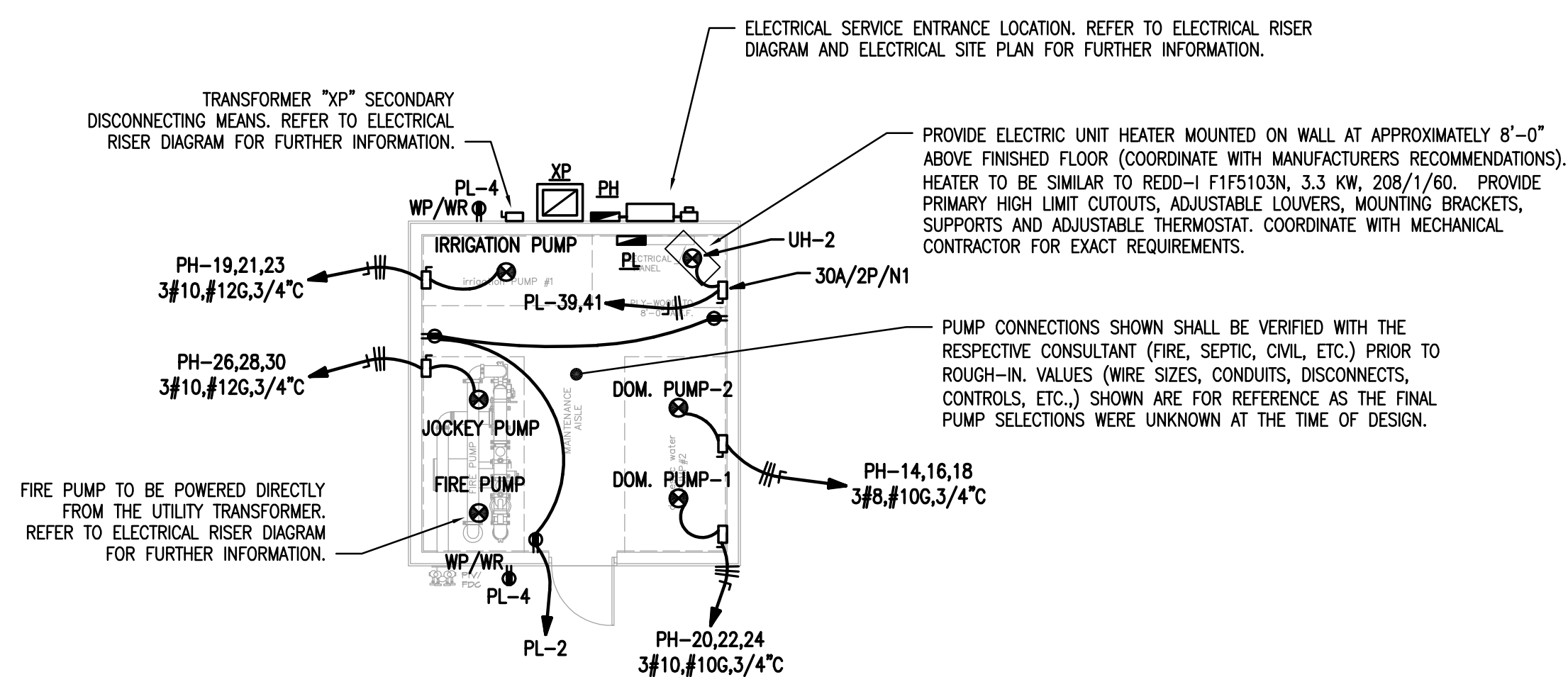


1 PARTIAL FLOOR PLAN - ELECTRICAL
SCALE: 1/8" = 1'-0"



2 PUMP HOUSE FLOOR PLAN - POWER
SCALE: 1/8" = 1'-0"

SHEET NOTES:

- GENERAL: REFER ALSO TO GENERAL ELECTRICAL NOTES ON SHEET E1.0.
- FOR CIRCUITS EXCEEDING 100'-FT FROM THE SERVING PANEL, INCREASE WIRE SIZES AS NECESSARY TO ACCOUNT FOR VOLTAGE DROP.
 - FIRE ALARM SYSTEM SHALL BE DESIGNED AND SUBMITTED TO THE AUTHORITY HAVING JURISDICTION BY A LICENSED FIRE ALARM CONTRACTOR. FIRE ALARM CONTRACTOR SHALL PROVIDE DESIGN DRAWINGS WHICH ARE NFPA 72 COMPLIANT FOR AHJ APPROVAL. IN ADDITION, THE LICENSED FIRE ALARM CONTRACTOR SHALL PROVIDE APPROVED/STAMPED PLANS FOR PERMIT SUBMISSION. FIRE ALARM CONTRACTOR SHALL PROVIDE NEW COMPONENTS, ACCESSORIES, EQUIPMENT, AND DEVICES AS REQUIRED FOR A COMPLETE SYSTEM CAPABLE OF SERVING THE SCOPE OF WORK INDICATED.
 - ALL 20 AMP, 125 VOLT RECEPTACLES LOCATED IN AREAS DESCRIBED IN N.E.C 210.8(B) SHALL BE "GFCI" TYPE. PER N.E.C. 210.8(B) ALL SINGLE PHASE RECEPTACLES RATED 150 VOLTS TO GROUND OR LESS, 50 AMPS OR LESS AND THREE PHASE RECEPTACLES RATED 150 VOLTS TO GROUND OR LESS, 100 AMPS OR LESS INSTALLED IN THIS AREA SHALL BE "GFCI" TYPE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL ALL "GFCI" TYPE RECEPTACLES IN A READILY ACCESSIBLE LOCATION FOR SERVICE PERSONNEL. IF RECEPTACLE MUST BE INSTALLED IN AN NON-ACCESSIBLE LOCATION THE ELECTRICAL CONTRACTOR SHALL PROVIDE GFCI BREAKER TO SERVE THE BRANCH CIRCUIT OR PROVIDE THE APPROPRIATE GFCI REMOTE TEST/RESET IN AN ACCESSIBLE LOCATION AND LABEL ACCORDING WITH "GFCI RESET" AND THE LOAD SERVED. EXAMPLE: "GFCI RESET-REFRIGERATOR".
 - COORDINATE WITH MECHANICAL AND PLUMBING CONTRACTORS FOR CONNECTION REQUIREMENTS AND LOCATIONS FOR RESPECTIVE EQUIPMENT.
 - PER NEC ARTICLE 110.3(B), ALL EQUIPMENT SHALL BE INSTALLED PER THE RESPECTIVE EQUIPMENT MANUFACTURER'S RECOMMENDATIONS/INSTRUCTIONS.
 - UNLESS NOTED OTHERWISE THE CONTRACTOR SHALL UTILIZE #10 THIN MINIMUM CONDUCTORS IN CONDUIT TO SERVE ALL MECHANICAL EQUIPMENT. PROVIDE NEUTRAL CONDUCTORS AS REQUIRED AND IF NEUTRAL CONDUCTOR IS NOT REQUIRED THE NEUTRAL CONDUCTOR CAN BE CAPPED, COILED AND TAPED IN JUNCTION BOX.
 - IT SHALL BE THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT ALL EQUIPMENT DISCONNECTS ARE PROVIDED WITH THE REQUIRED NEC WORKING CLEARANCES. TYPICAL FOR ALL EQUIPMENT DISCONNECTS.
 - THE CONTRACTOR SHALL PROVIDE A PERMANENTLY AFFIXED LABEL TO EACH INDIVIDUAL RECEPTACLE FACE/COVER PLATE, DISCONNECTING MEANS, SWITCH COVER, ETC., INDICATING THE PANEL AND THE CIRCUIT SERVING THE DEVICE. TYPICAL FOR ALL EQUIPMENT, RECEPTACLES, LIGHTING SWITCHES, AND DISCONNECTS.
 - REFER TO SITE PLAN ON SHEET EU1.0 FOR SITE AND ADDITIONAL BUILDING EXTERIOR LIGHTING.

KEYED NOTES:

- GENERAL: REFER ALSO TO GENERAL ELECTRICAL NOTES ON SHEET E1.0.
- FLOW AND TAMPER SWITCHES AT SPRINKLER SYSTEM OS&Y VALVES TO BE MONITORED BY THE FIRE ALARM SYSTEM. COORDINATE THE EXACT LOCATION AND QUANTITY WITH THE SPRINKLER SYSTEM CONTRACTOR.
 - SPRINKLER MONITORING SYSTEM PANEL PROVIDE PANEL MANUFACTURED BY EDWARDS TECHNOLOGY SYSTEM, OR APPROVED EQUAL. THE CONTRACTOR SHALL ROUTE 1-1" EMPTY CONDUIT WITH PULLWIRE FROM SPRINKLER MONITORING SYSTEM PANEL TO BUILDING TELEPHONE SERVICE PANEL.
 - PROVIDE A LOCKABLE TYPE CIRCUIT BREAKER FOR THE CIRCUIT SHOWN.
 - PROVIDE ELECTRIC UNIT HEATER MOUNTED ON WALL AT APPROXIMATELY 12'-0" ABOVE FINISHED FLOOR (COORDINATE WITH MANUFACTURERS RECOMMENDATIONS). HEATER TO BE SIMILAR TO REDD-1 G1G5107CA1L, 7.5 KW, 277/1/60. PROVIDE PRIMARY HIGH LIMIT CUTOUTS, ADJUSTABLE LOUVERS, MOUNTING BRACKETS, SUPPORTS AND ADJUSTABLE THERMOSTAT. COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT REQUIREMENTS.
 - MOTOR RATED DISCONNECT SWITCH. VERIFY THE EXACT DISCONNECTING POWER, AND INSTALLATION REQUIREMENTS WITH THE EQUIPMENT MANUFACTURER.
 - PROVIDE ELECTRIC UNIT HEATER MOUNTED ON WALL AT APPROXIMATELY 8'-0" ABOVE FINISHED FLOOR (COORDINATE WITH MANUFACTURERS RECOMMENDATIONS). HEATER TO BE SIMILAR TO REDD-1 F1F5103N, 3.3 KW, 208/1/60. PROVIDE PRIMARY HIGH LIMIT CUTOUTS, ADJUSTABLE LOUVERS, MOUNTING BRACKETS, SUPPORTS AND ADJUSTABLE THERMOSTAT. COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT REQUIREMENTS.
 - WEATHERPROOF JUNCTION BOX FOR CONNECTION TO SIGNAGE. COORDINATE EXACT LOCATION WITH THE ARCHITECT AND VERIFY THE CONTROL REQUIREMENTS WITH THE BUILDING LANDLORD. CONTRACTOR SHALL PROVIDE THE NECESSARY POWER PACK/RELAY AS REQUIRED TO CONTROL THE FIXTURE ON THE SCHEDULED BASIS.
 - CIRCUIT TO BE CONTROLLED ON A SCHEDULED BASIS VIA THE LIGHTING CONTROL SYSTEM. COORDINATE EXACT OPERATION TIMES WITH THE ARCHITECT PRIOR TO ROUGH-IN/START-UP.

REVISIONS

NO.	DESCRIPTION

ISSUE
PERMIT SET
DATE ISSUED
10/13/2020
SHEET TITLE
PARTIAL FLOOR PLAN - ELECTRICAL
SHEET NUMBER

E2.1

Refer to Civil Drawings for Building 3 Service Run

ELECTRICAL RISER/SERVICE NOTE:

GENERAL: REFER ALSO TO GENERAL ELECTRICAL NOTES ON SHEET E1.0.

- THE CONTRACTOR SHALL MAKE EVERY FEASIBLE EFFORT TO INSTALL THE REPRESENTED ELECTRICAL SERVICE DESIGN IN AS LITTLE SPACE AS POSSIBLE.
- IT SHALL NOT BE ACCEPTABLE TO ALTER OR DEVIATE FROM THE ELECTRICAL RISER DESIGN REPRESENTED. ANY ALTERATIONS OR DESIGN DEVIATIONS SHALL BE SUBMITTED TO AND APPROVED BY AYS ENGINEERING, LLC PRIOR TO ANY ROUGH-IN OR EQUIPMENT PURCHASES.
- CONTRACTOR SHALL FULLY SURVEY AND INVESTIGATE THE EXISTING ELECTRICAL DISTRIBUTION AND NOTIFY AYS ENGINEERING OF ANY DEVIATIONS THAT AFFECT THE DESIGN INTENT.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT THE ELECTRICAL INSTALLATION, EQUIPMENT, DEVICES, CONDUIT, ENCLOSURES, METERS, ETC., ARE IN ACCORDANCE WITH THE LOCAL UTILITY REQUIREMENTS AND THE LOCAL AHJ REQUIREMENTS.

Accusharp Bldg. #2 - SHORT CIRCUIT CALCULATIONS

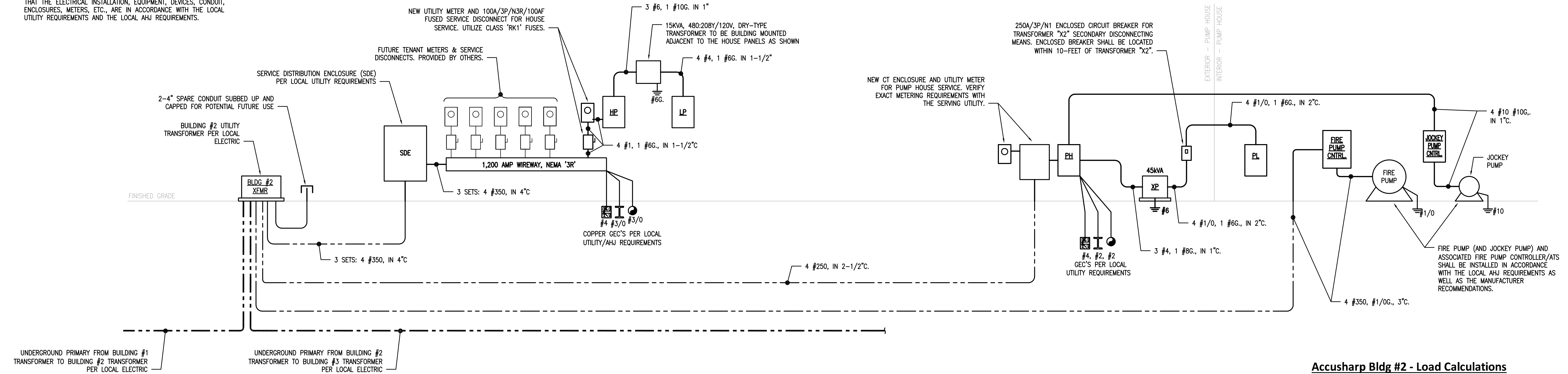
Equipment Name	Feeder Length (ft)	Parallel Sets	Conduit	Wire Type	Wire Size	L-L KVA	Voltage	%Z	C-Value	I (A)	I (SCA)	f-Value	M	Multiplier	Calculated Values (A)	
Utility Transformer*						750	480	1.4	1.4	902.1					71.429	64436
SDE/Wireway	30	3 Non-Mag	Copper	#350kcmil		480				22737	64436	0.102	0.907		58458	
Panel "HP"	10	1 Steel	Copper	#1		480				7293	58458	0.289	0.776		45343	
XFMR "XH"						45	208	1.4			45343	5.082	0.164		7455	
Panel "LP"	10	1 Steel	Copper	#4		208				3806	7455	0.163	0.860		6410	

* = Assumed Values Used for Calculation - Building #2 is anticipated to serve 1,200 Amps @ 480v, 3Ph, 4W for future Shell Service

Pump House (Fed from Bldg. #2 utility XFMR) - SHORT CIRCUIT CALCULATIONS

Equipment Name	Feeder Length (ft)	Parallel Sets	Conduit	Wire Type	Wire Size	L-L KVA	Voltage	%Z	C-Value	I (A)	I (SCA)	f-Value	M	Multiplier	Calculated Values (A)	
Utility Transformer*						750	480	1.4	1.4	902.1					71.429	64436
Panel "PH"	295	1 Steel	Copper	#250kcmil		480				16483	64436	4.161	0.194		12484	
XFMR "XP"						45	208	1.4			12484	1.399	0.417		5203	
Panel "PL"	20	1 Steel	Copper	#4/0		208				15082	5203	0.057	0.946		4921	

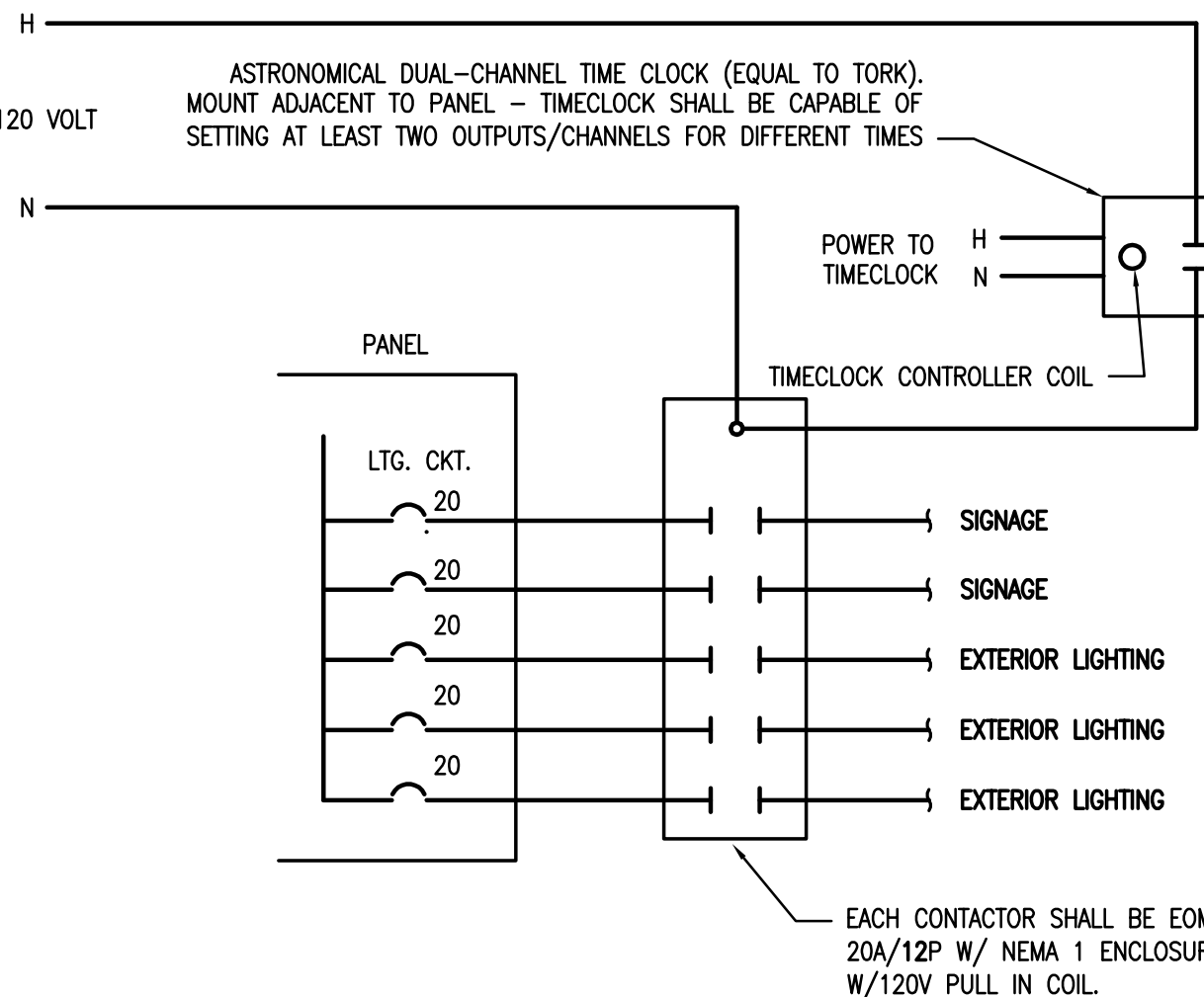
* = Assumed Values Used for Calculation - Building #2 is anticipated to serve 1,200 Amps @ 480v, 3Ph, 4W for future Shell Service



Accusharp Bldg #2 - Load Calculations

	SF	W/SF	Kva	Amps @ 480v, 3Ph
Shell Space	24,700	30	741	892
Pump House	n/a	n/a	38.9	47
House Service	n/a	n/a	42.5	51
Overall Electrical Service Load			822.4	990
			Service Size	1,200 Amp

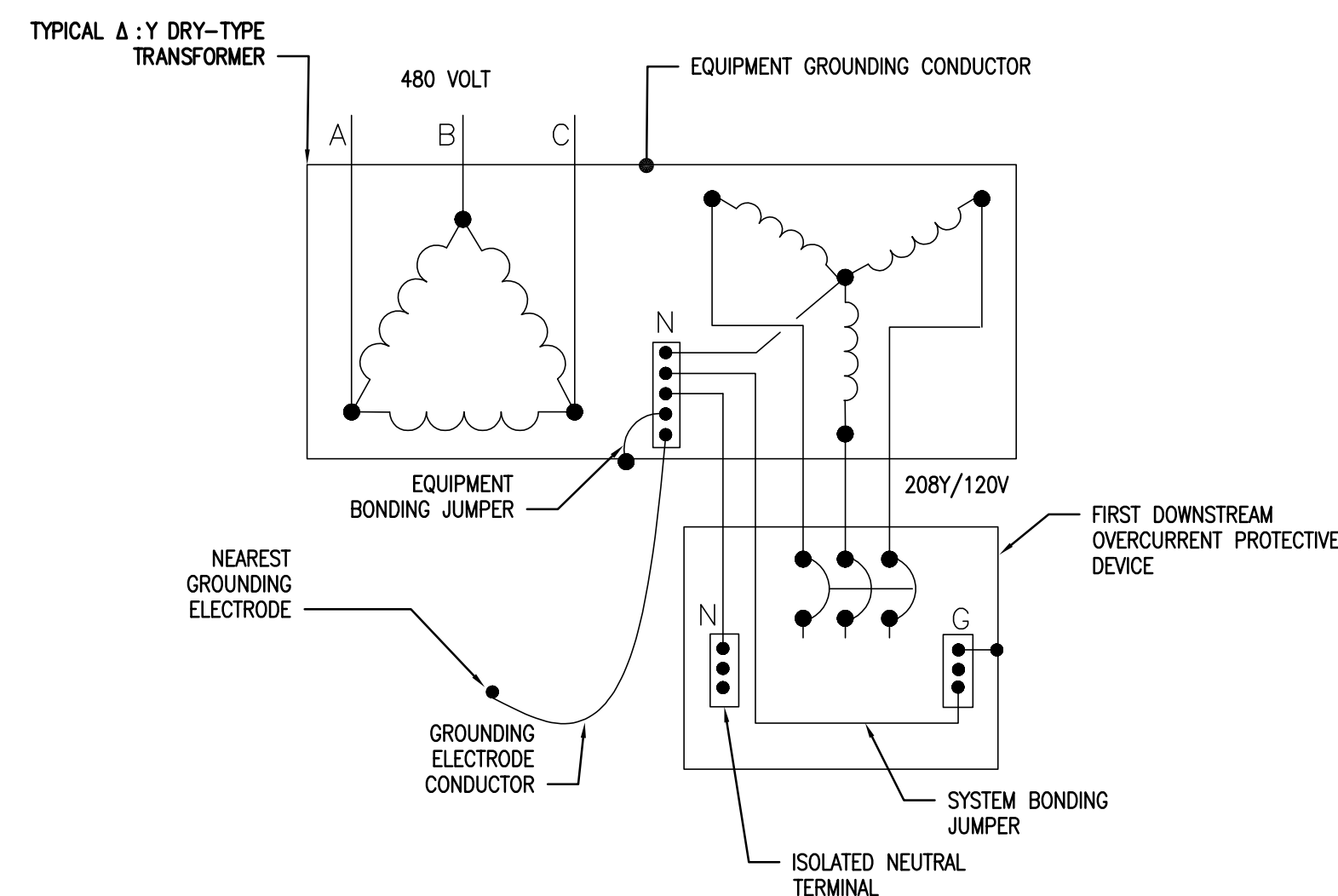
THEREFORE PROVIDE A 1,200 AMP, 277/480V, 3-PHASE, 4-WIRE UNDERGROUND ELECTRICAL SERVICE TO SERVE THE NEW LOADS



FOR REFERENCE ONLY - COORDINATE THE EXACT CIRCUITS TO BE CONTROLLED AND THE TIME/SCHEDULE REQUIRED WITH THE ARCHITECT AND/OR OWNER. PROVIDE THE NECESSARY QUANTITY OF CONTACTORS AND SUITABLE TIMECLOCK WITH REQUIRED QUANTITY OF CHANNELS TO PROVIDE FULLY FUNCTIONAL LIGHTING CONTROLS.

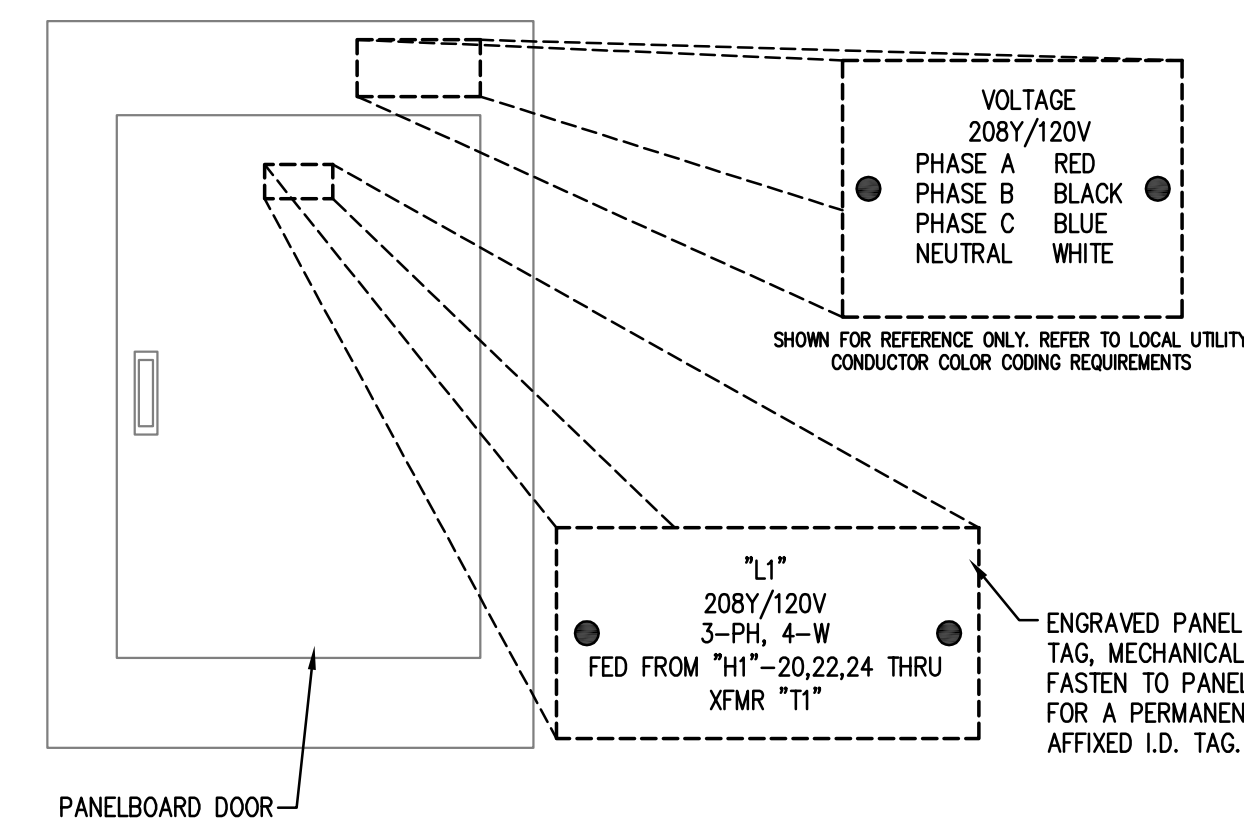
2 BUILDING #1 LIGHTING CONTROLS DIAGRAM

SCALE: NOT TO SCALE



3 TYPICAL 480: 208Y/120V TRANSFORMER GROUNDING DETAIL

SCALE: NOT TO SCALE

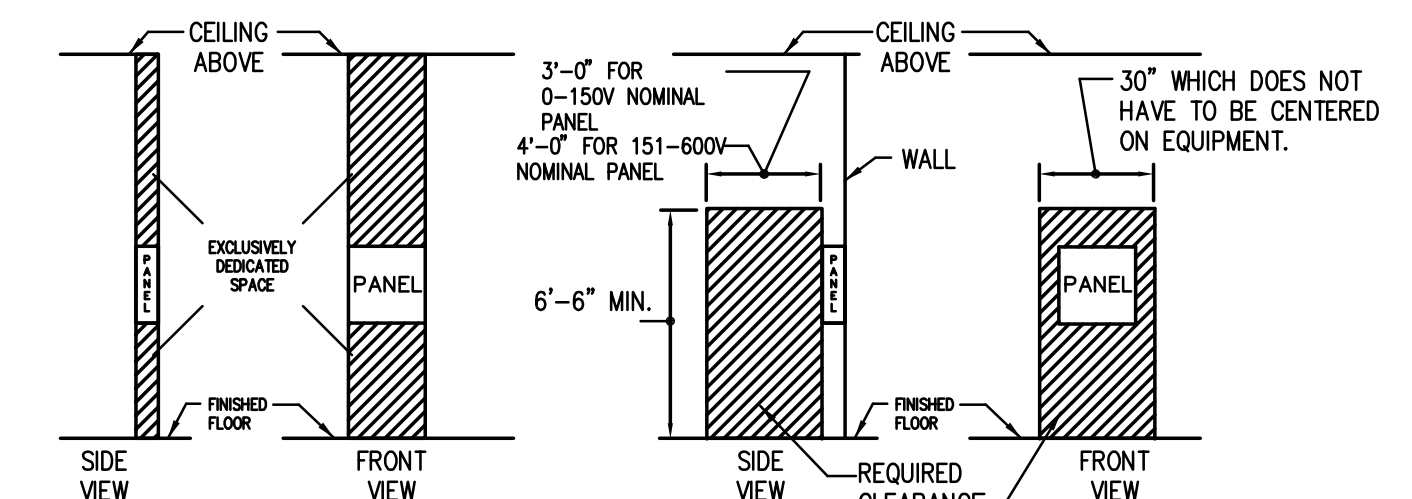


MEANS OF IDENTIFICATION OF GROUNDED AND UNGROUNDED BRANCH CIRCUIT CONDUCTORS. TAG SHALL BE PERMANENTLY AFFIXED TO PANEL

SUGGESTED TEXT ONLY - REFER TO SPECIFICATIONS FOR EXACT IDENTIFICATION TAG REQUIREMENTS

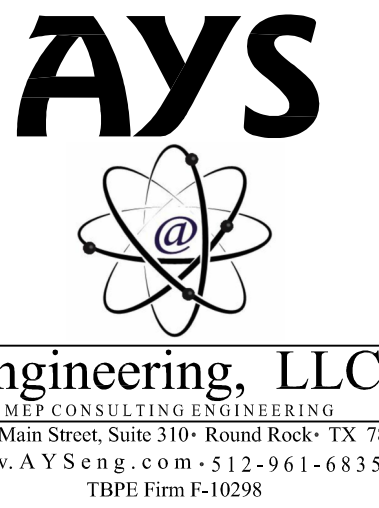
4 TYP. PANELBOARD IDENTIFICATION

SCALE: NOT TO SCALE



5 TYPICAL PANELBOARD REQUIRED CLEARANCE DETAIL

SCALE: NOT TO SCALE



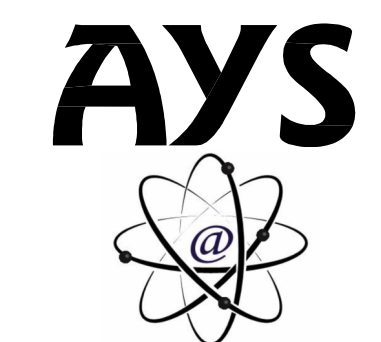
ACCUSHARP BLDG. 2 SHELL
2205 DOWNING LANE,
LEANDER TX, 78641

REVISIONS

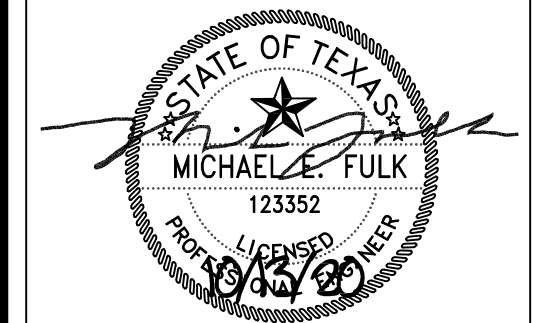
NO.	DESCRIPTION

ISSUE
PERMIT SET
DATE ISSUED
10/13/2020
SHEET TITLE
ELECTRICAL
RISER DIAGRAM

SHEET NUMBER
E3.0



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TBE Firm F-10298



ACCUSHARP
BLDG. 2 SHELL
2205 DOWNING LANE,
LEANDER TX, 78641

REVISIONS

ISSUE
PERMIT SET
DATE ISSUED
10/13/2020
SHEET TITLE
ELECTRICAL
PANEL SCHEDULE

SHEET NUMBER
E3.1

HP			ROOM BLDG. #2 EXTERIOR			VOLTS 480Y/277V 3P 4W			AIC 65,000		
MOUNTING RECESSED			BUS AMPS 100			MAIN BKR MLO			LUGS STANDARD		
FED FROM UTILITY			NEUTRAL 100%			LUGS STANDARD			LUGS STANDARD		
NOTE											
CKT #	CKT BKR	CIRCUIT DESCRIPTION	LOAD KVA			CKT #	CKT BKR	CIRCUIT DESCRIPTION	LOAD KVA		
			A	B	C				A	B	C
1	20/1	LIGHTING	0.711			2	40/1	UH-2	7.5		
3	-/1	SPACE		0		4	40/1	UH-2		7.5	
5	-/1	SPACE			0	6	40/1	UH-2			7.5
7	-/1	SPACE	0			8	40/1	UH-2	7.5		
9	-/1	SPACE		0		10	40/1	UH-2		7.5	
11	-/1	SPACE			0	12	-/1	SPACE			0
13	-/1	SPACE	0			14	-/1	SPACE	0		
15	-/1	SPACE		0		16	-/1	SPACE		0	
17	-/1	SPACE			0	18	-/1	SPACE			0
19	-/1	SPACE	0			20	-/1	SPACE	0		
21	-/1	SPACE		0		22	-/1	SPACE		0	
23	-/1	SPACE			0	24	-/1	SPACE			0
25	50/3	XFMR XH	1.04			26	-/1	SPACE	0		
27	-/1	SPACE		1.12		28	-/1	SPACE		0	
29	-/1	SPACE			1.92	30	-/1	SPACE			0
TOTAL CONNECTED KVA BY PHASE									16.8	16.1	9.42
			CONN KVA	CALC KVA					CONN KVA	CALC KVA	
LIGHTING			0.779	0.974	(125%)	NONCONTINUOUS			0.35	0.35	(100%)
RECEPTACLES			0.36	0.36	(50%>10)	HEATING			40.8	40.8	(100%)
						TOTAL LOAD			42.5		
						BALANCED 3-PHASE LOAD			51.1 A		

LP			ROOM BLDG. #2 EXTERIOR			VOLTS 208Y/120V 3P 4W			AIC 22,000		
MOUNTING SURFACE			BUS AMPS 60			MAIN BKR MLO			LUGS STANDARD		
FED FROM XH			NEUTRAL 100%			LUGS STANDARD			LUGS STANDARD		
NOTE											
CKT #	CKT BKR	CIRCUIT DESCRIPTION	LOAD KVA			CKT #	CKT BKR	CIRCUIT DESCRIPTION	LOAD KVA		
			A	B	C				A	B	C
1	20/1	LIGHTING, RECEPTACLE	0.248			2	-/1	SPACE	0		
3	20/1	FIRE SPRINKLER PANEL		0.35		4	-/1	SPACE		0	
5	20/1	RECEPTACLE			0.18	6	-/1	SPACE	0		0
7	-/1	SPACE	0			8	-/1	SPACE			0
9	-/1	SPACE		0		10	-/1	SPACE		0	
11	-/1	SPACE			0	12	-/1	SPACE			0
13	-/1	SPACE	0			14	-/1	SPACE	0		
15	-/1	SPACE		0		16	-/1	SPACE		0	
17	-/1	SPACE			0	18	-/1	SPACE			0
19	-/1	SPACE	0			20	-/1	SPACE	0		
21	-/1	SPACE		0		22	-/1	SPACE		0	
23	-/1	SPACE			0	24	-/1	SPACE			0
25	-/1	SPACE	0			26	-/1	SPACE			0
27	-/1	SPACE		0		28	20/2	UH-1		1.65	
29	-/1	SPACE			0	30	-/1	SPACE			1.65
TOTAL CONNECTED KVA BY PHASE									0.248	2	1.83
TOTAL CONNECTED AMPS BY PHASE									2.07	18.4	17.2
			CONN KVA	CALC KVA					CONN KVA	CALC KVA	
LIGHTING			0.068	0.085	(125%)	NONCONTINUOUS			0.35	0.35	(100%)
RECEPTACLES			0.36	0.36	(50%>10)	HEATING			3.3	3.3	(100%)
						TOTAL LOAD			4.1		
						BALANCED 3-PHASE LOAD			11.4 A		

PH			ROOM MOUNTING SURFACE			VOLTS 480Y/277V 3P 4W			AIC 22,000		
FED FROM UTILITY			BUS AMPS 250			MAIN BKR MLO			LUGS STANDARD		
NOTE			NEUTRAL 100%			LUGS STANDARD			LUGS STANDARD		
CKT #	CKT BKR	CIRCUIT DESCRIPTION	LOAD KVA			CKT #	CKT BKR	CIRCUIT DESCRIPTION	LOAD KVA		
			A	B	C				A	B	C
1	-/1	SPACE	0			2	-/1	SPACE	0		
3	-/1	SPACE		0		4	-/1	SPACE		0	
5	-/1	SPACE			0	6	-/1	SPACE			0
7	-/1	SPACE	0			8	-/1	SPACE	0		
9	-/1	SPACE		0		10	-/1	SPACE		0	
11	-/1	SPACE			0	12	-/1	SPACE			0
13	-/1	SPACE	0			14	50/3	DOM. PUMP-2	11.1		
15	-/1	SPACE		0		16	-/1	SPACE		11.1	
17	-/1	SPACE			0	18	-/1	SPACE			11.1
19	20/3	IRRIGATION PUMP	2.11			20	30/3	DOM. PUMP-1	5.82		
21	-/1	SPACE		2.11		22	-/1	SPACE		5.82	
23	-/1	SPACE			2.11	24	-/1	SPACE			5.82
25	70/3	XFMR XP	0			26	20/3	JOCKEY PUMP	3.05		
27	-/1	SPACE		0		28	-/1	SPACE		3.05	
29	-/1	SPACE			0	30	-/1	SPACE			3.05
TOTAL CONNECTED KVA BY PHASE									22.1	22.1	22.1
			CONN KVA	CALC KVA					CONN KVA	CALC KVA	
LARGEST MOTOR			33.3	8.31	(25%)	TOTAL LOAD			74.5		
MOTORS			66.2	66.2	(100%)	BALANCED 3-PHASE LOAD			89.6 A		

PL			ROOM MOUNTING SURFACE			VOLTS 208Y/120V 3P 4W			AIC 22,000		
FED FROM UTILITY			BUS AMPS 150			MAIN BKR MLO			LUGS STANDARD		
NOTE			NEUTRAL 100%			LUGS STANDARD			LUGS STANDARD		
CKT #	CKT BKR	CIRCUIT DESCRIPTION	LOAD KVA			CKT #	CKT BKR	CIRCUIT DESCRIPTION	LOAD KVA		
			A	B	C				A	B	C
1	20/1	TIME CLOCK	0.35			2	20/1	RECEPTACLE	0.54		
3	20/1	LIGHTING		0.204		4	20/1	RECEPTACLE		0.36	
5	20/1	LIGHTING			0.05	6	20/1	FUTURE HEAT TRACE			1.4
7	-/1	SPACE	0			8	-/1	SPACE	0		
9	-/1	SPACE		0		10	-/1	SPACE		0	
11	-/1	SPACE			0	12	-/1	SPACE			0
13	-/1	SPACE	0			14	-/1	SPACE	0		
15	-/1	SPACE		0		16	-/1	SPACE		0	
17	-/1	SPACE			0	18	-/1	SPACE			0
19	-/1	SPACE	0			20	-/1	SPACE	0		
21	-/1	SPACE		0		22	-/1	SPACE		0	
23	-/1	SPACE			0	24	-/1	SPACE			0
25	-/1	SPACE	0			26	-/1	SPACE		0	
27	-/1	SPACE		0		28	-/1	SPACE		0	
29	-/1	SPACE			0	30	-/1	SPACE			0
31	-/1	SPACE	0			32	-/1	SPACE		0	
33	-/1	SPACE		0		34	-/1	SPACE			0
35	-/1	SPACE			0	36	-/1	SPACE			0
37	-/1	SPACE	0			38	20/1	RECEPTACLE	0.18		
39	20/2	UH-2		1.65		40	30/2	SEPTIC PUMP		1.74	
41	-/1	SPACE			1.65	42	-/1	SPACE			1.74
TOTAL CONNECTED KVA BY PHASE									1.07	3.95	4.84
TOTAL CONNECTED AMPS BY PHASE									8.92	36.7	43.5
			CONN KVA	CALC KVA					CONN KVA	CALC KVA	
LIGHTING			0.254	0.318	(125%)	RECEPTACLES			1.08	1.08	(50%>10)
LARGEST MOTOR			1.92	0.48	(25%)	NONCONTINUOUS			1.75	1.75	(100%)
MOTORS			3.48	3.48	(100%)	HEATING			3.3	3.3	(100%)
						TOTAL LOAD			10.4		
						BALANCED 3-PHASE LOAD			28.9 A		

ELECTRICAL SPECIFICATIONS:

PART 1 - GENERAL

1.01 SCOPE OF WORK: FURNISH AND INSTALL ALL MATERIALS AND EQUIPMENT AND PROVIDE ALL LABOR, TOOLS, TRANSPORTATION, SUPERINTENDANCE AND SERVICES REQUIRED AND NECESSARY TO COMPLETE THE WORK SHOWN ON THE DRAWINGS AND/OR SPECIFIED HEREIN.

ALSO INCLUDED WILL BE ALL OTHER WORK AND MISCELLANEOUS ITEMS, NOT SPECIFICALLY MENTIONED, BUT REASONABLY INFERRED FOR A COMPLETE INSTALLATION INCLUDING ALL ACCESSORIES AND APPURTENANCES REQUIRED FOR TESTING THE SYSTEM. IT IS THE INTENT OF THE DRAWINGS AND SPECIFICATIONS THAT ALL SYSTEMS BE COMPLETE AND READY FOR OPERATION.

1.02 REGULATORY REQUIREMENTS: ALL WORK AND MATERIALS SHALL COMPLY WITH THE LATEST RULES, CODES AND REGULATIONS, INCLUDING, BUT NOT LIMITED TO THE FOLLOWING:

- A. 2015 INTERNATIONAL BUILDING CODE
B. 2015 INTERNATIONAL FIRE CODE
C. 2015 INTERNATIONAL PLUMBING CODE
D. 2015 INTERNATIONAL FUEL GAS CODE
E. 2015 INTERNATIONAL MECHANICAL CODE
F. 2015 INTERNATIONAL ENERGY CONSERVATION CODE/ASHRAE 90.1-2013 ENERGY CODE COMPLIANCE
G. 2017 NATIONAL ELECTRIC CODE
H. LOCAL CODE ORDINANCES AND AMENDMENTS
I. NATIONAL ELECTRICAL MANUFACTURER ASSOCIATION (NEMA)
J. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
K. NATIONAL ELECTRICAL SAFETY CODE (NESSC)
L. INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)
M. UNDERWRITERS' LABORATORIES (UL)
N. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
O. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
P. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)
Q. AMERICANS WITH DISABILITIES ACT (ADA)
R. APPLICABLE UTILITY COMPANIES

1.03 LICENSE, FEES AND PERMITS: ELECTRICAL CONTRACTOR SHALL PAY FOR ALL LICENSES, PERMITS AND INSPECTION FEES REQUIRED BY THE AUTHORITY HAVING JURISDICTION AND SHALL ARRANGE FOR ALL REQUIRED INSPECTIONS.

1.04 SAFETY AND INDEMNITY: THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF WORK. THIS REQUIREMENT WILL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.

NO ACT, SERVICE, DRAWING REVIEW OR CONSTRUCTION REVIEW BY THE OWNER, THE ENGINEERS OR THEIR CONSULTANTS, IS INTENDED TO INCLUDE REVIEW OF THE ADEQUACY OF THE CONTRACTOR'S SAFETY MEASURES, IN, ON, OR NEAR THE CONSTRUCTION SITE.

1.05 DRAWINGS AND SPECIFICATIONS: ALL DRAWINGS AND SPECIFICATIONS SHALL BE CONSIDERED AS A WHOLE AND WORK OF THIS DIVISION SHOWN ANYWHERE THEREIN SHALL BE FURNISHED UNDER THIS DIVISION.

DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF EQUIPMENT AND WIRING; MOST DIRECT ROUTING OF CONDUITS AND WIRING IS NOT ASSURED. EXACT REQUIREMENTS SHALL BE COVERED BY CONDITIONS OF THE JOB. CONSULT ALL OTHER DRAWINGS IN PREPARATION OF THE BID. EXTRA LENGTHS OF WIRING OR ADDITION OF PULL OR JUNCTION BOXES, ETC. NECESSITATED BY SUCH CONDITIONS SHALL BE INCLUDED.

1.06 CONDITIONS AT SITE: THE ELECTRICAL CONTRACTOR SHALL HAVE EXAMINED THE SITE AND FAMILIARIZED THEMSELVES WITH ALL DISCREMINABLE EXISTING CONDITIONS. NO EXTRA PAYMENT WILL BE ALLOWED FOR WORK REQUIRED BECAUSE OF THESE CONDITIONS, WHETHER SPECIFICALLY MENTIONED OR NOT.

1.07 WORKMANSHIP AND CONTRACTOR'S QUALIFICATIONS: ONLY QUALITY WORKMANSHIP WILL BE ACCEPTED. HAPHAZARD OR POOR INSTALLATION WILL BE CAUSE FOR REJECTION OF WORK. THE CONTRACTOR SHALL BE LICENSED IN THE STATE IN WHICH THE JOB IS LOCATED.

1.08 SHOP DRAWINGS AND MATERIALS LIST: SUBMIT TO OWNER IN A SINGLE PACKAGE SIX (6) COPIES OF COMPLETE SHOP DRAWINGS AND MATERIALS LIST, AS NOTED BELOW, FOR REVIEW WITHIN FIFTEEN (15) DAYS AFTER AWARD OF CONTRACT. SUBMITTALS REQUIRED AS FOLLOWS:

- A. WIRING DEVICES: SWITCHES, RECEPTACLES, DEVICE PLATES.
B. ENCLOSURES FOR UTILITY COMPANY METERING.
C. MAIN FUSED DISCONNECT SWITCH OR ENCLOSED CIRCUIT BREAKER.
D. SWITCHBOARDS, DISTRIBUTION PANELBOARDS, PANELBOARDS.
E. TRANSFORMERS.
F. DISCONNECT SWITCHES.
G. LIGHTING FIXTURES, LAMPS AND LIGHTING CONTROL EQUIPMENT.

1.09 SUBSTITUTIONS: ONE OR MORE MAKES OF MATERIALS OR METHODS MAY HAVE BEEN SPECIFIED TO ESTABLISH THE STANDARD OF QUALITY, WORKMANSHIP, FINISH AND DESIGN REQUIRED, BUT OTHER MATERIALS OR METHODS EQUAL IN QUALITY, WORKMANSHIP, FINISH, DESIGN, AND GUARANTEED PERFORMANCE WILL BE ACCEPTED. HOWEVER, ALL CHANGES AND SUBSTITUTIONS SHALL BE REQUIRED IN LETTER FORM AND SHALL BE ACCOMPANIED WITH A STATEMENT OF THE AMOUNT OF MONEY TO BE RETURNED TO THE CONTRACT IF THE SUBSTITUTION IS PERMITTED.

NO WORK INVOLVING MATERIALS SUBMITTED FOR SUBSTITUTION SHALL PROCEED UNTIL WRITTEN ACCEPTANCE IS RECEIVED FROM THE OWNER. THE OWNER IS THE SOLE JUDGE OF ACCEPTABILITY OF PREFERRED SUBSTITUTIONS. IF A SUBSTITUTION ITEM IS PERMITTED, AND ANY RE-DESIGN EFFORT IS THEREBY NECESSITATED, THE REQUIRED RE-DESIGN SHALL BE AT THE CONTRACTOR'S EXPENSE.

1.10 COORDINATION: COORDINATE WORK WITH OTHER TRADES TO AVOID CONFLICT AND TO PROVIDE CORRECT ROUGH-IN AND CONNECTION FOR EQUIPMENT FURNISHED UNDER OTHER TRADES THAT REQUIRE ELECTRICAL CONNECTIONS. INFORM CONTRACTORS OF OTHER TRADES OF THE REQUIRED ACCESS TO AND CLEARANCES AROUND ELECTRICAL EQUIPMENT TO MAINTAIN SERVICE ABILITY AND CODE COMPLIANCE.

VERIFY EQUIPMENT DIMENSIONS AND REQUIREMENTS WITH PROVISIONS SPECIFIED UNDER THIS SECTION. CHECK ACTUAL JOB CONDITIONS BEFORE FABRICATING WORK. REPORT NECESSARY CHANGES IN TIME TO PREVENT NEEDLESS WORK. CHANGES OR ADDITIONS, SUBJECT TO ADDITIONAL COMPENSATION, WHICH ARE MADE WITHOUT WRITTEN AUTHORIZATION AND IN AGREED PRICE, SHALL BE AT THE CONTRACTOR'S RISK AND EXPENSE.

1.11 ROUTINGS: ALL CONDUIT ROUTINGS, INCLUDING MC CABLE, SHALL BE PARALLEL AND PERPENDICULAR TO THE BUILDING STRUCTURE AND LINES. CONDUITS SHALL BE CONCEALED WHERE POSSIBLE UNLESS NOTED OTHERWISE. AESTHETIC APPEARANCE IS VERY IMPORTANT FOR THE WORK OF THIS PROJECT - THE CONTRACTOR WILL BE REQUIRED TO REMOVE AND REPLACE WORK THAT IS NOT NEAT AND ACCURATE. UNDERGROUND ROUTINGS, IF ANY, BETWEEN BUILDINGS MAY TAKE MOST DIRECT ROUTE.

1.12 CUTTING AND PATCHING: ALL CUTTING AND PATCHING REQUIRED FOR WORK OF THIS DIVISION IS INCLUDED HEREIN. COORDINATION WITH GENERAL CONTRACTOR AND OTHER TRADES IS IMPERATIVE. CONTRACTOR SHALL BEAR THE RESPONSIBILITY FOR AND THE ADDED EXPENSE OF ADJUSTING FOR IMPROPER HOLES, SUPPORTS, ETC.

1.13 ACCEPTANCE DEMONSTRATION: UPON COMPLETION OF THE WORK, AT A TIME TO BE DESIGNATED BY THE OWNER, THE CONTRACTOR SHALL DEMONSTRATE FOR THE OWNER THE OPERATION OF THE ELECTRICAL INSTALLATION, INCLUDING ANY AND ALL SPECIAL ITEMS INSTALLED BY HIM/HER OR INSTALLED UNDER THEIR SUPERVISION. PROPERLY SET AUTOMATIC TIME SWITCHES TO PERFORM SWITCHING OPERATIONS IN ACCORDANCE WITH SCHEDULES PROVIDED BY THE OWNER'S REPRESENTATIVE AND DEMONSTRATE (USING THE MANUFACTURER'S OPERATING INSTRUCTIONS) HOW TO OVERRIDE AND/OR TEST TIME SWITCHES' PROGRAMMING.

1.14 RECORD DRAWINGS, EQUIPMENT DATA: MAINTAIN ONE SET OF CLEAN WORKING DRAWINGS AT THE JOB SITE AND ENTER DAILY SUCH "AS-BUILTS" INFORMATION AS FEEDER AND SERVICE ROUTES, PULL BOX LOCATIONS AND CHANGES IN LAYOUT OR ARRANGEMENT WHICH OCCUR DURING CONSTRUCTION. DELIVER COMPLETED DRAWINGS TO THE OWNER.

DELIVER TO THE OWNER'S REPRESENTATIVE THREE COPIES OF DATA SHEETS OR OTHER CURRENT MANUFACTURERS' PUBLICATIONS FOR EACH ITEM OF ELECTRICAL EQUIPMENT FURNISHED FOR THE PROJECT INCLUDING AT LEAST THESE DATA:

- A. TECHNICAL DESCRIPTION AND REPLACEABLE PARTS LIST.
B. PHYSICAL DESCRIPTION AND INSTALLATION INSTRUCTIONS.
C. USER'S MANUAL AND OPERATING INSTRUCTIONS.
D. MANUFACTURER'S WARRANTY.

1.15 CLEAN-UP: RID THE PREMISES OF SCRAP MATERIALS, TRASH AND DEBRIS BOTH DURING CONSTRUCTION AND AT COMPLETION OF THE PROJECT. LEAVE THE BUILDING AND SURROUNDING AREA IN A CLEAN AND ORDERLY CONDITION.

1.16 TEMPORARY SERVICES: PROVIDE ADEQUATE AND SAFE TEMPORARY ELECTRICAL POWER AND LIGHTING THROUGHOUT THE CONSTRUCTION AND FINISHING OF THE PREMISES FOR BENEFICIAL OCCUPANCY. IN ADDITION TO SPECIAL OR UNUSUAL REQUIREMENTS, PROVIDE AT LEAST THESE ITEMS:

- A. SIX 20-AMP CIRCUITS FOR CONSTRUCTION POWER TOOLS. PROVIDE GFI TEMPORARY CIRCUITS WITH COVERPLATES TO MEET OSHA REQUIREMENTS.
B. EIGHT OR MORE LIGHT STRINGS SUSPENDED APPROXIMATELY ONE FOOT BELOW THE HEIGHT OF FINISH CEILING WITH LAMPS SPACED NOT MORE THAN TWELVE FEET ON CENTERS. STRINGS SHALL BE RUN THE LENGTH OF THE BUILDING FOOTPRINT WITH ONE STRING WITHIN EIGHT FEET OF EACH WALL AND ONE (OR MORE) INTERMEDIATE STRING(S) ARRANGED TO LIMIT THE SPACING BETWEEN ROWS TO SIXTEEN FEET OR LESS.
C. FLOOD LIGHTING AND TASK LIGHTING FOR PAINTING AND OTHER FINISH WORK. WHEN PERMANENT ELECTRICAL SERVICE IS OPERABLE, DISCONNECT AND REMOVE FROM THE PREMISES THE MATERIALS AND EQUIPMENT USED FOR TEMPORARY POWER AND LIGHTING, AND RESTORE MODIFICATIONS AND REPAIR DAMAGE CAUSED BY THE INSTALLATION, USE OR REMOVAL OF TEMPORARY SERVICE PROVISIONS.

1.17 WARRANTY: THE CONTRACTOR SHALL UNCONDITIONALLY WARRANT ALL WORK TO BE FREE OF DEFECTS IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE AND WILL REPAIR OR REPLACE ANY DEFECTIVE WORK PROMPTLY AND WITHOUT CHARGE AND RESTORE ANY OTHER EXISTING WORK DAMAGED IN THE COURSE OF REPAIRING DEFECTIVE MATERIALS AND WORKMANSHIP.

PART 2 - PRODUCTS

2.01 MATERIAL APPROVAL: ALL MATERIALS MUST BE NEW AND BEAR UNDERWRITER'S LABORATORIES LABEL. MATERIALS THAT ARE NOT COVERED BY UL TESTING STANDARDS SHALL BE TESTED AND APPROVED BY AN INDEPENDENT TESTING LABORATORY OR A GOVERNMENTAL AGENCY.

MATERIAL NOT IN ACCORDANCE WITH THESE SPECIFICATIONS MAY BE REJECTED EITHER BEFORE OR AFTER INSTALLATION.

2.02 CONDUITS AND OTHER RACEWAYS:

- A. RIGID STEEL: HOT-DIPPED GALVANIZED.
B. INTERMEDIATE METAL CONDUIT (IMC): HOT-DIPPED GALVANIZED.
C. ELECTRICAL METALLIC TUBING (EMT): ELECTRO-GALVANIZED.
D. WIREWAY: CODE GAUGE STEEL, WITH KNOCKOUTS AND HINGED COVER, CORROSION RESISTANT, GRAY BAKED ENAMEL FINISH.
E. PROVIDE FITTINGS AND ACCESSORIES APPROVED FOR THE PURPOSE EQUAL IN ALL RESPECTS TO THE CONDUIT OR RACEWAY. EMT CONNECTORS AND COUPLINGS SHALL BE STEEL SETSCREW TYPE INDOORS AND STEEL COMPRESSION TYPE IN WET LOCATIONS AND OUTDOORS.

2.03 WIRES AND CABLES:

- A. FOR POWER AND LIGHTING SYSTEM 600V OR LESS:
1. CONDUCTOR: MINIMUM SIZE #12 AWG.
a. #12 AND #10 AWG SHALL BE STRANDED COPPER.
b. #8 AWG AND LARGER SHALL BE STRANDED COPPER.
2. INSULATION TYPE:
a. #12 TO #1 AWG: THIN FOR WET OR UNDERGROUND AND THIN FOR DRY LOCATIONS.
b. #1/0 THROUGH #4/0 AWG: XHHW (55 MILS).
c. #250 KCMIL AND LARGER: XHHW (65 MILS).
d. GROUNDING WIRE: TW.
B. FOR SIGNAL AND COMMUNICATIONS CIRCUIT:
1. CONDUCTORS FOR GENERAL USE SHALL BE STRANDED COPPER CONDUCTOR, #16 AWG MINIMUM, WITH THIN INSULATION FOR UNDERGROUND OR WET LOCATIONS AND THIN INSULATION FOR DRY LOCATIONS.
2. SPECIAL CABLES SHALL BE AS SPECIFIED ON DRAWINGS.
C. ACCEPTABLE PRODUCTS: GENERAL ELECTRIC, ANACONDA, OKONITE, PARANITE OR TRIANGLE PRODUCTS CONFORMING OR EXCEEDING APPLICABLE IPCEA STANDARDS.

2.04 OUTLET BOXES, JUNCTION AND PULL BOXES:

- A. OUTLET BOXES: 4" SQUARE X 1-1/2" DEEP (OR LARGER) GALVANIZED SHEET STEEL KO-TYPE WITH PLASTER RING AND COVER FOR GENERAL INTERIOR USE AND CAST METAL TYPE FS OR FD WITH MATCHING SCREW COVERS FOR EXTERIOR AND EXPOSED INTERIOR LOCATIONS (GASKETED IN DAMP OR WET LOCATIONS).
B. JUNCTION BOXES SHALL BE SAME AS OUTLET BOXES UP TO 42 CU. IN. AND CODE-GAUGE STEEL IN LARGER SIZES WITH SURFACE OR FLUSH-TYPE SCREW-MOUNTED TRIM COVERS, BOTH BOXES AND COVERS INHIBITOR-PRIMED AND PAINTED INSIDE OUT.
C. PULL BOXES SHALL BE SAME AS JUNCTION BOXES UNLESS INDICATED OTHERWISE ON THE DRAWINGS, WITH COVERS.
D. TELEPHONE OUTLET BOXES SHALL BE THE TYPE AND SIZE REQUIRED BY THE SERVING TELEPHONE COMPANY BUT NOT SMALLER THAN 4-11/16" SQUARE X 2-1/8" DEEP WITH SINGLE-GANG RING AND SIERRA #S-754N SPLIT PLATE BUSHING.
E. ALL BOXES AND ASSOCIATED COMPONENTS SHALL BE STEEL CITY 663 SERIES, WITH P80-39 COVERPLATE OR EQUAL.
F. MULTISERVICE FLOOR BOXES SHALL BE RECTANGULAR, CAST IRON, FULLY ADJUSTABLE WITH NUMBER OF GANGS, DATA OUTLETS, AND 5-20R DUPLEX RECEPTACLES AS SHOWN ON PLANS AND SHALL CONTAIN SEPARATE COMPARTMENTS FOR POWER AND VOICE/DATA CABLING. FLOOR BOX SYSTEMS SHALL BE EQUAL TO LEGRAND OMNIBOX 8800SK-1 AND SHALL INCLUDE FLANGES AND COVERPLATES TO MATCH FLOOR BOX GANG CONFIGURATION, COORDINATE WITH ARCHITECT FOR FLOOR TYPE AND COLOR OF FLANGES AND COVERPLATES.

2.05 WIRING DEVICES AND PLATES SHALL BE HUBBELL, ARROW HART, LEVITON, GE OR P&S WITH HUBBELL NUMBERS USED TO SPECIFY TYPE USED.

A. STANDARD DESIGN:

- 1. SWITCH AND RECEPTACLE DEVICES SHALL BE AS SPECIFIED BY ARCHITECT.
2. WALL PLATES SHALL BE AS SPECIFIED BY ARCHITECT.
3. ISOLATED GROUND RECEPTACLES SHALL BE ORANGE WITH INDICATOR TRIANGLE AS REQUIRED PER NEC, MANUFACTURED BY "LEVITON" #5362-IGW OR APPROVED EQUAL.
4. SWITCHES SHALL BE 20 AMP, 120/277 VOLT A.C. RATED: SINGLE POLE SWITCHES SHALL BE #1221, 3-WAY SWITCHES SHALL BE #1223, AND 4-WAY SWITCHES SHALL BE #1224 (HUBBELL NUMBERS).
5. RECEPTACLES SHALL BE GROUNDING TYPE #5362 (HUBBELL NUMBER).
6. PROVIDE DIMMERS WITH LINEAR SLIDE AND ON/OFF SWITCH, SIZED FOR 150 PERCENT OF THE LOAD, UNLESS LARGER SIZE IS INDICATED. PROVIDE INCANDESCENT, FLUORESCENT, LED, OR LOW VOLTAGE TYPE DIMMER TO MATCH THE LOAD APPLICATION SHOWN ON THE DRAWINGS. PROVIDE SINGLE-POLE OR THREE-WAY DIMMERS AS INDICATED ON PLANS. PROVIDE GANG DIMMERS AS REQUIRED IN ACCORDANCE WITH MANUFACTURER'S DIRECTIONS. PROVIDE DIMMERS WITH COVERPLATE AS SPECIFIED BY ARCHITECT.
7. WALL-SWITCH OCCUPANCY/VACANCY SENSORS SHALL BE DUAL-RELAY, MULTI-TECHNOLOGY WALL-SWITCH TYPE, 120/277V, ADJUSTABLE TIME DELAY UP TO 30 MINUTES, 180-DEGREE FIELD OF VIEW, EQUAL TO LEVITON OSSM-MD.
8. CEILING MOUNT OCCUPANCY SENSORS SHALL BE MULTI-TECHNOLOGY, 360-DEGREE, SELF-ADJUSTING, ADJUSTABLE TIME DELAY UP TO 30 MINUTES, COMMERCIAL GRADE, EQUAL TO LEVITON OSC05-MOW.

2.06 CONDUIT HANGERS: FOR INDIVIDUAL CONDUIT RUNS NOT DIRECTLY FASTENED TO THE STRUCTURE, USE ROD HANGERS MANUFACTURED BY CADDY, UNISTRUT, OR POWERSTRUT. FOR MULTIPLE CONDUIT RUNS, USE UNISTRUT OR POWERSTRUT TRAPPEZE TYPE CONDUIT SUPPORT DESIGNED FOR MULTIPLE DEFLECTION NOT GREATER THAN 1/8".

2.07 WIRE CONNECTORS:

FOR WIRE SIZES #8 AWG AND SMALLER: INSULATED PRESSURE TYPE (WITH LINE SPRING) RATED 105 DEGREES C, 600V FOR BUILDING WIRING AND 1000V IN SIGNS OR FIXTURES; SCOTCHLOK OR IDEAL FOR WIRE SIZE #6 AWG AND LARGER; T & B OR EQUIVALENT COMPRESSION TYPE WITH 3M #33+R OR PLYMOUTH "SLIPKNOT GRAY" TAPE INSULATION.

2.08 PANELBOARDS:

- A. CONSTRUCTION: CABINETS SHALL BE OF CODE GAUGE, GALVANIZED STEEL, SURFACE OR FLUSH MOUNTED AS INDICATED. DOORS SHALL BE OF COLD-ROLLED STEEL WITH CONCEALED HINGES AND FLUSH CATCH AND LOCK. ALL PANELS SHALL BE KEPT ALIKE. PANELS LOCATED ADJACENT TO EACH OTHER SHALL HAVE IDENTICALLY SIZED ENCLOSURE AND TRIMS. MINIMUM PANEL WIDTH SHALL BE 20". FINISH EXPOSED PART WITH ONE COAT OF PRIMER AND ONE COAT OF LIGHT GRAY ENAMEL SUITABLE FOR OVERPAINTING IN FIELD IF DESIRED.
B. BUS BARS: PROVIDE GROUND BLOCK WITH FULL COMPLEMENT OF TERMINALS IN ADDITION TO INSULATED NEUTRAL BUS. FUTURE BREAKER SPACES SHALL HAVE COMPLETE PROVISION INCLUDING BUSESSES AND CONNECTING HARDWARE.
C. MANUFACTURERS: PANELBOARDS SHALL BE GENERAL ELECTRIC, SQUARE D, EATON, OR SIEMENS-ITE.
D. CIRCUIT BREAKERS: SHALL BE QUICK-MAKE, QUICK-BREAK, MOLDED CASE TYPE:
1. 120/208 VOLT PANELS: SHALL BE BOLT-ON TYPE WITH MINIMUM SYMMETRICAL INTERRUPTING CAPACITY AS SHOWN ON THE PLANS.
2. 277/480 VOLT PANELS: SHALL BE BOLT-ON TYPE, WITH MINIMUM SYMMETRICAL INTERRUPTING CAPACITY AS SHOWN ON THE PLANS.
3. PROVIDE MULTI-POLE UNITS WITH COMMON TRIP ELEMENT.
4. CIRCUIT BREAKERS USED FOR CONTROL OF LIGHTING (PANELBOARD SWITCHING) SHALL BE UNDERWRITERS' LABORATORIES LISTED AND MARKED "SWD" TO INDICATE THEIR STABILITY.
E. IDENTIFICATION: PROVIDE SCREWED-ON (NO ADHESIVES) BAKELITE OR PHOTO-ETCHED METALLIC NAMEPLATE IDENTIFICATION ON OUTSIDE OF EACH PANEL SHOWING PANEL DESIGNATION, VOLTAGE, AND PHASE IN MINIMUM 1/4" HIGH LETTERS. EACH PANEL SHALL CONTAIN A METAL-FRAMED CIRCUIT DIRECTORY INSIDE COVER, WITH PLASTIC PROTECTOR.
F. COMPLETE SHOP DRAWINGS ARE REQUIRED. SEE ARTICLE 1.08.

2.09 DRY TYPE TRANSFORMERS:

- A. GENERAL: EQUIPMENT SHALL CONFORM TO OR EXCEED REQUIREMENTS OF THE ENERGY CODE, NEMA, ANSI STANDARD C89.2 FOR DRY TYPE TRANSFORMER FOR GENERAL APPLICATIONS. ACCEPTABLE PRODUCTS ARE THOSE OF SQUARE D, EATON, SIEMENS-ITE, OR EQUIVALENT.
B. ELECTRICAL RATINGS:
1. PRIMARY WINDINGS VOLTAGE: 480 VOLTS, 3-PHASE DELTA, SECONDARY WINDINGS VOLTAGES: 208Y/120 VOLTS, 3-PHASE GROUND.
FREQUENCY: 60 HZ.
KVA RATING: AS SHOWN ON DRAWINGS.
TAPS: SIX (6) 2.5% FULL CAPACITY TAPS: 2 ABOVE AND 4 BELOW RATED VOLTAGE.
IMPEDANCE: FOR TRANSFORMERS LARGER THAN 75 KVA, 4.5% MINIMUM, 5.75% MAXIMUM.
2. WINDING TEMPERATURE RISE SHALL BE 150 DEGREES CENTIGRADE IN ACCORDANCE WITH UL SPECIFICATION ARTICLE 506.
3. TRANSFORMER SHALL BE CAPABLE OF OPERATING AT 100% OF NAMEPLATE RATING CONTINUOUSLY WHILE IN AN AMBIENT TEMPERATURE NOT EXCEEDING 40 DEGREES CENTIGRADE.
4. TRANSFORMER SHALL MEET THE DAILY OVERLOAD REQUIREMENTS OF ANSI STANDARD C57.96.

C. VIBRATION ISOLATION, FACTORY-INSTALLED: PROVIDE NEOPRENE RUBBER PADS TO ISOLATE CORE AND COIL ASSEMBLY FROM TRANSFORMER ENCLOSURE.

D. INSTALLATION:

- 1. ANCHOR TRANSFORMER SECURELY WITH MINIMUM 1/2" DIAMETER BOLTS. STRENGTH OF BOLTS USED TO SECURE THE TRANSFORMER SHALL BE SUFFICIENT TO RESIST SHEAR AND UPLIFT PRODUCED BY FORCE EQUAL TO 1/2 OF THE EQUIPMENT MASS APPLIED HORIZONTALLY AT CENTER OF GRAVITY.
2. PROVIDE 1" THICK HIGH RESILIENCY PADS TO ISOLATE TRANSFORMER FROM FLOOR OF PLATFORM. KORFUND "ELASTO RIB" OR EQUIVALENT.
3. USE FLEXIBLE CONDUITS AT LEAST 24" LONG FOR ELECTRICAL CONNECTIONS.
4. PROVIDE GROUNDING OF EACH TRANSFORMER SECONDARY INCLUDING ALL CONDUITS, WIRES, AND CONNECTORS IN ACCORDANCE WITH NEC 250-26 AND ANY LOCAL ENHANCEMENTS.

2.10 INDIVIDUALLY MOUNTED MOTOR CONTROLLERS:

- A. FOR POLYPHASE MOTORS: COMBINATION MOTOR CIRCUIT PROTECTOR AND MAGNETIC STARTER, WITH 3-LEG OVERLOAD PROTECTION, PROVIDE TWO INTERLOCK CONTACTS OF THE INTERCHANGEABLE OPEN-CLOSE TYPE. PROVIDE HAND-OFF-AUTOMATIC SELECTOR SWITCH, MOTOR RUNNING PILOT LIGHT AND RESET BUTTON IN COVER. CIRCUITS 300V AND OVER SHALL BE PROVIDED WITH INDIVIDUAL 120V CONTROL TRANSFORMERS. PROVIDE REDUCED VOLTAGE STARTERS FOR LARGE MOTORS (7.5 HP AND GREATER) OR AS REQUIRED BY UTILITY CO.
B. STARTERS FOR FRACTIONAL HORSEPOWER 120V MOTORS SHALL BE MANUAL TYPE UNLESS SHOWN OTHERWISE, EQUIPPED WITH BUILT-IN OVERLOAD PROTECTION.
C. ACCEPTABLE MANUFACTURERS: GENERAL ELECTRIC, EATON, SIEMENS, SQUARE D, AND ALLEN BRADLEY.

2.11 MISCELLANEOUS MATERIALS:

- A. SAFETY SWITCHES: HEAVY DUTY TYPE, 600V, HORSEPOWER RATED FOR MOTORS, FUSED OR NON-FUSED AS REQUIRED MOUNT IN ENCLOSURE WITH NEMA RATING AS REQUIRED FOR THE SPECIFIC APPLICATION. GENERAL ELECTRIC, SQUARE D, EATON OR SIEMENS-ITE.
B. TIME CLOCK: TORK #DGLC, OR ACCEPTED SUBSTITUTE.
C. PHOTOCELLS: TORK EPC1, OR ACCEPTED SUBSTITUTE.
D. CONTACTORS/RELAYS: AS MANUFACTURED BY ASCO, OR ACCEPTED SUBSTITUTE, MECHANICALLY HELD WITH RELAYS AS REQUIRED TO OPERATE ON TWO WIRE CONTROL CIRCUITS.

2.12 LIGHTING:

- A. LIGHTING TO BE PROVIDED BY THE ELECTRICAL CONTRACTOR AS INDICATED ON THE DRAWINGS. SUBCONTRACTORS TO INSTALL ALL FIXTURES COMPLETE, INCLUDING LAMPS AND BALLASTS, READY FOR SERVICE.
B. SUPPORTS: PROPER SUPPORTS AND MOUNTING ACCESSORIES, SUCH AS HANGERS, STEMS, YOKES, PLASTER FRAMES, ETC. SHALL BE PROVIDED AS REQUIRED BY THE TYPE OF CEILING INSTALLED. FIXTURES SHALL HANG PLUMB REGARDLESS OF CEILING SLOPE.
C. FIXTURE DESIGNATION: FIXTURE TYPES ARE DESIGNATED ON DRAWINGS. FOR EXACT FIXTURE COUNT AND LOCATION, REFER TO REFLECTED CEILING PLAN.
D. BALLASTRY: ADVANCE, GE, OR APPROVED HIGH FREQUENCY ELECTRONIC, FULL LIGHT OUTPUT, ENERGY SAVING, CLASS "P", HIGH POWER FACTOR, 10% THD, ETL CERTIFIED, SOUND RATING "A" OR AS INDICATED ON DRAWINGS.
E. BATTERY PACKS:
1. WHERE FLUORESCENT FIXTURES ARE SHOWN IN THE CONTRACT DOCUMENTS TO HAVE BATTERY BACK UP, PROVIDE BATTERY PACK INVERTER WITH END-OF-LIFE SHUTDOWN AS FOLLOWS: TO SUPPORT LAMP F32T8, BODINE B50, 1350 LUMENS MIN.

PART 3 - EXECUTION

3.01 GENERAL:

- A. ELECTRIC SYSTEM LAYOUTS INDICATED ON THE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND SHALL BE FOLLOWED AS CLOSELY AS ACTUAL CONSTRUCTION AND WORK OF OTHER TRADES WILL PERMIT. GOVERN EXACT ROUTING OF CABLE AND WIRING AND THE LOCATIONS OF OUTLETS BY THE STRUCTURE AND EQUIPMENT SERVED. TAKE ALL DIMENSIONS FROM ARCHITECTURAL DRAWINGS.
B. CONSULT ALL OTHER DRAWINGS, VERIFY SCALES AND REPORT ANY DIMENSIONAL DISCREPANCIES OR OTHER CONFLICTS WITH THE ARCHITECT BEFORE SUBMITTING BID.
C. ALL HOME RUNS TO PANELBOARDS ARE INDICATED AS STARTING FROM THE OUTLET NEAREST THE PANEL AND CONTINUING IN THE GENERAL DIRECTION OF THAT PANEL. CONTINUE SUCH CIRCUITS TO THE PANEL AS THOUGH THE ROUTES WERE COMPLETELY INDICATED. TERMINATE HOMERUNS OF SIGNAL, ALARM, AND COMMUNICATION SYSTEMS IN A SIMILAR MANNER.

D. AVOID CUTTING AND BORING HOLES THROUGH STRUCTURE OR STRUCTURAL MEMBERS WHEREVER POSSIBLE. OBTAIN PRIOR APPROVAL OF OWNER AND CONFORM TO ALL STRUCTURAL REQUIREMENTS WHEN CUTTING OR BORING THE STRUCTURE IS NECESSARY AND PERMITTED.

E. FURNISH AND INSTALL ALL NECESSARY HARDWARE, HANGERS, BLOCKING, BRACKETS, BRACING, RUNNERS, ETC. REQUIRED FOR EQUIPMENT SPECIFIED UNDER THIS SECTION.

F. PROVIDE NECESSARY BACKING REQUIRED TO INSURE RIGID MOUNTING OF OUTLET BOXES.

3.02 WIRING METHODS:

A. NO "ROMEX" OR ARMORED CABLE WIRING IS PERMITTED - ALL ELECTRICAL WIRING MUST BE IN CONDUIT.

B. CONDUIT SHALL BE RIGID STEEL, IMC, EMT, METAL CLAD (MC) CABLE, OR SCHEDULE 40 PVC AS FOLLOWS:

- 1. ABOVE GROUND: USE RIGID STEEL, IMC, MC, OR EMT. MC CABLE SHALL BE INSTALLED ONLY WHERE PERMITTED BY CODE AND THE AUTHORITY HAVING JURISDICTION.
a. WET LOCATIONS: RIGID STEEL OR IMC ONLY.
b. LOCATIONS SUBJECT TO MECHANICAL DEFORMATION: RIGID STEEL OR IMC ONLY.
c. HAZARDOUS LOCATIONS: THREADED RIGID STEEL OR THREADED STEEL IMC ONLY.
d. DRY INTERIOR LOCATIONS FOR BRANCH CIRCUIT WIRING AND NOT SUBJECT TO MECHANICAL DEFORMATION: EMT, IMC, MC, OR RIGID STEEL CONDUIT.
e. DRY INTERIOR LOCATIONS FOR OTHER THAN BRANCH CIRCUIT WIRING AND NOT SUBJECT TO MECHANICAL DEFORMATION: EMT, IMC, OR RIGID STEEL CONDUIT.
2. UNDERGROUND: USE RIGID STEEL OR SCHEDULE 40 PVC WITH RIGID STEEL ELLS AND RIGID STEEL CONDUIT/FITTINGS WHEN EMERGING FROM GRADE, UNLESS NOTED OTHERWISE.

C. USE FLEXIBLE CONDUITS IN THE FOLLOWING APPLICATIONS (MAX 6-FT):

- 1. RECESSED LIGHTING FIXTURES.
2. MOTOR CONNECTIONS.
3. TRANSFORMER CONNECTIONS.
4. AT BUILDING JOINTS.
5. AT WET LOCATIONS, FLEXIBLE CONDUIT SHALL BE LIQUIDTIGHT TYPE.
D. LIGHT FIXTURES INSTALLED IN GYP BOARD CEILINGS MAY BE WIRED FROM FIXTURE TO FIXTURE USING MC CABLE UNLESS PROHIBITED BY THE AHJ. VERIFY THAT LIGHT FIXTURES ARE PROVIDED WITH JUNCTION BOXES APPROVED FOR THIS PURPOSE. MC TYPE CABLE TO MEET ANSI/NFPA 70 REQUIREMENTS. CABLE ARMOR TO BE INTERLOCKED STEEL METAL TAPE. MC TYPE CABLE MANUFACTURED BY AFC CABLE SYSTEMS, PIRELLI CABLE CORPORATION AND SOUTHWIRE COMPANY ARE APPROVED. MC CABLE SHALL NOT BE USED TO WIRE LIGHT FIXTURES INSTALLED IN EXPOSED CEILINGS FROM FIXTURE TO FIXTURE (6-FT LIGHT FIXTURE WHIPS ARE PERMITTED).
E. ALL WIRING SHALL BE IN CONDUIT.
F. ALL CONDUIT AND MC CABLE SHALL BE SUPPORTED AS REQUIRED BY THE NEC.

3.03 INSTALLATION OF CONDUITS:

A. GENERAL:

- 1. RUN ALL CONDUIT CONCEALED, IF POSSIBLE, UNLESS NOTED OTHERWISE ON THE PLANS.
2. RUN ALL CONDUIT PARALLEL TO OR AT RIGHT ANGLES TO CENTER LINES OF COLUMNS AND BEAMS.
3. CONDUITS ABOVE CEILINGS SHALL NOT OBSTRUCT REMOVAL OF CEILING TILES, LIGHTING FIXTURES, AIR DIFFUSERS, ETC.
4. CONDUITS SHALL NOT CROSS ANY DUCT SHAFT OR AREA DESIGNATED AS FUTURE DUCT SHAFT HORIZONTALLY. CONDUIT RISERS, WHEN ALLOWED IN DUCT SHAFT, MUST BE COORDINATED WITH MECHANICAL WORK TO AVOID ANY CONFLICT.
5. INSTALL NO MORE THAN THE EQUIVALENT OF THREE 90-DEGREE BENDS IN ANY CONDUIT RUN EXCEPT FOR COMMUNICATIONS CONDUITS, FOR WHICH ONLY TWO BENDS ARE ALLOWED. PROVIDE J-BOXES AS NEEDED WHERE MORE BENDS ARE NEEDED.

B. CONDUIT SUPPORTS:

- 1. SUPPORT CONDUITS WITH UNDERWRITER'S LABORATORIES LISTED STEEL CONDUIT SUPPORTS AT INTERVALS REQUIRED BY THE NATIONAL ELECTRIC CODE. WIRES AND SHEET METAL STRIPS ARE NOT ACCEPTABLE FOR CONDUIT SUPPORT. USE CONDUIT HANGERS FOR ALL CONDUITS NOT DIRECTLY FASTENED TO STRUCTURE AND FOR ALL MULTIPLE CONDUIT RUNS. DO NOT ATTACH ANY CONDUIT TO MECHANICAL DUCTS OR PIPES.
2. AVOID ATTACHING CONDUIT TO AIR MOVING SYSTEM WHEN IT IS NECESSARY TO SUPPORT CONDUIT FROM AIR MOVING SYSTEM, PROVIDE A LENGTH OF FLEXIBLE CONDUIT BETWEEN PORTION ATTACHED TO AIR MOVING SYSTEM AND PORTION ATTACHED TO THE BUILDING TO MINIMIZE TRANSMISSION OF VIBRATION TO THE BUILDING STRUCTURE.
3. AN NFPA 251 TESTED AND APPROVED CEILING SYSTEM CAN BE USED TO SUPPORT BRANCH CIRCUIT CABLING WHERE APPROVED BY THE AHJ.

C. CONDUIT PENETRATION:

- 1. PENETRATING FIRE RATED FLOOR OR WALL: INSTALL CONDUIT IN CONDUIT SLEEVE OR FRAMED OPENING. SEAL PENETRATION WITH FIRE RETARDANT SEALANT.
2. PENETRATING ROOF OR EXTERIOR WALL: AVOID PENETRATING ROOF OR EXTERIOR WALL WHERE POSSIBLE. WHERE PENETRATIONS ARE NECESSARY, BUILDING WEATHERPROOF INTEGRITY MUST BE PRESERVED. CONDUITS PENETRATING THROUGH ROOF SHALL HAVE ROOF FLASHING WITH CAULK TYPE COUNTERFLASHING SLEEVE.
3. PENETRATING SOUND INSULATED OR AIR PLENUM WALL: INSTALL CONDUIT IN CONDUIT SLEEVE AND SEAL PENETRATION AS DETAILED ON THE DRAWINGS.
4. PENETRATING NON-FIRE RATED DRY WALL: CONDUIT SLEEVES ARE NOT REQUIRED. PENETRATIONS MUST BE SEALED WITH PLASTER PRIOR TO PAINTING. PENETRATIONS MADE AFTER WALL FINISH IS APPLIED MUST BE AS SMALL AS POSSIBLE AND PROVIDED WITH ESCUTCHEONS, ONE ON EACH SIDE OF WALL.
5. PENETRATING SUSPENDED CEILING: CUT HOLE AS SMALL AS POSSIBLE TO PERMIT CONDUIT PENETRATION. PROVIDE ESCUTCHEON FOR EACH CONDUIT BELOW CEILING.

3.04 CONNECTIONS TO EQUIPMENT:

A. GENERAL:

- 1. FURNISH AND INSTALL REQUIRED POWER SUPPLY CONDUIT AND WIRING TO ALL EQUIPMENT. SEE BELOW FOR OTHER WIRING REQUIRED.
2. FURNISH AND INSTALL A DISCONNECT SWITCH IMMEDIATELY AHEAD OF AND ADJACENT TO EACH MAGNETIC MOTOR STARTER OR APPLIANCE UNLESS THE MOTOR APPLIANCE IS LOCATED ADJACENT AND WITHIN SIGHT OF THE SERVING PANELBOARD, CIRCUIT BREAKER OR SWITCH. VERIFY ALL EQUIPMENT NAMEPLATE CURRENT RATINGS PRIOR TO INSTALLATION.
3. INSTALL ALL ROUGH-IN WORK FOR EQUIPMENT FROM APPROVED SHOP DRAWINGS TO SUIT THE SPECIFIC REQUIREMENTS OF THE EQUIPMENT.
4. FURNISH AND INSTALL MANUAL THERMAL PROTECTION FOR ALL MOTORS NOT INTEGRALLY EQUIPPED WITH THERMAL PROTECTION.
5. FURNISH 120 VOLT POWER TO EACH CONTROL PANEL AND TIME SWITCH REQUIRING A SOURCE OF POWER TO OPERATE.

3.05 INSTALLATION OF CONDUCTORS:

- A. PULL NO WIRE INTO ANY PORTION OF THE CONDUIT SYSTEM UNTIL ALL CONSTRUCTION WORK WHICH MIGHT DAMAGE THE WIRE HAS BEEN COMPLETED.
B. INSTALL ALL WIRE CONTINUOUS FROM OUTLET TO OUTLET OR TERMINAL TO TERMINAL SPLICES IN CABLES WHEN REQUIRED SHALL BE MADE IN HAND HOLES, PULL BOXES OR JUNCTION BOXES. MAKE BRANCH CIRCUIT SPLICES IN OUTLET BOXES WITH 8" OF CORRECTLY COLOR-CODED TAILS LEFT IN THE BOX.
C. SPLICES IN WIRES AND CABLES SHALL BE MADE UTILIZING MATERIALS AND METHODS DESCRIBED HEREIN BEFORE.
D. MAKE ALL GROUND, NEUTRAL AND LINE CONNECTIONS TO RECEPTACLE AND WIRING DEVICE TERMINALS AS RECOMMENDED BY MANUFACTURER.
E. PROVIDE BRADY WIRE MARKERS WHERE NUMBER OF CONDUCTORS IN A BOX EXCEEDS FOUR.
F. MEGGER AND RECORD INSULATING RESISTANCE OF ALL 600 VOLT INSULATED CONDUCTORS SIZE #4/0 AND LARGER USING 500 VOLT MEGGER FOR ONE MINUTE. MAKE TESTS WITH CIRCUITS ISOLATED FROM SOURCE AND LOAD. VERIFY THAT RESULTS ARE WITHIN THE MANUFACTURER'S RESISTANCE SPECIFICATIONS. SUBMIT ALL RESULTS TO ENGINEER.

3.06 WIRE COLOR CODE:

COLOR CODING SHALL BE CONTINUOUS FOR WIRE #12 THROUGH #10 AWG. PHASE CONDUCTORS #8 AND LARGER AND CONDUCTORS OF ANY SIZE IN CABLE ASSEMBLIES MAY HAVE COLORED PHASING TAPE AT TERMINATIONS. COLOR CODE WIRES AS FOLLOWS:

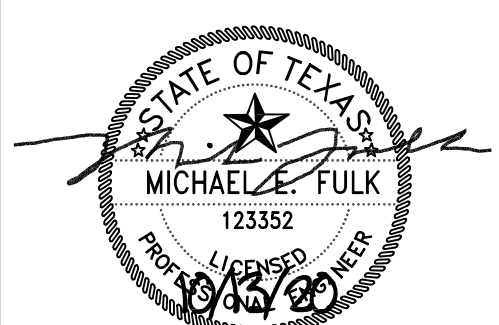
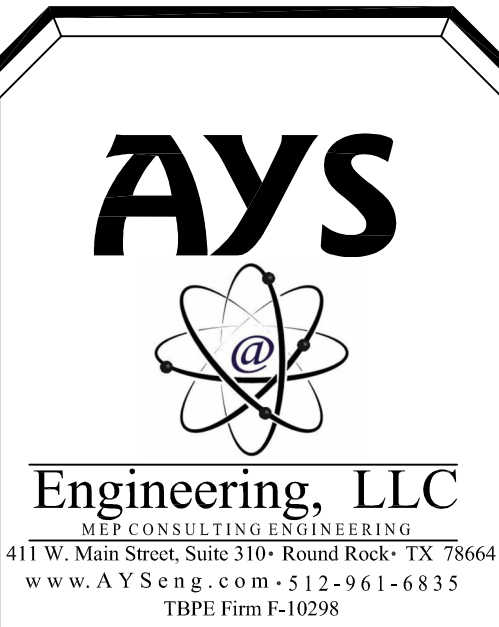
Table with columns: VOLTAGE, PHASE A, PHASE B, PHASE C, NEUTRAL, GND. Rows: 120/208V, 277/480V with corresponding color codes (RED, BLACK, BLUE, WHITE, GREEN, BROWN, YELLOW, PURPLE, GRAY, GREEN).

3.07 IDENTIFICATION:

- A. PROVIDE NAMEPLATES FOR SWITCHGEARS, PANELBOARDS, AND ALL SIMILAR DEVICES. NAMEPLATES SHALL BE SCREWED (NO ADHESIVES) ENGRAVED BAKELITE OR PHOTO-ETCHED METALLIC NAMEPLATE IDENTIFICATION SHOWING PANEL DESIGNATION, VOLTAGE AND PHASE IN MINIMUM 1/4" HIGH LETTERS.
B. EACH PANELBOARD SHALL CONTAIN A METAL-FRAMED CIRCUIT DIRECTORY INSIDE COVER, WITH PLASTIC PROTECTOR.
C. PANELBOARD SCHEDULE: AFTER COMPLETION OF WORK, PROVIDE TYPEWRITTEN UPDATED PANELBOARD SCHEDULES FOR ALL PANELBOARDS. INCLUDE ROOM/EQUIPMENT DESIGNATIONS TO IDENTIFY ROOM/EQUIPMENT SERVED BY CIRCUIT.

3.08 GROUNDING:

- A. ELECTRICAL SERVICE AND SEPARATELY DERIVED ALTERNATING CURRENT SYSTEMS SHALL BE GROUNDED IN ACCORDANCE WITH NEC ARTICLE 250-3 TO 250-26, INCLUSIVE.
B. GROUND NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL ENCLOSURES, FRAMES, CABLE TRAYS OR CONDUCTOR RACEWAYS TO PROVIDE A LOW IMPEDANCE PATH FOR LINE-TO-GROUND FAULT CURRENT AND TO BOND ALL NON-CURRENT CARRYING METAL PARTS TOGETHER. PROVIDE GROUND CONDUCTOR IN EACH RACEWAY SYSTEM, WHETHER GROUND WIRE IS SPECIFICALLY LISTED OR NOT. EQUIPMENT GROUND CONDUCTOR SHALL BE ELECTRICALLY AND MECHANICALLY CONTINUOUS FROM THE ELECTRICAL CIRCUIT SOURCE TO THE EQUIPMENT TO BE GROUNDED. SIZE GROUND CONDUCTORS PER NEC ARTICLE 250.122 UNLESS LARGER CONDUCTORS ARE SHOWN ON DRAWINGS.
C. GROUNDING CONDUCTORS SHALL BE IDENTIFIED WITH GREEN INSULATION. WHERE GREEN INSULATION IS NOT AVAILABLE ON LARGER SIZES, BLACK INSULATION SHALL BE USED AND SUITABLY IDENTIFIED WITH GREEN TAPE AT EACH JUNCTION BOX OR DEVICE ENCLOSURE.
D. ISOLATED GROUND CONDUCTORS SHALL BE RUN CONTINUOUS WITHOUT SPLICE FROM THE ISOLATED GROUND BUS IN THE PANEL TO THE "IG" DESIGNATED DEVICE.



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Table with columns: NO., DATE, DESCRIPTION. Multiple empty rows for revisions.

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