTED.
- N3R 30A — DISCONNECT SWITCH, FUSIBLE, SIZE AND NEMA TYPE AS NOTED, FUSE AS NOTED OR PER MANUFACTURER'S RECOMMENDATION FOR EQUIPMENT SERVED, NON-FUSED SWITCH MAY BE USED IF UNIT IS UL TESTED WITH BREAKER PROTECTION
- R — RELAY - RATING AS SHOWN
- R — RELAY - CONFIGURATION AND COIL VOLTAGE AS INDICATED
- CONTACTOR - NORMALLY OPEN
- CONTACTOR - NORMALLY CLOSED
- EO — EMERGENCY OFF SWITCH

POWER, PANELS & POWER EQUIPMENT

- PANELBOARD 208 VOLT - SURFACE MOUNTED - SEE PANELBOARD SCHEDULE
- POWER DISTRIBUTION PANEL OR 480 VOLT - SEE PANELBOARD SCHEDULE
- MOLDED CASE CIRCUIT BREAKER
- 15 — STEP DOWN, DRY-TYPE TRANSFORMER - 15KVA INDICATED.
- TVSS — TRANSIENT AND VOLTAGE SURGE PROTECTION DEVICE
- SA — SURGE ARRESTOR

CEILING OUTLETS

- LIGHTING FIXTURE - MOUNTING AND TYPE AS SHOWN IN FIXTURE SCHEDULE. SEE SCHEDULE FOR SPECIFIC REQUIREMENTS.

WALL OUTLETS

- EMERGENCY LIGHT WITH BATTERY BACKUP
- DUPLEX RECEPTACLE, 20A, 125V, 2 POLE, 3 WIRE, MOUNT 4'-0" AFF, NEMA 5-20R.
- DOUBLE DUPLEX RECEPTACLE, 20A, 125V, 2 POLE, 3 WIRE,MOUNT 4'-0"AFF, NEMA 5-20R.
- WP — DUPLEX RECEPTACLE, 20A, 125V, 2 POLE, 3 WIRE, WITH WEATHERPROOF-IN-USE COVER
- GFI — DUPLEX RECEPTACLE, 20A, 125V, 2 POLE, 3 WIRE, WITH GROUND FAULT INTERRUPTER. MOUNT 4'-0" AFF
- 5-30 — SPECIAL RECEPTACLE - NEMA CONFIGURATION AS SHOWN ON FLOOR PLANS OR IN EQUIPMENT SCHEDULE - SHOWN NEMA 5-30R.

HOMERUNS TO PANELS

- ARROW INDICATES CIRCUIT HOMERUNS IN CONDUIT
- LPA-2,4 — INDICATES HOMERUN TO CIRCUIT NUMBERS 2 & 4 IN PANEL "LPA"

NOTE:
NUMBER OF HOMERUNS SHOWN ON THE PLANS ARE THE NUMBER OF HOMERUNS REQUIRED. DO NOT RUN MORE THAN THREE HOMERUNS IN ONE CONDUIT. DO NOT RUN 2 CIRCUITS ON THE SAME PHASE IN ONE CONDUIT.

- CONDUIT STUBBED OUT ABOVE CEILING OR AS NOTED - PROVIDE BUSHING ON CONDUIT END.
- INDICATES CONTINUATION OF RUN SHOWN ON ANOTHER PLAN VIEW

CIRCUITING AND BRANCH CIRCUITS

- CIRCUITS SHOWN L2A-3 INDICATES 1 #12 PHASE CONDUCTOR, 1 #12 NEUTRAL & 1 #12 GND - 3/4" C. TO 20 AMP, 1 POLE BREAKER ON CIRCUIT No. 3, IN PANEL L2A.
- L2A-2,4 — INDICATES 2 #12 PHASE CONDUCTORS, 1 #12 NEUTRAL & 1 #12 GND - 3/4" C. TO 20 AMP, 1 POLE BREAKER ON CIRCUIT No.'s 2 & 4 IN PANEL "L2A".
- L2A-2,4,6 — INDICATES 3 #12 PHASE CONDUCTORS, 1 #12 NEUTRAL & 1 #12 GND - 3/4" C, TO 20 AMP 1 POLE BREAKERS ON CIRCUIT No,'S 2,4,6, IN PANEL "L2A" ETC.
- 10'S — INDICATES ALL CONDUCTORS ARE TO BE MINIMUM #10 GAUGE, CONDUIT PER NEC OR AS INDICATED.
- SHORTER TICKMARKS INDICATE 2 OR MORE PHASE CONDUCTORS, OR SWITCH LEGS
- LONGER TICKMARKS INDICATE GROUNDED CONDUCTOR(S), QUANTITY AS SHOWN.

NEUTRALS SHALL NOT BE SMALLER SIZE THAN PHASE CONDUCTORS UNLESS SPECIFICALLY INDICATED OTHERWISE.

INSULATED GROUNDING CONDUCTORS SHALL BE USED IN ALL CIRCUITS, SIZED IN ACCORDANCE WITH NEC ARTICLE 250.

2-#12, 1-#12 GROUND SHALL BE RUN IN 1/2" CONDUIT. 4 OR MORE #12 CONDUCTORS SHALL BE RUN IN 3/4" C, OR AS REQUIRED BY NEC. LARGER THAN #12 CONDUCTORS SHALL BE RUN IN CONDUIT SIZED IN ACCORDANCE WITH NEC.

- CONCEALED OVERHEAD OR IN WALLS.
- CONCEALED IN OR BELOW FLOORS OR GRADE.
- EXPOSED SURFACE MOUNTED METAL RACEWAY.

GROUNDING

- G-Z — 3/4" X 10'-0" GROUND ROD.

JUNCTION BOXES AND OUTLETS

- J — JUNCTION BOX IN OR ABOVE CEILING
- J — JUNCTION BOX IN WALL - MOUNT 1'-6" UNLESS NOTED OTHERWISE.

SCOPE OF WORK

1. FURNISH ALL LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS REQUIRED TO COMPLETE ALL ELECTRICAL WORK AS SHOWN ON THE CONTRACT DRAWINGS.
2. THIS SHALL INCLUDE THE INSTALLATION OF A COMPLETE AND PROPERLY OPERATING ELECTRICAL SYSTEM. THIS SYSTEM REQUIRED CONSISTS BASICALLY OF, AND IS NOT LIMITED TO, THE FOLLOWING:
   - EXTEND THE DISTRIBUTION SYSTEM FOR POWER INCLUDING THE NECESSARY SERVICE ENTRANCE FEEDERS, BRANCH CIRCUITS, INSTALLATION OF AND CONNECTION TO DEVICES, PANELBOARDS, TRANSFORMERS, SWITCHES, AND ALL OTHER EQUIPMENT SHOWN, AND THE CONNECTION TO OTHER POWER LOADS THAT ARE EXISTING OR NEW.
   - EXTEND THE BUILDING GROUND SYSTEM AND PROVIDE SPECIAL GROUNDS AS INDICATED.
   - INSTALL OWNER FURNISHED CONDUCTORS FOR ALL CONTROL AND ANNUNCIATING DEVICES AS INDICATED ON THESE DRAWINGS.
3. THE BIDDER SHALL INSPECT THE PRESENT JOBSITE CONDITIONS BEFORE PREPARING HIS BID. THE SUBMISSION OF A BID WILL BE CONSIDERED EVIDENCE THAT SUCH A VISIT AND INSPECTION WAS PERFORMED BY THE BIDDER AND THAT HE TAKES FULL RESPONSIBILITY FOR ALL FACTORS GOVERNING HIS WORK.
4. THE ELECTRICAL WORK SHALL BE COMPLETE, FULLY OPERATIONAL, AND SUITABLE IN EVERY WAY FOR THE SERVICE REQUIRED. DRAWINGS ARE GENERALLY DIAGRAMMATIC IN NATURE AND DO NOT SHOW ALL DETAILS, DEVICES AND INCIDENTAL MATERIALS NECESSARY TO ACCOMPLISH THEIR INTENT. THEREFORE, IT SHALL BE UNDERSTOOD THAT SUCH DEVICES AND INCIDENTAL MATERIALS REQUIRED SHALL BE FURNISHED AT NO COST TO THE OWNER.

GENERAL NOTES

1. ALL WORK SHALL CONFORM TO THE NATIONAL ELECTRICAL CODE (NEC) NFPA-70 (2014), AND THE FLORIDA BUILDING CODE 6 th EDITION (2017).
2. ALL CONDUCTORS SHALL BE INSTALLED IN METAL CONDUIT OR TUBING. CONDUIT FOR BURIAL IN SOIL OR UNDER CONCRETE SHALL BE PLASTIC. FLEXIBLE CONDUIT INSTALLED OUT-OF-DOORS, IN ANY MECHANICAL EQUIPMENT ROOM, OR IN NORMALLY WET AREAS, SHALL BE LIQUID TIGHT FLEX WITH SUITABLE FITTINGS.
3. CONDUIT SHALL BE RUN PARALLEL AND PERPENDICULAR TO WALLS, JOISTS AND SUPPORTS.
4. BRANCH CIRCUITS AND HOMERUNS SHALL BE #12 WIRE AND 3/4" CONDUIT MINIMUM. EVERY CONDUIT SHALL HAVE A GREEN GROUND WIRE (#12 MINIMUM).
5. NO MORE THAN 3 PHASE CONDUCTORS SHALL BE INSTALLED IN ONE CONDUIT UNLESS NOTED OTHERWISE.
6. PROVIDE BARRIERS BETWEEN ALL 277V SWITCHES MOUNTED UNDER THE SAME COVER PLATE WITH OTHER 277V SWITCHES ON DIFFERENT PHASES OR WITH 120V SWITCHES.
7. MAINTAIN NEC MINIMUM CLEARANCE IN FRONT OF ALL SAFETY SWITCHES AND PANELBOARDS.
8. ALL UNDERGROUND CONDUIT RUNS SHALL BE SEALED TO PREVENT THE ENTRANCE OF MOISTURE AND GASES.
9. CONDUIT FOR LIGHTING AND OTHER CIRCUITS SHALL BE RAN OVERHEAD UNLESS NOTED OTHERWISE.
10. WHERE RECEPTACLES ARE INDICATED TO BE EQUIPPED WITH GROUND FAULT INTERRUPTING CIRCUITRY, IT SHALL BE INTEGRAL TO THE DEVICE AND HAVE A TEST/RESET MECHANISM INTEGRAL WITH THE DEVICE. REMOTE TEST/RESET OR THE INTERWIRING OF ADDITIONAL RECEPTACLES UTILIZING GF SENSING OF A SINGLE RECEPTACLE IS NOT ACCEPTABLE.

LIGHTING FIXTURE SCHEDULE

FIXTURE MARK	MOUNTING	LAMPS NO.	LAMPS WATTS	LAMPS TYPE	LAMPS LUMENS	DESCRIPTION
EM1	SURFACE 8'-0" AFF	2	25	MR-16 HALOGEN	-	EMERGENCY BATTERY PACK, WHITE POWDERCOAT LOW PROFILE HOUSING, GALVANIZED STEEL BACK ENCLOSURE. TWO ADJUSTABLE HALOGEN LIGHTING UNITS, SELF DIAGNOSTICS, BROWN OUT PROTECTION, TEST SWITCH, 12 VOLT OPERATION. DAMP LOCATION. 120/277 VOLT. (GUIDE: CHLORIDE C4125LW2M7FDL)
FVT	SURFACE	-	29	LIGHT EMMITTING DIODE 5000'K	5100	4' LED VAPOR-TIGHT WRAP, NARROW PROFILE. GRAY OR WHITE INJECTION MOLDED CORROSION-FREE PLASTIC HOUSING WITH CHAIN HANGER KIT AND CABLE CONNECTOR. CLEANABLE ACRYLIC GASKETED LENS. HIGH PERFORMANCE DRIVER. 120/277 VOLT. (GUIDE: PHILLIPS DWA E 51 L 850 4 UNV)

LIGHTING FIXTURE SCHEDULE NOTES

1. ALL FIXTURES AND ACCESSORIES ARE TO BE SUITABLE FOR OUTDOOR USE AND LISTED.
2. SUPPORT FIXTURES FROM THE STRUCTURE.
3. ALL EXIT SIGNAGE AND EMERGENCY UNIT EQUIPMENT SHALL BE SUITABLE FOR OPERATION AT 120 OR 277 VOLTS.
4. MOUNTING HEIGHTS INDICATED ARE ABOVE FINISHED FLOOR UNLESS NOTED OTHERWISE.

LOAD / REMARKS	CIR. NO.	BREAKERS AMPS	BREAKERS POLES	H.P. OR K.W.	AMPS PER PHASE LIGHTING ØA	LIGHTING ØB	LIGHTING ØC	GEN. RECEPT. ØA	GEN. RECEPT. ØB	GEN. RECEPT. ØC	SPECIAL ØA	SPECIAL ØB	SPECIAL ØC	H.P. OR K.W.	BREAKERS AMPS	BREAKERS POLES	CIR. NO.	LOAD / REMARKS
SPARE	1	20	1	-	-			1,5			-			-	20	1	2	GENERAL PURPOSE RECEPTACLE
SPARE	3	20	1	-		-			-			-		-	20	1	4	SPARE
SPARE	5	20	1	-			-			-			-	-	20	1	6	SPARE
SPARE	7	20	1	-	-			-			-			-	20	1	8	SPARE
SPARE	9	20	1	-		-			-			-		-	20	1	10	SPARE
SPARE	11	20	1	-			-			-			-	-	20	1	12	SPARE
SPARE	13	20	1	-	-			-			-			-	-	-	14	-
SPARE	15	20	1	-		-			-			-		-	-	-	16	-
SPARE	17	20	1	-			-			-			52	-	60	2	18	TIG WELDER
SPARE	19	20	1	-	-			-			52			-	-	-	20	-
SPARE	21	20	1	-		-			-			52		-	60	2	22	TIG WELDER
SPARE	23	20	1	-			-			-			52	-	-	-	24	-
SPARE	25	20	1	-	-			-			-			-	20	3	26	SURGE PROTECTION DEVICE
SPARE	27	20	1	-		-			-			-		-	-	-	28	-
SPARE	29	20	1	-			-			-			-	-	-	-	30	-
-	31	-	-	-	-			-			-			-	-	-	32	-
-	33	-	-	-		-			-			-		-	-	-	34	-
-	35	-	-	-			-			-			-	-	-	-	36	-
-	37	-	-	-	-			-			-			-	-	-	38	-
-	39	-	-	-		-			-			-		-	-	-	40	-
-	41	-	-	-			-			-			-	-	-	-	42	-
TOTAL CONNECTED LOAD (AMPS)				-	-	-	2	-	-	52	52	104	TOTAL CONNECTED LOAD (AMPS)					

PANELBOARD SCHEDULE

FRANKLIN COUNTY SCHOOLS
Eastpoint, Florida

Panel N2
Location WELDING SHELTER
Service 3 Phase 4 Wire
■ 208Y/120V
☐ 480Y/277V
Main Bkr. 175 A 3 P
Lugs Only — A
10,000 AIC Min. at 240 Volts 60 Hz.

■ Surface mounted panel
☐ Flush mounted panel
☐ 200% Neutral Bar

Remarks
NEMA 3R ENCLOSURE

LOAD / REMARKS	CIR. NO.	BREAKERS AMPS	BREAKERS POLES	H.P. OR K.W.	AMPS PER PHASE LIGHTING ØA	LIGHTING ØB	LIGHTING ØC	GEN. RECEPT. ØA	GEN. RECEPT. ØB	GEN. RECEPT. ØC	SPECIAL ØA	SPECIAL ØB	SPECIAL ØC	H.P. OR K.W.	BREAKERS AMPS	BREAKERS POLES	CIR. NO.	LOAD / REMARKS
SPARE	1	20	1	-		3,6			-			-		-	20	1	2	LIGHTS
SPARE	3	20	1	-			3,6			-			-	-	20	1	4	LIGHTS
SPARE	5	20	1	-	-			-			-			-	20	1	6	SHUNT TRIP CIRCUIT
PLASMA CUTTER (S)	7	15	3	-		-			9			-		-	20	3	8	SURGE PROTECTION DEVICE
-	9	-	-	-	-			9			-			-	-	-	10	-
-	11	-	-	-		-			9			-		-	-	-	12	-
-	13	-	-	-	-			2			23			-	70	3	14	45 KVA TRANSFORMER (S)
WELDING PAK RECEPTACLE (S)	15	90	3	-		-			68			25		-	-	-	16	
-	17	-	-	-	-			68			45			-	-	-	18	
-	19	-	-	-		-			-			-		-	-	-	20	
-	21	-	-	-	-			-			-			-	-	-	22	-
WELDING PAK RECEPTACLE (S)	23	90	3	-		-			68			-		-	-	-	24	-
-	25	-	-	-	-			68			-			-	-	-	26	-
-	27	-	-	-		-			68			-		-	-	-	28	-
-	29	-	-	-	-			-			-			-	-	-	30	-
WELDING PAK RECEPTACLE (S)	31	90	3	-		-			68			-		-	-	-	32	-
-	33	-	-	-	-			68			-			-	-	-	34	-
-	35	-	-	-		-			68			-		-	-	-	36	-
-	37	-	-	-	-			-			-			-	-	-	38	-
-	39	-	-	-		-			-			-		-	-	-	40	-
-	41	-	-	-			-			-			-	-	-	-	42	-
TOTAL CONNECTED LOAD (AMPS)				4	4	-	2	-	-	236	236	258	TOTAL CONNECTED LOAD (AMPS)					

PANELBOARD SCHEDULE

FRANKLIN COUNTY SCHOOLS
Eastpoint, Florida

Panel N4
Location WELDING SHELTER
Service 3 Phase 4 Wire
☐ 208Y/120V
■ 480Y/277V
Main Bkr. — A — P
Lugs Only 400 A
25,000 AIC Min. at 480 Volts 60 Hz.

■ Surface mounted panel
☐ Flush mounted panel
☐ 200% Neutral Bar

Remarks
NEMA 3R ENCLOSURE.
(S) DENOTES CIRCUIT BREAKER WITH INTEGRAL SHUNTING MECHANISM

Franklin County District Schools

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Mechanical · Electrical · Fire Protection · Plumbing
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Tallahassee, Florida 32301
EB #03990

FRANKLIN COUNTY
SCHOOL DISTRICT
WELDING CLASSROOM
ELECTRICAL EQUIPMENT

1250 Highway 98
Eastpoint, Florida 32328

DATE:
SEPTEMBER 7, 2018

REVISED:
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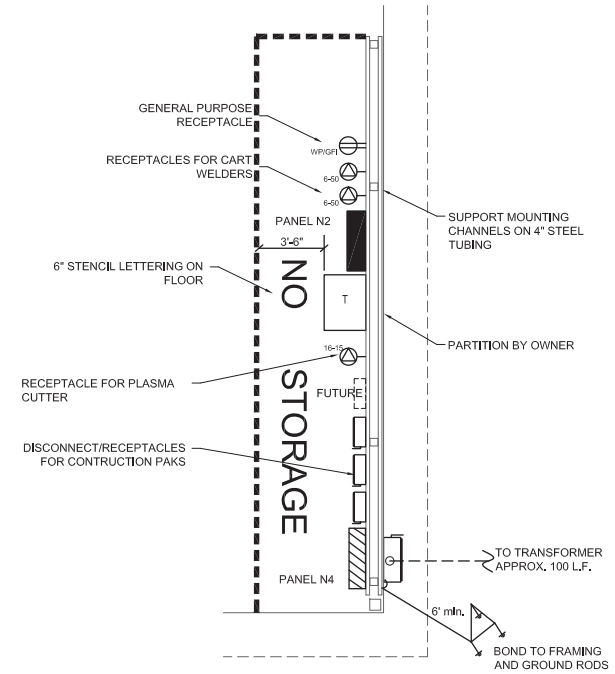
DESIGNED BY: CKF
DRAWN BY: TEB

SUBMITTAL:
CONSTRUCTION DOCUMENTS

SHEET TITLE:
ELECTRICAL
LEGEND, NOTES
AND SCHEDULES

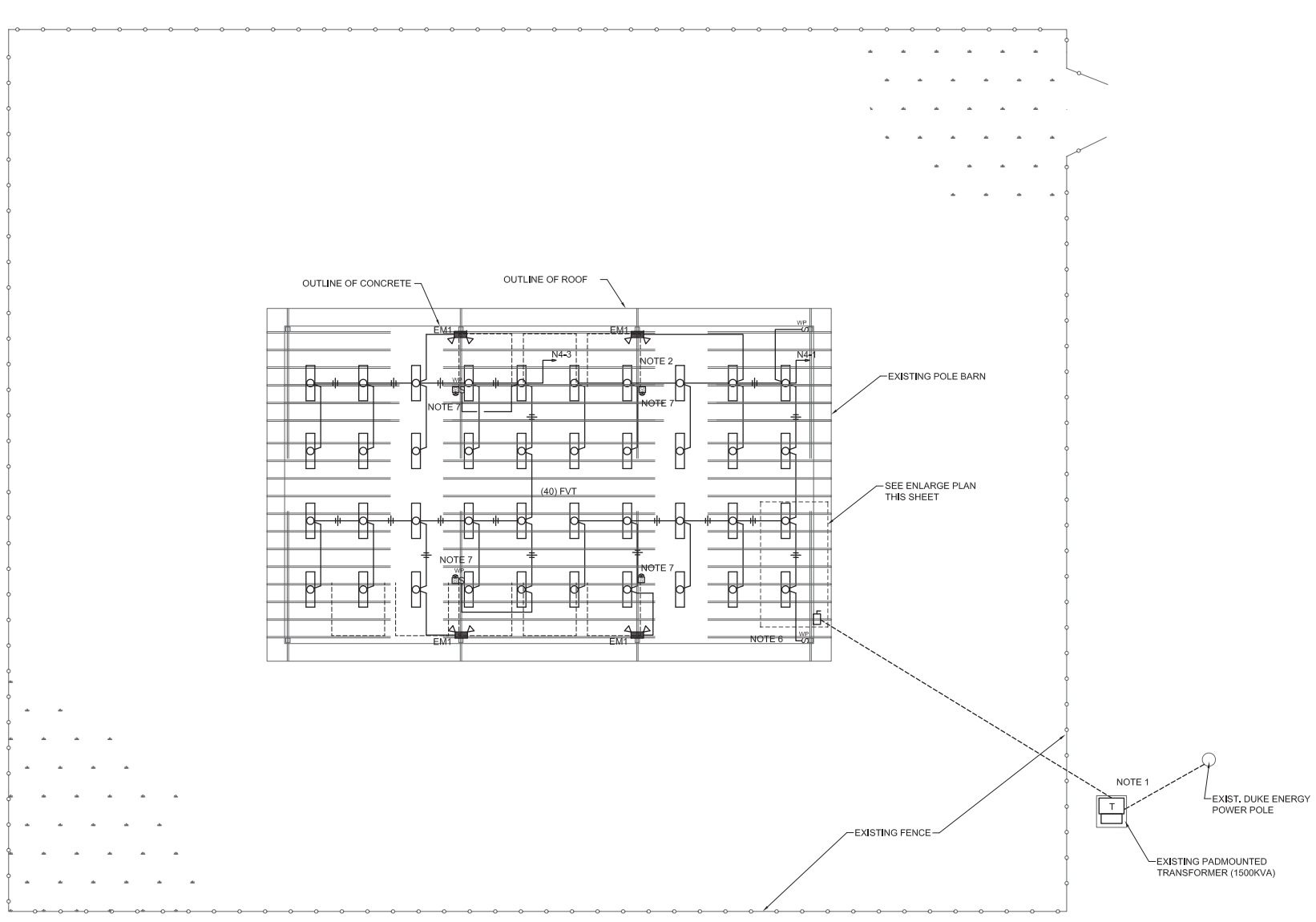
SHEET:
E1.0

JOB NUMBER:
2018-18



ENLARGE AREA SHOWING ELECTRICAL EQUIPMENT

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



WELDING CLASSROOM - ELECTRICAL PLAN

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

NOTES

1. COORDINATE ALL UTILITY SERVICE WORK WITH DUKE ENERGY. ALL SERVICE WORK SHALL COMPLY WITH DUKE ENERGY SERVICE REQUIREMENTS MANUAL, FLORIDA EDITION. NOTIFY ONE WEEK PRIOR TO NEED FOR UTILITY CONNECTION. DEWAYNE BUTLER 850-818-1979.
2. CONTRACTOR SHALL EXCAVATE FOR SERVICE FEEDER INSTALLATION INCLUDING UNDEREXCAVATION OF TRANSFORMER SECONDARY COMPARTMENT.
3. PROVIDE 5' MINIMUM CABLE IN TRANSFORMER SECONDARY COMPARTMENT. FINAL CONNECTION TO TRANSFORMER BY DUKE ENERGY. REQUIRED OUTAGE SHALL BE SCHEDULED WITH OWNER AND SHALL BE AFTER HOURS.
4. COMPACT BACKFILL AND RESTORE ANY TRENCHING REQUIRED. PROVIDE LOCATES IN ACCORDANCE WITH STATE REQUIREMENTS BEFORE BEGINNING WORK.
5. ALL METAL CHANNEL, HARDWARE AND CONNECTORS SHALL BE GALVANIZED STEEL. ALL EQUIPMENT SHALL BE WEATHERTIGHT, NEMA 3R MINIMUM.
6. INSTALL EMERGENCY FIXTURES TO SUPPORT COLUMNS
7. INSTALL LIGHTING CONTROLS AND EMERGENCY OFF SWITCHES TO OUTER STRUCTURE OF INSTRUCTION BOOTH. OWNER WILL PROVIDE PLATE STEEL MOUNTING PAD FOR DEVICES. USE WATERTIGHT FLEX EXTENSION TO BOXES, ATTACHED TO STRUCTURE TUBING.

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FRANKLIN COUNTY
SCHOOL DISTRICT
WELDING CLASSROOM
ELECTRICAL EQUIPMENT

1250 Highway 98
Eastpoint, Florida 32328

DATE:
SEPTEMBER 7, 2018

REVISED:
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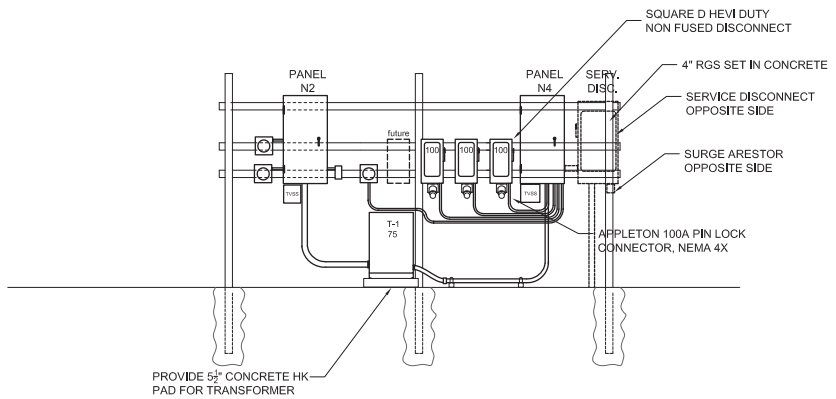
DESIGNED BY:	DRAWN BY:
CKF	TEB

SUBMITTAL:
CONSTRUCTION DOCUMENTS

SHEET TITLE:
ELECTRICAL
NEW WORK PLAN

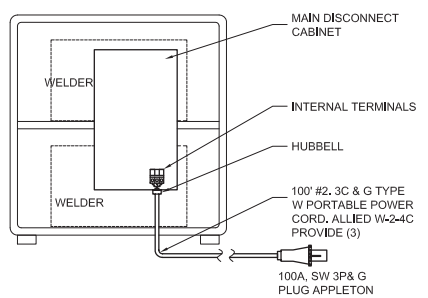
SHEET:
E2.0

JOB NUMBER:
2018-18



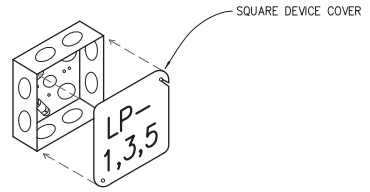
PORTABLE WELDER SUPPLY/DISCONNECT

NOT TO SCALE



CONNECTION AT LINCOLN WELDER PACK

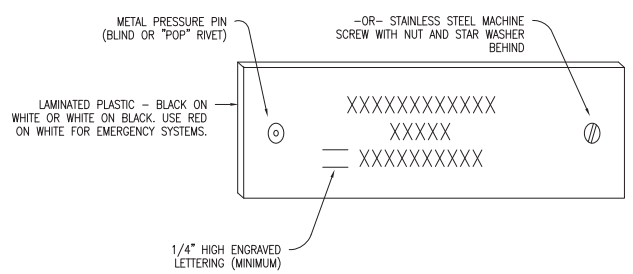
NOT TO SCALE



JUNCTION BOX IDENTIFICATION: EACH JUNCTION BOX COVER SHALL BE LABELED WITH A PERMANENT "MAGIC" MARKER OR OTHER MEANS TO IDENTIFY THE CIRCUITS WITHIN. FOR EXAMPLE, A JUNCTION BOX CONTAINING LIGHTING CIRCUITS 21, 23, 25 FROM PANEL L2A WOULD BE LABELED "L2A–21,23,25".

ALL RACEWAYS LEAVING THE SERVICE ENTRANCE PANEL AND DISTRIBUTION PANELS SHALL BE CLEARLY MARKED AS TO THEIR CIRCUIT NUMBER. FOR EXAMPLE, A CONDUIT CONTAINING CONDUCTORS FOR PANEL MDP, CIRCUIT NO. 5 WOULD BE MARKED MDP–5. EMPTY CONDUITS SHALL BE MARKED "EMPTY".

ALL ENCLOSURES CONTAINING ENERGIZED COMPONENTS SHALL BE MARKED WITH MYLAR LABELS IDENTIFYING HAZARDS. SUCH WARNING MESSAGES AS "WARNING–HAZARDOUS VOLTAGE", "480 VOLTS", "240 VOLTS", ETC. ARE ACCEPTABLE.



EQUIPMENT IDENTIFICATION SHALL BE MADE USING ENGRAVED LAMINATED PLASTIC PLATES (INDENTED TAPE LABELS WILL NOT BE PERMITTED). CHARACTERS SHALL BE WHITE ON A BLACK BACKGROUND AND 1/4" HIGH MINIMUM. PLATES SHALL BE SECURED TO THE PANELS BY MEANS OF SCREWS OR METAL PRESSURE PINS. CEMENT, BY ITSELF, WILL NOT BE ACCEPTABLE. ALL NAMEPLATES SHALL BE MOUNTED ON THE OUTSIDE SURFACE OF THE PIECE OF EQUIPMENT.

SERVICE ENTRANCE PANEL AND DISTRIBUTION PANELS SHALL HAVE EACH CIRCUIT IDENTIFIED AS TO CIRCUIT NUMBER, LOAD, AND ELECTRICAL CHARACTERISTICS OF LOAD. FOR EXAMPLE, A 5 HP, 208 VOLT, 3 PHASE HOT WATER PUMP NUMBER 6 FEED FROM PANEL MDP, CIRCUIT NO. 4 WOULD BE LABELED AS FOLLOWS WITH THE PLATE ATTACHED ADJACENT TO THE CIRCUIT:

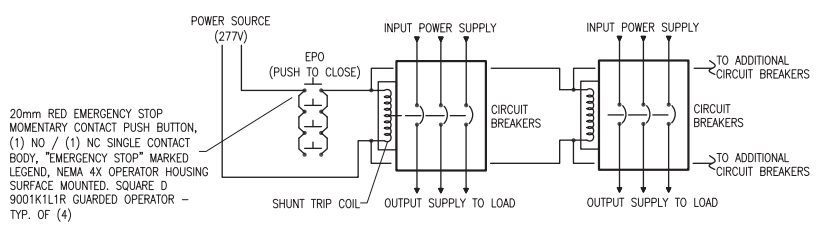
MDP–4
HWP–6
5 HP, 208V, 3ø

DISTRIBUTION PANELS, PANELBOARDS, AND TRANSFORMERS SHALL BE IDENTIFIED INDICATING PANEL DESIGNATION FROM THE DRAWINGS, ELECTRICAL CHARACTERISTICS AND SOURCE. FOR EXAMPLE, A 277/480 VOLT 3 PHASE PANEL "LPA" FEED FROM "MDP" CIRCUIT NO. 3 SHALL BE LABELED AS FOLLOWS:

PANEL LP–A
277/480V, 3ø
(FEEDER: MDP–3)

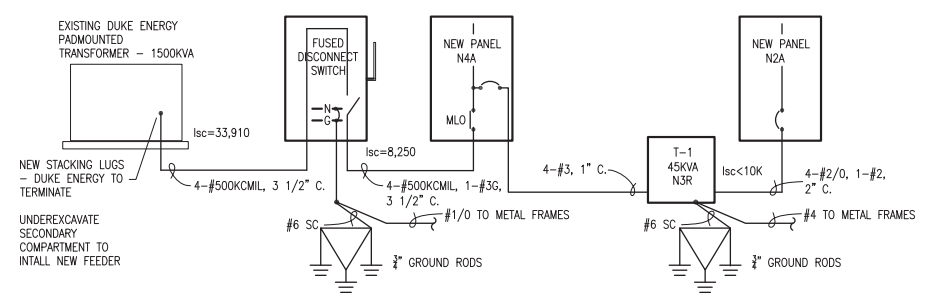
NAMEPLATE DETAILS

NO SCALE



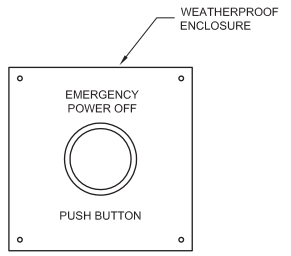
SHUNT TRIP WIRING DIAGRAM

NO SCALE



POWER ONE–LINE DIAGRAM

NO SCALE



NOTES:
- WEATHERPROOF SWITCH
- RED LETTERING ON WHITE BACKGROUND
- RED MOMENTARY SWITCH RATED FOR 600V

EMERGENCY POWER OFF SWITCH

NOT TO SCALE

McGinniss & Fleming
Engineering, Inc.

Mechanical · Electrical · Fire Protection · Plumbing

820 East Park Ave - Suite I-200
Tallahassee, Florida 32301 *EB #03990*

FRANKLIN COUNTY
SCHOOL DISTRICT
WELDING CLASSROOM
ELECTRICAL EQUIPMENT

1250 Highway 98
Eastpoint, Florida 32328

DATE:
SEPTEMBER 7, 2018

REVISED:
.
.
.

DESIGNED BY:	DRAWN BY:
CKF	TEB

SUBMITTAL:
CONSTRUCTION DOCUMENTS

SHEET TITLE:
ELECTRICAL
DETAILS

SHEET:
E3.0

JOB NUMBER:
2018-18

BASIC MATERIALS AND METHODS

PART 1 - GENERAL

SCOPE OF WORK

Furnish all labor, materials and equipment and incidentals required to construct and install the complete electrical systems as indicated on the Drawings and as specified in this Section.

STANDARD OF MATERIALS

All materials, equipment and apparatus covered by this specification shall be new, of current manufacture and shall bear the seal of approval of the Underwriters' Laboratories.

All equipment and materials shall have ratings established by a recognized independent agency or laboratory. The Contractor shall apply the items used on this project within the ratings and subject to any stipulations or exceptions established by the independent agency or laboratory.

All conduits and raceways, wire, devices, panelboards, switches, etc., of a given type shall be the product of one manufacturer.

SUBMITTALS

Manufacturer's data and shop drawings for all components, fixtures, assemblies and accessories indicated in this Division.

PART 2 - PRODUCTS

RIGID CONDUIT, TUBING AND FITTINGS

Rigid steel conduit: zinc coated, threaded type conforming to the requirements of UL 6 and ANSI C80.1 standards. Zinc coating shall be applied to both inner and outer surfaces.

A fitted thread protector shall protect threaded ends from damage during shipment and handling.

Fittings for rigid steel conduit: zinc coated, threaded type, conforming to Federal Specification W-F-408.

Electrical Metallic Tubing (EMT): UL 797 and ANSI C80.3 standards.

Fittings for electrical metallic tubing: Federal Specification W-F-408. Steel compression type, galvanized or cadmium plated, and suitable for location of installation. Conduit bushings shall be metallic with insulated throats. Insulating grounding type bushings shall be provided where required under "Grounding". EMT connectors shall be similar to T&B "Insuline" with completely insulated throats. Field applied insulated throats are not acceptable.

Acceptable Metal Conduit and Tubing Manufacturers:

EMT: Allied Tube & Conduit Co.
Wheatland Tube Co.
Triangle PWC, Inc.

Fittings: Steel City
Thomas & Betts (T&B)
Raco Inc.

FLEXIBLE METAL CONDUIT, COUPLINGS AND FITTINGS

Flexible metal conduit for damp or exterior applications: liquid tight, UL listed, spiral wound galvanized steel with PVC outer jacket.

Fittings for liquid tight conduit: Federal Specification W-F-406. Provide cadmium plated, malleable iron fittings with compression type steel ferrule and gasket sealing rings and insulated throats.

Acceptable Metal Conduit and Fittings Manufacturers:

FMC: Allex Corp.
American Flexible Conduit Co.
Anaconda Metal Hose, ANAMET Inc.

Fittings: Steel City
Thomas & Betts (T&B)
Raco Inc.

CONDUIT MOUNTING EQUIPMENT

Hangers, rods, backplates, beam clamps etc. shall be hot-dipped galvanized iron or steel. They shall be as manufactured by the Appleton Electric Co., Thomas and Betts Co., Unistrut Corp., or approved equal.

JUNCTION BOXES

Sheet Steel Outlet Boxes: conform to UL 514A, "Metallic Outlet Boxes, Electrical", UL 514B, "Fittings for Conduit and Outlet Boxes, Covers, and Box Supports", and NEMA OS1, "Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports".

Sheet Steel: Flat-rolled, code gauge galvanized steel.

Acceptable Manufacturers: Sheet-steel boxes shall be manufactured by RACO, Steel City or equal.

All junction boxes and pull boxes shall be sized per NEC requirements and be of the proper NEMA classification for the locations where they are installed.

LOCATION OF OUTLETS

The approximate locations of outlets, etc. are shown on the drawings. The exact locations shall be determined at the building.

It is the responsibility of the Contractor to note the locations and heights of obstructions before the installation of outlets.

CONDUCTORS

Compliance: Provide wires, cables and connectors that comply with the following standards as applicable:

UL Standard 83 Thermoplastic Insulated Wires and Cables
UL Standard 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors
NEMA/ICEA WC-5 Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
IEEE Standard 82 Test procedures for Impulse Voltage Tests on Insulated Conductors

Wire and cable manufactured more than twelve months before delivery to the jobsite shall not be used.

All conductors shall be soft-drawn copper of not less than ninety-eight percent (98%) conductivity, with NEC Type THHN or THWN for No. 4 and smaller, and Type THWN for No. 2 and larger, 600 volt insulation.

Jackets: Factory applied nylon or PVC external jacketed wires and cables for installation in raceways and where indicated.

Color coding of all ungrounded service, feeder, and branch circuits conductors shall be required according to the following convention:

120/208 Volt, 3 phase: black, red, and blue
277/480 Volt, 3 phase: brown, orange, and yellow

Ground wires shall be green and neutrals shall be white. Isolated grounding conductors shall be green with yellow stripe or green with applied yellow tape to indicate isolated ground. Green and white shall be used for these purposes only. Where grounded conductors of different systems are installed in the same raceway, box, auxiliary gutter, or other type of enclosure, each grounded conductor shall be individually identified by system. Additional grounded conductors shall be white with a readily distinguishable colored stripe, other than green, running along the insulation.

Conductors No. 12 AWG through No. 10 AWG shall be solid and No. 8 AWG and larger shall be stranded. No conductors smaller than No. 12 AWG shall be used except as otherwise noted.

Acceptable manufacturers: Anaconda Wire and Cable Co., General Electric Co., Okonite Co., Southwire Co., or Rome Cable Co.

CABLE AND WIRE SPLICES

General: the materials shall be compatible with the conductors, insulations and protective jackets of the respective cables and wires. Use connectors with ampacity and temperature ratings equal to or greater than those of the wires upon which used.

Connectors: UL 486A. Aluminum and aluminum alloy fittings will not be accepted.

Conductor Sizes No. 6 AWG and Larger: Splices in conductors shall be made with copper, long barrel compression sleeves with cold shrink insulation.

Conductor Sizes No. 8 AWG and Smaller: Wire nuts secured with electrical tape.

WIRE AND CABLE MARKERS

Wire and cable markers shall be "Omni-Grip" as manufactured by Brady Worldwide, Inc., or equal.

Wire and cables with diameters exceeding the capacity of the "Omni-Grip" shall be marked with pre-printed, self-adhesive vinyl tapes as manufactured by Brady Worldwide, Inc., 3M Co., or equal.

GROUNDING AND BONDING

Conductors: type THHN/THWN to match power supply wiring.

PANELBOARDS

Compliance: NFPA 70 National Electrical Code, UL 67, "Electric Panelboards", NEMA Publication PB1, "Panelboards", Federal W-P-115a Type 1, Class 1 specifications and NEMA PB 1.1, "Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less".

Provide factory assembled panelboards in sizes and rating as indicated. Panelboards shall be UL listed and labeled.

Acceptable manufacturers: panelboards shown on the drawings shall be manufactured by Cutler-Hammer, Square D, or Siemens.

Provide dead front safety type lighting and appliance panelboards as indicated, with panelboard switching and protective devices in quantities, ratings, types, and with arrangement shown; with anti-turn solderless pressure type main lug connectors approved for use with copper conductors.

Refer to the drawings to determine each panelboards pertinent characteristics such as bus rating, main circuit breaker or lugs only, voltage rating, number of phases, number of positions required, etc.

Select unit with feeders connecting at the top of the panel. Equip with copper bus bars with not less than 98 percent conductivity, and with full size neutral bus; provide suitable lugs on neutral bus for outgoing feeders requiring neutral connections.

Interrupting ratings shall be coordinated with the available short circuit current. Provide molded case main and branch circuit breaker types for each circuit, with toggle handles that indicate when tripped. Where multiple pole breakers are indicated, provide with common trip so overload on any pole will trip all poles simultaneously.

All panels shall be provided with an equipment grounding bus similar to, but isolated from the solid-neutral bus. Provide panelboards with bare uninsulated grounding bars suitable for bolting to enclosures.

Panels shall be carefully aligned and rigidly secured in place with the top of the cabinets located 78 inches above the finished floor.

Each panel shall be furnished with an identification plate as specified in the "Equipment Identification" section of this specification.

Circuit Breakers:

Qualifications: NEMA AB3 - 1984 "Molded Case Circuit Breakers".

Panelboards shall be equipped with thermal-magnetic molded case circuit breakers with trip ratings as shown on the drawings.

Circuit breakers shall be quick-make and quick-break units with positive trip indicating mechanism and common trip on all multi-pole breakers.

Single pole 15 and 20 amp circuit breakers shall be UL listed as "Switching Breakers" and be marked SWD.

Circuit breakers shall be the bolt-on type.

Bus Assembly:

Bus bar connections to the branch circuit breakers shall be the "phase sequence" type.

Bus bars shall be of copper construction. All current carrying parts of the bus shall be plated.

Buses shall be full length with constant cross sectional area, designed for the bus current indicated.

Cable lugs shall be furnished in the quantity and size required for the size and number of conductors indicated.

Mains ratings: as shown on the drawings.

Short circuit current rating: as shown on the drawings. Panelboards, as a complete unit, shall have a short circuit current rating equal to or greater than that indicated. It shall be understood that the minimum rating for 240 and 480 volt rated panelboards shall be 10,000 and 35,000 RMS symmetrical amperes respectively.

Cabinet construction:

Panel enclosures: UL 50. Enclosures shall be furnished without knockouts. All knockouts shall be field cut.

The panelboard bus assembly shall be enclosed in a dead front safety constructed steel cabinet.

The size of the wiring gutters and gauge of steel shall be in accordance with NEMA and UL standards; except that the thickness of steel shall not be less than 16 gauge.

The box shall be fabricated from galvanized steel. Boxes intended for outdoor duty, or where indicated, shall be rated NEMA 3R.

Select enclosures which are fabricated by same manufacturer as panelboards, which mate and match properly with panelboards.

Construction shall be such that circuit breaker mounting hardware is not required when circuit breakers are added in the future.

A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door. Typed directory cards shall be furnished in each panel.

PART 3 - EXECUTION

RACEWAY INSTALLATION

All interior and above grade exterior wiring shall be installed in a metal conduit and all embedded in concrete or below grade wiring shall be in PVC conduit unless indicated otherwise on the drawings.

No wire shall be pulled until the conduit system is complete in all details.

The ends of all conduits shall be tightly plugged to exclude dust and moisture during construction.

Conduit support shall be spaced at intervals of 8 ft, or less, as required to obtain rigid construction.

Single conduits shall be supported by means of two-hole pipe clamps. Multiple runs of conduits shall be supported on trapeze type hangers with steel horizontal members and threaded hanger rods. The rods shall be not less than 3/8 inch diameter. The channel shall be not less than 1 1/2" nominal size.

Conduit hangers shall be attached to structural steel by means of beam or channel clamps.

All conduits on exposed work shall be run at right angles to and parallel with the surrounding walls and shall conform to the form of the structure. No diagonal runs will be allowed. Bends in parallel conduit runs shall be concentric. All conduit shall be run straight and true.

Conduit terminating in sheet steel boxes shall have double locknuts and insulated bushings.

In general, the conduit installation shall follow the layout shown on the plans. This layout is, however, diagrammatic only, and where changes are necessary due to structural conditions, other apparatus or other causes, such changes shall be made without additional cost to the Owner. It is recognized that branch circuit routing shown on the drawings may not always be the most economical or the most feasible method. Routing may be changed by the Contractor subject to the following provisions:

Not more than three circuits may be installed in any one conduit. Care must be taken to provide the appropriate number of neutrals where two or three circuits are on the same phase.

All empty conduits shall be provided with a plastic pull wire rated for a minimum of 200 lbs.

Conduit stub-ups at panels shall be secured in place by use of Unistrut and clamps.

Flexible conduit in all areas subject to moisture shall be liquid-tight flexible conduit.

All electrical connections to vibration isolated equipment shall be made with flexible conduit.

RACEWAY INSTALLATION - CONDITIONS

Conduit raceways shall be installed as indicated herein. Where more than one type of raceway is listed under one condition, the Contractor may exercise his option of the raceway used. Conditions of raceway installation are as follows:

Exposed Raceway Below 8'-0" from Finish Floor and in Areas Subject to Moisture: Rigid galvanized steel conduit.

Raceway Concealed Overhead, or In Walls: Rigid galvanized steel conduit or electrical metallic tubing (EMT).

Final Raceway Connection to Recessed Fixtures in Accessible Locations: Flexible steel conduit maximum of 6'-0" long.

WIRING

All conductors shall be carefully handled to avoid kinks or damage to insulation.

All wires, cables and each conductor of multi-conductor cables shall be uniquely identified at each end by color or with wire and cable markers. Lighting and receptacle wiring shall be distinctly differentiated and junction boxes marked.

Lubrications shall be used, if required, to facilitate wire pulling. Lubricants shall be UL approved for use with the insulation specified.

Neutral wires shall be pigtailed to receptacles so that a receptacle can be removed for replacement without the neutral connection to other receptacles on the circuit being disconnected.

Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A.

All 600 Volt wire insulation shall be tested with a "megger" after installation. Tests shall be made at not less than 500 Volts.

OUTLET BOXES

The location of boxes on the electrical plans is approximate. The Engineer shall reserve the right to move boxes during rough in.

DEVICES

Unless indicated otherwise on the drawings or in the specifications all receptacles shall be mounted with the centerline of the device 48" above the finished floor.

PANELBOARDS

Mount panelboards such that top most circuit breaker handles shall not be more than 6'-6" above finished floor.

Only one conductor shall be allowed under each terminal of circuit breakers. No splices are permitted in panelboards. Tighten connectors and terminals in accordance with equipment manufacturer's published torque tightening values for equipment connectors.

Complete and install a typewritten directory for each panelboard that accurately indicates all loads being served by each breaker.

GROUNDING

Ground all non-current carrying metal parts of the electrical system to provide a low impedance path for ground fault current. Route ground connections and conductors to ground and protective devices in shortest and straightest paths as possible.

Insulated grounding bushings shall be required for all raceways, service entrance panels, distribution panels, all raceways one inch and larger and any raceway entering a concentric knock-out.

In general a ground wire shall be installed in every conduit. The conduit installation itself shall serve as an additional grounding means.

Where there are parallel feeders installed in more than one raceway, each raceway shall have a ground conductor.

Where conduits terminate without mechanical connection (i.e., locknuts and bushings) to panelboards, and for all terminations of conduit sizes one inch and larger; and for all sizes of metallic conduit (rigid or flexible) terminating in concentric knockouts, the following procedure shall be followed: Each conduit shall be provided with an insulated grounding bushing and each bushing connected with a bare copper conductor to the ground bus in the electrical equipment. The ground conductor shall be in accordance with Article 250 of the NEC.

Grounding conductors shall be attached to equipment with a bolt-on lug or approved tapered screw used for no other purpose. Use crimp-on spade lugs for stranded conductors.

IDENTIFICATION

Junction Box Identification: Each junction box cover shall be labeled with a permanent "magic" marker or other means to identify the circuits within. For example, a junction box containing lighting circuits 21, 23, 25 from Panel L2A would be labeled "L2A-21,23,25".

Conductor Identification: All cables and wires shall be color coded as to phase per convention. See color coding above.

Device Identification: When it is not clear what a wall switch or what a receptacle is dedicated for then the device plate shall be engraved appropriately.

END

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GENERAL CONDITIONS

PART 1 - GENERAL

APPLICATION

The work described hereunder shall be installed subject to the Contractual Conditions for the entire Specifications.

These provisions apply to all sections of these specifications unless specified otherwise in another section.

DESCRIPTION OF WORK

Furnish all labor, materials, equipment and incidentals required to complete all electrical work as specified and as shown on the Contract Drawings. The work shall include the installation of a complete and properly operating electrical system. This system required consists basically of, and is not limited to, the following:

Furnish and install a new service lateral to the new installation.Extend the distribution system for power including the necessary feeders, branch circuits, installation of and connection to devices, panelboards, transformers, switches, and all other equipment shown, and the connection to other power loads that are existing or new, provided by other contracts or the owner.

Extend the building ground system and provide special grounds as indicated.

Refer to other parts of this specification for electrical requirements of factory installed motors, controllers, power supplies, etc. Electrical connections to equipment furnished by others or shown on other than the Electrical Drawings shall be governed by this DMsion of the Specifications.

The bidder shall inspect the present jobsite conditions before preparing his bid. The submission of a bid will be considered evidence that such a visit and inspection was performed by the bidder and that he takes full responsibility for all factors governing his work.

The electrical work shall be complete, fully operational, and suitable in every way for the service required. Drawings are generally diagrammatic in nature and do not show all details, devices and incidental materials necessary to accomplish their intent. Therefore, it shall be understood that such devices and incidental materials required shall be furnished at no cost to the Owner.

RELATED WORK

Drawings and general provisions of Contract, Including General Conditions, Supplementary General Conditions, and Special Conditions sections apply to work specified.

CONFORMANCE

If the Contractor takes no exceptions to these Specifications in the Submitted Bid, the Contractor will be held totally responsible for failure to comply.

Any exception to the Specification shall reference the affected paragraph(s), subject(s), and list benefit to the Owner.

The Owner reserves the right to have the Contractor replace installed material or equipment which does not comply with these Specifications at the Contractor's expense.

SUBMITTALS

Obtain approval before procurement, fabrication, or delivery of items to the Job site. Submit manufacturers' data on the equipment listed below. Data shall be in the form of manufacturer's descriptive data sheets and engineering drawings and will be reviewed by the Engineer before materials and equipment are delivered to the work site. Review of the submittal by the Engineer is to check for general conformance to the design intent and will not relieve the Contractor of the responsibility for the correctness of all dimensions, conformance and the proper fitting of all parts of the work.

Switchgear
Plugs and Receptacles
Lighting Fixtures
Lighting Controls
Circuit Breakers and Fuses
Gutter and Trough

Submit manufacturers' names and catalog numbers for the following materials:

Conduit, Fittings, and Couplings
Boxes and Fittings
600 Volt Wire and Cables
Grounding Equipment

The Contractor shall thoroughly check the submittal for accuracy and compliance with the contract requirements. Shop drawings and data sheets shall bear the date checked and shall be accompanied by the Contractor's statement that they have been checked for conformity to the Specifications and Drawings. Submittals not so checked and noted will be returned without review.

Deliver the entire electrical submittal to the Engineer complete and in one package. An incomplete submittal will be returned to the Contractor without review.

EQUIPMENT SUBSTITUTIONS

Substitutions that do not increase installation value will not be accepted.

Acceptance of the substitution as an equal will be the sole discretion of the Engineer. Items of necessary coordination or review omitted from the documentation shall be grounds for rejection of the substitution.

No cost increase to the Owner for any changes due to coordination will be considered.

CODES, INSPECTION AND FEES

Comply with the indicated edition of the following codes and ordinances. Where specific edition is not indicated, comply with the latest published edition.

NFPA 70 - 2014: The National Electrical Code
NFPA 72 - 2012: The National Fire Alarm Code
NFPA 101 - 2018: The Life Safety Code
UL Standard 467: Electrical Grounding and Bonding Equipment
UL Standard 506: Enclosures
ANSI C2 - 1994 - The National Electrical Safety Code
NEMA ICS 1 and 2, and IEEE 472
FBC 2017: The Florida Building Code, 6th Edition
The Florida Fire Prevention Code, 6th Edition
Serving Utility Company Policies
State and Municipal Codes and Requirements

Obtain all permits required. Contractor shall pay all fees for permits and inspections.

COMPLIANCE AND REVIEW

Within two weeks of the awarding of the contract, and before any work is commenced, the Contractor shall meet with all legal authorities having jurisdiction, review all materials and details of this project, and agree on any required revisions. A letter shall be forwarded to the Engineer listing the names, dates and place of such review and the revisions required. A copy of the letter shall also be sent to the reviewing authority.

The Contractor shall also meet with each serving utility and repeat the above procedure. A letter certifying each meeting shall also be written with the information as described above.

GUARANTEES

Equipment (excluding lamps): one (1) year from final acceptance by the Owner. Materials and labor: one (1) year from final acceptance by the Owner.

All equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced and the unit(s) restored to service at no expense to the Owner.

In addition to the guarantee of equipment by the manufacturer the Contractor shall also guarantee such equipment for a period of one (1) year from final acceptance by the Owner. The Contractor's one (1) year guarantee shall be for equipment, materials, and labor.

The manufacturer's warranty period shall run concurrently with the Contractor's warranty period. No exception to this provision will be allowed.

Additional guarantee requirements specific to certain parts or assemblies or installations may be in the General and Special Conditions, or other Sections of these Specifications.

PART 2 - PRODUCTS

EQUIPMENT AND MATERIALS

Furnish materials or equipment specified by manufacturers named.

Materials furnished shall be new, undamaged and packed in the original manufacturer's packing.

All equipment and apparatus shall bear the seal of approval of the Underwriter's Laboratory where testing and listing performance criteria has been established for like items.

Protect equipment and materials from mechanical and water damage during construction. Suitable storage facilities shall be provided. Equipment shall not be stored out-of-doors.

All items to be installed shall be free of rust and dirt. Damaged materials and equipment shall be replaced by the Contractor at no cost to the Owner.

All electrical panels, enclosures, raceways, conduit, and boxes shall be fabricated of metal unless indicated otherwise.

EQUIPMENT AND MATERIALS STANDARDS

Design and fabrication of electrical equipment and materials:

The American National Standards Institute (ANSI)
The American Society of Mechanical Engineers (ASME)
The American Society for Testing and Materials (ASTM)
The Institute of Electrical and Electronic Engineers (IEEE)
The National Electrical Manufacturers Association (NEMA)
The Occupational Safety and Health Administration (OSHA)
The Underwriters Laboratories (UL)
The National Fire Protection Association (NFPA)

Comply with the latest edition and revisions of these codes and standards.

EQUIPMENT RATINGS

Horsepower and wattages of equipment shown on the Drawings are estimated and comply with a certain basis of design. It is the Contractor's responsibility to coordinate with, and furnish proper connections to equipment substituted and accepted as equivalent to the basis of design.

Conduit, wire, disconnects, fuses, and circuit breakers shall be sized to suit the horsepower and wattage of equipment actually furnished. However, conduit, boxes, wire or disconnects shall not be sized smaller than shown on the Drawings.

PART 3 - EXECUTION

QUALITY ASSURANCE

Installer's Qualifications: At least three years of successful installation experience on projects with electrical work similar to that required for this project.

Manufacturer's Qualifications: Manufacturers regularly engaged in the manufacture of electrical components and equipment of the types and sizes required, whose products have been in satisfactory use in similar service for not less than five years.

Electrical work shall be performed by experienced persons skilled in the trade.

Work shall be supervised by a licensed journeyman or master electrician who shall be on the job site at all times while work is in progress.

Work shall be done neatly and in keeping with good practice and conventions of the trade. The electrical installation shall be of high quality, and of the performance level associated with top level commercial electrical installations as determined by the Engineer and the National Electrical Code.

IDENTIFICATION

Provide laminated plastic nameplates for each panelboard, equipment enclosure and all other major pieces of equipment installed or modified as part of this contract.

Panelboards shall have typewritten directories with all loads thoroughly described for each circuit. Update existing panelboards and their directories to reflect new work.

CLEANING AND PAINTING

Clean all equipment and boxes thoroughly inside and outside at the completion of installation. Do not leave dirt and debris inside panelboard and equipment cabinets, device and junction boxes, etc.

TESTS

Contractor shall test all wiring for shorts and all equipment for proper grounding before energizing. Equipment shall be thoroughly checked and adjusted for proper operation.

END OF SECTION

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