ELECTRICAL SYN				
STANDARD MOUNTING H		POWER EQUIPMENT & DEVICES	WIRING DEVICES & BOXES	ELECTRICAL ONE-LINE
ANNUNCIATOR PANELS (DISPLAY) CONTROLS (CENTRO OF DEVICE)	60" 48" 1 ELECTRICAL OR FIRE ALARM PLAN NOTE CALLOUT	ELECTRICAL PANELBOARD (SURFACE OR FLUSH MOUNT)	SIMPLEX RECEPTACLE - NEMA 5-20R, UNO	V SWITCH (RATING AS INDICATED)
EXIT SIGNS (SEE DRAWINGS) FIRE ALARM ANNUNCIATOR PANEL (DISPLAY) FIRE ALARM BELL (EXTERIOR) (CENTERLINE)	105" 60" PLUMBING EQUIPMENT DESIGNATION. (CONTRACTOR FURNISHED AND 120" 1 INSTALLED). REFER TO PLUMBING FIXTURE OR EQUIPMENT	CONTROL SYSTEM CABINET (CONTROLS, SECURITY, A/V)	DUPLEX RECEPTACLE - NEMA 5-20R, UNO	↑ ##AS 3P FUSED SWITCH (RATING, POLES AND FUSE TYPE AS INDICATED)
FIRE ALARM CONTROL PANEL/UNIT (DISPLAY) PULL STATIONS (TOP OF DEVICE) RECEPTACLES (TO CENTER)	60" SCHEDULES 48" 16" EQUIPMENT DESIGNATION (OWNER FURNISHED, CONTRACTOR	PLYWOOD TERMINAL BOARD FOR TELEPHONE SYSTEM, UNO. SIZE AS	DOUBLE DUPLEX RECEPTACLE - NEMA 5-20R, UNO	
RECEPTACLES (EXTERIOR) RECEPTACLES (GARAGES)	24" 1 INSTALLED)	NOTED	The Booker Bor LEXTRESET TABLE THE MINTO 2011, 6110	CIRCUIT BREAKER (RATINGS AS INDICATED)
RECEPTACLES (POOLS) RECEPTACLES (ABOVE COUNTER) RECEPTACLES IN EQUIPMENT ROOMS	27" 42" 44" MECHANICAL EQUIPMENT DESIGNATION (CONTRACTOR FURNISHED AND INSTALLED UNLESS NOTED OTHERWISE)	SWITCHBOARD OR MOTOR CONTROL CENTER ON HOUSEKEEPING PAD	SPECIAL RECEPTACLE - NEMA TYPE AS NOTED	PANELBOARD, SINGLE OR MULTI-SECTION (REFER TO SCHEDULES)
REMOTE INDICATING LIGHT (EQUIPMENT ROOMS) REMOTE INDICATING LIGHT (FINISHED AREAS) SAFETY SWITCHES (TOP OF DEVICE)	48" CEILING 60" DETAIL REFERENCE UPPER NUMBER INDICATES DETAIL NUMBER	ELECTRICAL DISTRIBUTION PANELBOARD	GFCI TYPE RECEPTACLE*	ISOLATED POWER PANELBOARD W/ INTEGRAL TRANSFORMER (REFER TO SCHEDULES)
STARTERS (TOP OF DEVICE) SWITCHES (TOP OF DEVICE)	60" LOWER NUMBER INDICATES SHEET NUMBER 48" ACENT DEVICE, UNO	T TRANSFORMER	ISOLATED GROUND TYPE RECEPTACLE*	TX#
TELEPHONE TERMINAL BOARD (BOTTOM)	TO ARCH DRAWINGS 1 SECTION CUT DESIGNATION	◆ MOTOR	● EMERGENCY RECEPTACLE*	
FIRE ALARM DEVICES (CENTERLINE)	CIRCUITING & WIRING	DISCONNECT SWITCH - "200/3/150/3R" DENOTES	RECEPTACLE INSTALLED ABOVE COUNTER OR BACKSPLASH*	SHIELDED TRANSFORMER (TYPE AND RATINGS AS INDICATED)
	HOMERUN TO PANELBOARD, INFORMATION AT ARROWS ARE CIRCUIT	AMPERES/POLE/FUSE/NEMA ENCLOSURE RATING, NF= NON-FUSED, CB= CIRCUIT BREAKER (200/3/CB), NO VALUE (200/3/150) FOR NEMA ENCLOSURE MEANS STANDARD NEMA 1 RATING	RECEPTACLE INSTALLED IN CEILING*	AUTOMATIC TRANSFER SWITCH (RATINGS AS INDICATED)
USE THE DEFAULT MOUNTING HEIGHTS SHOWN ABOVE UNLESS NOTE	NUMBERS AND PANELBOARD FOR TERMINATION. REFER TO	COMBINATION DISCONNECT (SAFETY) SWITCH AND MOTOR STARTER	RECEPTACLE INSTALLED IN FLOOR*	AUTOMATIC TRANSFER SWITCH WITH BYPASS (RATINGS AS
THE CONSTRUCTION DOCUMENTS. MOUNTING HEIGHTS LISTED ARE ALL FLOOR (AFF) OR ABOVE FINISHED GRADE (AFG) TO BOTTOM OF OUTLE SHALL BE INSTALLED IN COMPLIANCE WITH CURRENT ADA AND LOCAL	BOVE FINISHED T BOX. ALL DEVICES	30/3/15/1/3R "30/3/15/1/3R" DENOTES AMPÈRES/POLE/FUSE/NEMA STARTER L SIZE/NEMA ENCLOSURE RATING. NF= NON-FUSED, CB= CIRCUIT	RECEPTACLE INSTALLED VIA DROP CORD*	AUTOMATIC TRANSFER SWITCH WITH BYPASS (RATINGS AS INDICATED)
ABBREVIATIONS	CONDUIT CONCEALED	BREAKER (30/3/CB/1), NO VALUE (200/3/150/1) FOR NEMA ENCLOSURE MEANS STANDARD NEMA 1 ENCLOSURE RATING	NEGET MOLE INCINELED VINDICOL GOING	## KW GENERATOR ## KW
A M		MAGNETIC MOTOR STARTER, NEMA SIZE AS NOTED. 3-POLE, UNO	HWRWP	GENERATOR (RATINGS AS INDICATED) NON-SEPARATELY DERIVED SOURCE
AFC AVAILABLE FAULT CURRENT MCC MOTOR CO AFF ABOVE FINISHED FLOOR MFR MANUFACT	NTROL CENTER URER	\$ MANUAL MOTOR STARTER DISCONNECT	RECEPTACLE LETTER DESIGNATIONS AS FOLLOWS: C = AUTOMATICALLY CONTROLLED D = DEMOLISHED	OR SEPARATELY DERIVED SOURCE
AFG ABOVE FINISHED GRADE MIN MINIMUM AHJ AUTHORITY HAVING MLO MAIN LUGS JURISDICTION MOCP MAXIMUM (ONLY OVERCURRENT EXPOSED CONDUIT	VFD VARIABLE FREQUENCY DRIVE	E = EXISTING EM = EMERGENCY POWER ER = EXISTING TO BE RELOCATED	MDP SWITCHBOARD ELEC ROOM ### AMPS 480Y/277V 3Ø 4W SWITCHGEAR, SWITCHBOARD AND/OR DISTRIBUTION
AHU AIR HANDLING UNIT PROTECTION AIC AMPERE INTERRUPTING MTD MOUNTED CAPACITY	LOW VOLTAGE CABLE	LOW-VOLTAGE PUSH-BUTTON (AUTO-OPENER / SECURITY)	GFCI = GROUND-FAULT CIRCUIT INTERRUPTER H = HORIZONTALLY MOUNTED	PANELBOARD (TYPE, RATING, DEVICES AND ACCESSORIES AS INDICATED)
AS AMPERE SWITCH SIZE AT AMPERE TRIP SETTING N/A NOT APPLIC			IG = ISOLATED GROUND R = RELOCATED, NEW LOCATION S = MANUALLY SWITCHED	DIGITAL VOLT METER/AMMETER
	T (24HR ON) Y RECOGNIZED CONDUIT TURNING UP	STOP-START PUSH BUTTON CONTROL STATION	TR = TAMPER RESISTANT TV = TELEVISION USB = USB/DUPLEX	### CIRCUIT IDENTIFICATION (REFER TO CIRCUIT SCHEDULE)
BAS BUILDING AUTOMATION (CSA,ETL,N SYSTEM		EMERGENCY POWER OFF BUTTON	WP = WEATHER PROOF COVER WR = WEATHER RESISTANT	GFR GROUND FAULT RELAY
BKR BREAKER OS OCCUPANO	Y SENSOR THROUGHOUT THE DRAWINGS DIFFERENT LINETYPES ARE USED IN COMBINATION	OVERHEAD PADDLE FAN	J JUNCTION BOX/OUTLET BOX	PFR PHASE FAILURE RELAY KK3 KIRK-KEY INTERLOCK
C CONDUIT P POLE	WITH THE SYMBOLS TO INDICATE THE STATUS OF ITEMS AS EXISTING, TO BE DEMOLISHED, TO BE INCLUDED AS PART OF NEW WORK AND/OR ITEMS WHICH			ST SHUNT-TRIP RELAY
CATV CABLE TELEVISION SYSTEM PART PARTIAL CI CCTV CLOSED CIRCUIT TELEVISION PH/Ø PHASE CD CANDELA PNL PANEL	ARE ANTICIPATED TO BE PROVIDED IN THE FUTURE. THE STATUS OF ITEMS USING THESE LINETYPES ARE RELATIVE TO THE VIEW IN WHICH THEY APPEAR. PHASING SHOWN IN DRAWINGS IS NOT INTENDED TO FULLY DESCRIBE ALL NECESSARY		*SYMBOL DEMONSTRATED WITH DUPLEX RECEPTACLE, WHEN USED IN COMBINATION WITH OTHER DEVICES MEANING IS SIMILAR FOR THOSE DEVICE TYPES.	AM AMMETER, RANGE AS SPECIFIED OR REQUIRED VM VOLTMETER, RANGE AS SPECIFIED OR INDICATED
CKT CIRCUIT PNLBD PANELBOA CT CURRENT TRANSFORMER PROVIDE FURNISH A	ND INSTALL OF THEIR RESPONSIBILITIES. ANY SUCH PHASES DESCRIBED IN THE		TECHNOLOGY DEVICES & BOXES	UTILITY METER (AS REQUIRED BY UTILITY)
CVD CUMULATIVE VOLTAGE DROP	TRANSFORMER CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBING THE PROJECT. THE FOLLOWING LINETYPES MAY BE USED ON ANY DEVICE, EQUIPMENT, NOTE, LINE, SHAPE, ETC.			CURRENT TRANSFORMER RATING AS SPECIFIED OR REQUIRED
DEMO DEMOLITION DPDT DOUBLE-POLE, QTY QUANTITY R	EXISTING TEMPORARY BACKED UP DISCONNECTED		MULTI-OUTLET ASSEMBLY	POTENTIAL TRANSFORMER RATING AS SPECIFIED OR REQUIRED
DOUBLE-THROW RCPT RECEPTAC DPST DOUBLE-POLE, RELO RELOCATE SINGLE-THROW RLA RUNNING L	E DEVISE DEVISE DE	LIGHTING (REFER TO LIGHT FIXTURE SCHEDULE FOR MORE INFO) A LIGHT FIXTURE	TELEPHONE OUTLET	TVSS TRANSIENT VOLTAGE SURGE SURPRESSOR
RTU ROOFTOP I		a = SWITCHED BY SWITCH "a"	☑ ▼ ▼ DATA OUTLET	GROUND CONNECTION
ED EXISTING TO BE DEMOLISHED EF EXHAUST FAN EM EMERGENCY SCCR SHORT-CIR RATING	CUIT CURRENT SWITCH LETTER DESIGNATIONS AS FOLLOWS: 2 = TWO POLE	A = LIGHT FIXTURE TYPE "A" NL = NIGHT LIGHT FITURE	MULTI-SERVICE OUTLET; TELEPHONE AND DATA	● () GROUND CONNECTION WITH TEST WELL
EMS ENERGY MANAGEMENT SD SMOKE DU SYSTEM SQFT/SF SQUARE FE EMT ELECTRICAL METALLIC TUBING SPDT SINGLE-PO		O O	ABOVE COUNTER, TYP WALL, TYP (W - HANGING PHONE)	
ENT ELECTRICAL NON-METALLIC DOUBLE-TH TUBING SPST SINGLE-PO	ROW DO = DIMMING OCCUPANCY SENSOR LE, F = FAN SPEED CONTROL	> = ARROW INDICATES AIMING DIRECTION	FLOOR, TYP	GROUND CONNECTION AND GROUND ROD
ETR EXISTING TO BE RELOCATED SINGLE-TH EWC ELECTRIC WATER COOLER ST SHUNT TRI EX EXISTING TO REMAIN SWBD SWITCHBO	LV = LOW VOLTAGE ARD O = OCCUPANCY SENSOR	LIGHT FIXTURE CIRCUITED ON BACK-UP POWER (NOT EGRESS)	A MULTI-SERVICE POWER POLE WITH TELEPHONE, DATA AND POWER	= ≠ OPEN / CLOSED CONTACTORS
SWGR SWITCHGE FAAP FIRE ALARM ANNUNCIATOR T	P = SPST PILOT LIGHT V = VACANCY SENSOR WP = WEATHER PROOF	EMERGENCY LIGHT FIXTURE WITH EMERGENCY LIGHTING BATTERY PACK OR CONNECTED TO LIFE-SAFETY GENERATOR CIRCUIT	OUTLETS A = TYPE, REFER TO PLANS, SCHEDULES AND SPECIFICATIONS	HEATER
PANEL TBB TELECOMM FACP FIRE ALARM CONTROL PANEL BONDING B TO BE DETAILED.		NL = NIGHT LIGHT FIXTURE	A MULTI-SERVICE FLOOR BOX WITH TELEPHONE, DATA AND POWER OUTLETS A = TYPE, REFER TO PLANS, SCHEDULES AND	MOTOR
FF FINISHED FLOOR TGB TELECOMN FLA FULL LOAD AMPS GROUND B	UNICATIONS JS BAR BTS BRANCH CIRCUIT TRANSFER SWITCH	LIGHT FIXTURE WITH DUAL BALLASTS CIRCUITED SEPARATELY (SHADING IMPLIES EMERGENCY LIGHT FIXTURE)	SPECIFICATIONS	## BLOCK LOAD KW OR KVA
FLR FLOOR TL TWISTLOCI FMC FLEXIBLE METALLIC CONDUIT TMGB TELECOMM GROUND B	UNICATIONS MAIN	□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	POKE THROUGH, A = TYPE, REFER TO PLANS, SCHEDULES AND SPECIFICATIONS	F# FAULT POINT REFERENCED IN SHORT CIRCUIT CURRENT AND VOLTAGE DROP SPREADSHEET
GC GENERAL CONTRACTOR TX TRANSFOR	RELATION (UNIACION # = QUANTILITOE RELATS)	EXTERIOR SITE PARKING LOT LIGHT FIXTURE	THERMOSTAT	$oldsymbol{1}$ CONNECTION POINT OR EQUIPMENT TERMINATION
I GIND GROUND	LIGHTING CONTROL PHOTOCELL (SHADE INDICATES AIMING)	EXTERIOR PEDESTRIAN POST TOP LIGHT FIXTURE	D D DATA/TECHNOLOGY JUNCTION BOX/OUTLET BOX	
UPS UNINTERRU SUPPLY IG ISOLATED GROUND	IPTIBLE POWER TS TIME SWITCH	EXTERIOR LIT BOLLARD LIGHT FIXTURE		
V VD VOLTAGE D	CEILING OCCUPANCY SENSOR DESIGNATIONS:	EXIT SIGN - CEILING / WALL MOUNTED, ARROWS AS INDICATED, FACE	LOW-VOLTAGE CABLE JUNCTION BOX/OUTLET BOX	
L W	DT = DUAL-TECH US = ULTRASONIC	HATCHED HATCHED	CTL LOW-VOLTAGE CONTROL PANEL	
TF LINEAR FEET LRA LOCKED ROTOR AMPS W/ WITH LTG/LTS LIGHTING/LIGHTS WP WEATHER	MP = MICROPHONE PROOF	EMERGENCY LIGHTING UNIT EQUIPMENT WITH BATTERY PACK - CEILING/WALL MOUNTED		
MAU MAKE-UP AIR UNIT WR WEATHER MAX MAXIMUM WT WATERTIG MCA MINIMUM CIRCUIT AMPACITY		ADDITIONAL LETTER DESIGNATIONS AS FOLLOWS:	A NUMBER ADJACENT TO ANY TECHNOLOGY SYMBOL INDICATES TOTAL QUANTITY OF	LINE TYPES INDICATED ON THIS COVER SHEEET ALL APPLY TO THE ONE-LINE DIAGRAM
X XP EXPLOSION		D = DEMOLISHED E = EXISTING	CABLES AND PORTS TO BE INSTALLED AT THAT LOCATION. IF A HOME-RUN IS USED ON ANY FLOOR-BOX OR MULTI-OUTLET ASSEMBLY, IT INDICATES	
		EM = EMERGENCY POWER ER = EXISTING TO BE RELOCATED	THAT POWER IS ALSO TO BE INSTALLED IN THIS DEVICE.	
		R = RELOCATED, NEW LOCATION		

PROJECT SCOPE

THIS PROJECT IS FOR TEMPORARY CONSTRUCTION POWER SERVICE ONLY. ELECTRICAL POWER SERVICE WILL BE SERVED BY ARIZONA PUBLIC SERVICE (APS) NEAR LUKEVILLE, AZ. THE SERVICE WILL SUPPLY POWER TO FIVE (5) MODULAR OFFICE STRUCTURES, A FABRICATION PANELBOARD, AND WATER PUMP EQUIPMENT.

PROJECT NOTES

1. PROVIDE ALL SUB-CONTRACTORS A COMPLETE SET OF FULL-SIZE CONSTRUCTION DOCUMENTS AND FULLY COORDINATE REQUIRED WORK WITH PROJECT TRADES.

- 2. CONTRACTOR SHALL BE FAMILIAR WITH THE EXISTING CONDITIONS UNDER WHICH THEY WILL HAVE TO OPERATE AND WHICH MAY AFFECT THE
- 3. ELECTRICAL DRAWINGS ARE DIAGRAMMATIC IN NATURE AND REPRESENT THE GENERAL SCOPE OF THE WORK AS IT PERTAINS TO THE ENGINEERED SYSTEMS AT HAND.
- 4. PRIOR TO PURCHASING ANY PANELS, PROTECTIVE DEVICES, SWITCHES, STARTERS, FUSES, CONDUIT, WIRE, ETC. TO FEED ANY PIECE OF EQUIPMENT VERIFY THE VOLTAGE, PHASE, AND LOAD OF THAT ITEM IN THE FIELD AND CONTACT ENGINEER IF THERE ARE ANY INCONSISTENCIES.
- 5. VERIFY EXACT LOCATIONS AND ELEVATION OF ALL EQUIPMENT IN THE FIELD WITH THE OWNER PRIOR TO ROUGH-IN. FINAL CONNECTIONS OF EQUIPMENT SHALL BE PER MANUFACTURERS RECOMMENDATIONS. ALL MATERIALS REQUIRED TO PROVIDE FINAL CONNECTION TO THE EQUIPMENT SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR.
- 6. ALL WORK SHALL CONFORM TO THE LATEST EDITIONS OF LOCAL, STATE, AND NATIONAL CODES AND ORDINANCES. DRAWINGS AND SPECIFICATIONS GOVERN WHERE THEY EXCEED CODE REQUIREMENTS.
- 7. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ALL PEOPLE AND STRUCTURES FROM DAMAGE, HARM, OR INJURY THROUGHOUT THE COURSE OF CONSTRUCTION.
- 8. ANY SITE DAMAGES SHALL BE REPLACED IN KIND WITH NO COST TO THE OWNER.
- 9. THE CONTRACTOR SHALL EMPLOY QUALIFIED AND EXPERIENCED TRADESPEOPLE FOR THIS WORK.
- 10. FURNISH ALL LABOR, MATERIALS, TOOLS, ACCESSORIES, ETC. REQUIRED FOR A COMPLETE AND OPERABLE SYSTEM.
- 11. PROVIDE ALL CIRCUITS WITH AN NEC SIZED GREEN EQUIPMENT GROUNDING CONDUCTOR IN ALL LINE-VOLTAGE RACEWAYS. UPSIZE GROUNDING CONDUCTOR FOR VOLTAGE DROP PER NEC.
- 12. CABLE LENGTHS WHEN INDICATED ARE APPROXIMATE AND USED FOR ENGINEERING CALCULATIONS ONLY, CONTRACTOR SHALL NOT UTILIZE FOR MATERIAL TAKE-OFFS.
- 13. MAINTAIN WORKING CLEARANCES AROUND ALL ELECTRICAL EQUIPMENT PER NEC ARTICLE 110.
- 14. CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY CONFLICTS, OMISSIONS, AND/OR DISCREPANCIES WITH CONTRACT DOCUMENTS INCLUDING BUT NOT LIMITED TO; DRAWING SHEETS, PUBLISHED SCOPE OF WORK, SPECIFICATIONS, AND/OR CODE REQUIREMENTS.

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E0.0 ELECTRICAL COVER SHEET

SHEET LIST

E1.1 ELECTRICAL SITE AND AREA PLAN

E2.1 ELECTRICAL POWER PLAN

E3.1 ELECTRICAL PANEL SCHEDULES

E4.1 ELECTRICAL ONE-LINE DIAGRAM AND

E5.1 ELECTRICAL SPECIFICATIONS 1

E5.2 ELECTRICAL SPECIFICATIONS 2

CALCULATIONS

E5.3 ELECTRICAL SPECIFICATIONS 3

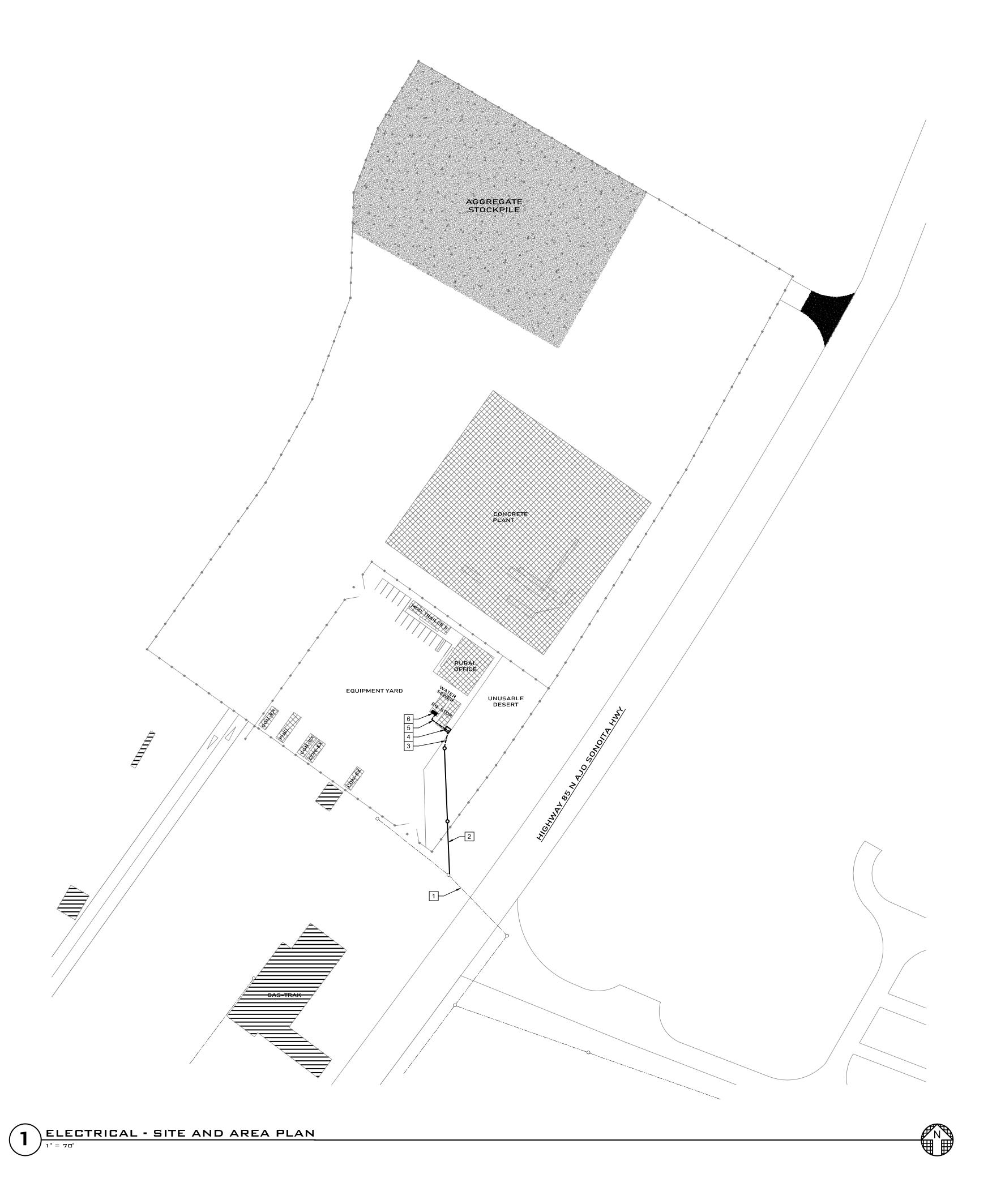
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SHEET NAME **ELECTRICAL COVER SHEET**

SHEET NUMBER



GENERAL NOTES

- A. REFER TO E0.0 'ELECTRICAL SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES' FOR ADDITIONAL INFORMATION BEFORE ESTIMATING OR CONSTRUCTION FROM THIS SHEET.
- B. SEE SHEET E2.1 FOR SPECIFIC PROJECT INSTALLATION DETAILS.
- C. SEE SHEET E4.1 FOR ONE-LINE DIAGRAM AND ELECTRICAL CALCULATIONS.
- D. PROTECT EXISTING BUILDINGS AND EQUIPMENT FROM HARM AND/OR UNAUTHORIZED ACCESS
 WITH TEMPORARY CONSTRUCTION BARRIERS DURING WORK.



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KEYED NOTES

- EXISTING ARIZONA PUBLIC SERVICE (APS)

 1. EXISTING ARIZONA PUBLIC SERVICE (APS) OVERHEAD UTILITY POWER DISTRIBUTION LINES.
- 2. COORDINATE WITH ARIZONA PUBLIC SERVICE (APS) TO PROVIDE A NEW SLACK OVER HEAD PRIMARY UTILITY LINE EXTENSION FROM EXISTING STEEL UTILITY POLE TO LOCATION INDICATED. ALL CONSTRUCTION FOR LINE EXTENSION INCLUDING BUT NOT LIMITED TO CONDUCTORS, TEMPORARY WOOD POLES, STANDOFFS, INSULATORS, ETC. SHALL BE PROVIDED BY APS. CONTRACTOR HAS NO RESPONSIBILITY FOR LINE EXTENSION OUTSIDE OF COORDINATION.
- 3. PROVIDE NEW UNDERGROUND CONDUIT FOR EXTENSION OF PRIMARY UTILITY SERVICE LATERAL. CONTRACTOR SHALL PROVIDE CONDUIT A MINIMUM OF 24" BELOW GRADE. CONDUIT SHALL BE STUBBED UP BESIDE EXISTING UTILITY POLE. UTILITY COMPANY SHALL PROVIDE AND TERMINATE NEW CONDUCTORS, INCLUDING ON-POLE MOUNTING. SEE ONE-LINE DIAGRAM FOR CONDUIT SIZES. INSTALL PER SPECIFICATIONS AND APS DESIGN STANDARDS.
- 4. PROVIDE NEW PAD-MOUNTED UTILITY TRANSFORMER WITH DEAD FRONT ACCESS. INSTALL A MINIMUM OF 10 LINEAR FEET FROM THE ELECTRICAL SERVICE AND PROVIDE ANY NECESSARY PROTECTIVE BOLLARDS. INSTALL PER SPECIFICATIONS AND APS DESIGN STANDARDS.
- 5. PROVIDE NEW UNDERGROUND CONDUIT FOR EXTENSION OF SECONDARY UTILITY SERVICE CONDUCUCTORS. CONTRACTOR SHALL PROVIDE CONDUIT A MINIMUM OF 24" BELOW GRADE TO ELECTRICAL SERVICE ENTRANCE SECTION. UTILITY COMPANY SHALL PROVIDE AND TERMINATE NEW CONDUCTORS. SEE ONE-LINE DIAGRAM FOR CONDUIT SIZE AND INSTALL PER SPECIFICATIONS AND APS DESIGN STANDARDS.
- 6. PROVIDE NEW ELECTRICAL SERVICE ENTRANCE SECTION COMPLYING WITH ARIZONA PUBLIC SERVICE (APS) DESIGN AND CONSTRUCTION STANDARDS. SEE ONE-LINE DIAGRAM ON SHEET E4.1 FOR ADDITIONAL INFORMATION.

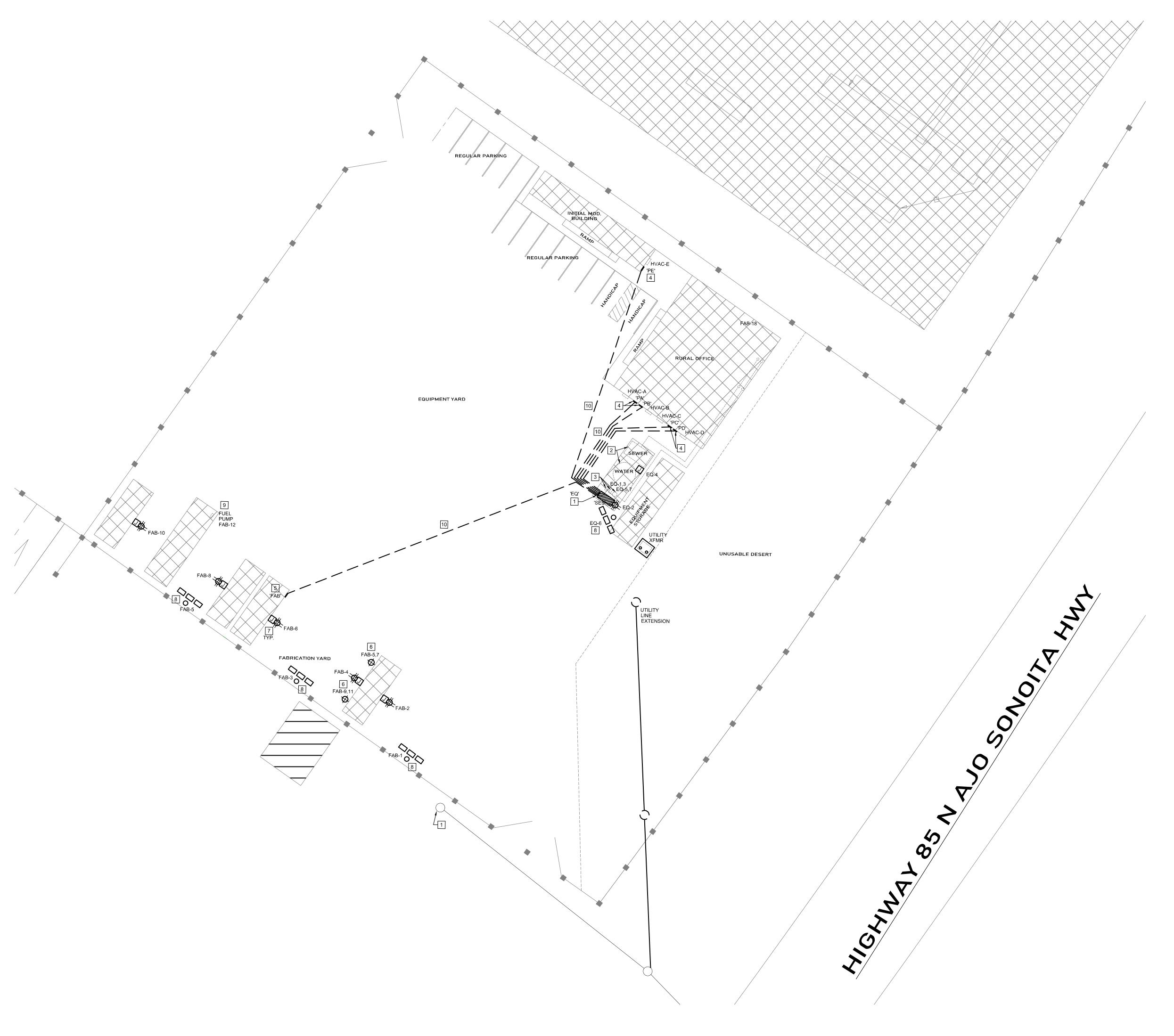
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SHEET NAME **ELECTRICAL**

SITE AND AREA PLAN

SHEET NUMBER E1.1



GENERAL NOTES

- A. SEE ONE-LINE DIAGRAM ON SHEET E4.1 FOR FEEDER WIRE AND CONDUIT SIZES, AS WELL AS ADDITIONAL INFORMATION REGARDING TEMPORARY SYSTEMS.
- B. REFER TO E0.0 'ELECTRICAL SYMBOLS,
 ABBREVIATIONS, AND GENERAL NOTES' FOR
 ADDITIONAL INFORMATION BEFORE ESTIMATING
 OR CONSTRUCTION FROM THIS SHEET.
- C. PROTECT BUILDINGS, PEOPLE, AND EQUIPMENT FROM HARM AND/OR UNAUTHORIZED ACCESS WITH TEMPORARY CONSTRUCTION BARRIERS DURING WORK.
- D. PROVIDE ALL NECESSARY ITEMS TO MEET THE INSTALLATION REQUIREMENTS AND PROVIDE A FULLY OPERATIONAL SYSTEM.
- E. COMPLY WITH ALL SPECIFICATIONS OUTLINED

ON SHEET E5.1, E5.2, AND E5.3.

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WALL FICE

KEYED NOTES

- 1. CONTRACTOR SHALL INSTALL TWO SECTIONS OF UNIVERSAL MOUNTING CHANNEL (UNI-STRUT) TO ONE END OF THE ELECTRICAL SERVICE EQUIPMENT AND INSTALL NEW PANELBOARD. PROVIDE MAINTENANCE RECEPTACLE, MAINTENANCE LIGHTING, AND ANY REQUIRED MOTOR CONTROLLERS FOR WATER AND SEWER PUMPING SYSTEMS ON UNI-STRUT. SEE PANELBOARD SCHEDULE 'EQ' ON SHEET E3.1 FOR ADDITIONAL INFORMATION.
- 2. POTENTIAL LOCATION AND ALLOCATED SPACE FOR WATER STORAGE TANK AND SEPTIC SYSTEM IF REQUIRED FOR RESTROOM FUNCTIONALITY. WATER AND SEPTIC SYSTEMS SHALL BE INSTALLED BY OTHERS.
- 3. POTENTIAL LOCATION AND ALLOCATED SPACE FOR WATER PUMPS AND FILTERS INSTALLED BY OTHERS IF REQUIRED FOR PROPER RESTROOM OPERATION. POWER EQUIPMENT FROM PANEL 'EQ', CIRCUITS ALLOCATED.
- 4. EXISTING PRE-WIRED PANELBOARD PROVIDED WITH MODULAR BUILDING UNIT. CONTRACTOR SHALL PROVIDE CONNECTION TO PANELBOARD MAIN BREAKER AS INDICATED. SEE SHEET E2.1 FOR ADDITIONAL INFORMATION.
- 5. CONTRACTOR SHALL PROVIDE TEMPORARY UNI-STRUT ASSEMBLY CONSISTING OF PANELBOARD AND FLEXIBLE BRANCH CIRCUIT SOOW AND SJOOW CABLES. SEE PANELBOARD SCHEDULE ON SHEET E3.1 FOR MORE INFORMATION. ALL FITTINGS SHALL CONFORM TO SPECIFICATIONS ON SHEETS E5.1, E5.2, AND E5.3
- 6. PROVIDE NEW 30A, 240V, 1PH WELDING RECEPTACLES MOUNTED TO CON-EX UNIT FOR WELDERS IF REQUIRED.
- 7. PROVIDE 120V QUADPLEX RECEPTACLES IN WATERPROOF JUNCTION BOX WITH 'EXTRA DUTY' IN-USE COVER. RECEPTACLES SHALL BE FED BY FLEXIBLE SOOW/SJOOW CABLES. MOUNT TO EQUIPMENT AS REQUIRED FOR TEMPORARY POWER TOOLS.
- 8. PROVIDE 20A, 120V LIGHTING CIRCUIT TO FLOODLIGHTING EQUIPMENT IF REQUIRED. LIGHTING SHALL BE FED BY FLEXIBLE SOOW/SJOOW CABLES.
- 9. PROVIDE 20A, 120V CIRCUIT TO EXISTING TRAILER MOUNTED FUEL PUMP. GROUND TRAILER UTILIZING A #1CU GROUNDING ELECTRODE CONDUCTOR AND A 10' COPPER CLAD GROUND ROD. ENSURE GROUND RESISTANCE IS BELOW 5 OHMS, TRIANGULATE GROUND ROD IF REQUIRED.
- 10. PROVIDE FEEDER TO INDICATED ELECTRICAL PANELBOARD UTILIZING SCHEDULE 80 PVC CONDUIT A MINIMUM OF 24" BELOW GRADE. SEE ONE-LINE DIAGRAM FOR CONDUIT AND WIRE SIZES.

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SHEET NAME
ELECTRICAL
POWER PLAN

SHEET NUMBER

=2 1

ANELBOARD: EQ NEW JS AMPS: 125A NN SIZE/TYPE: MLO							42K/10K PING EC		RATED SY	STEM		EQUIPMENT GRO	
DLTS/PHASE: 240D/120V, 1PH, 3W				MOUI	NTING	:SL	JRFACE						
(T DESCRIPTION			PS/PHASE	WRE	BKR		P BK	RWRE	VOLTAM			DESCRIPTION	
D. WELL PUMP		1,800	В	NO.	AMP 20	2	1 20	_	360	В	MAINTENANCE F	RECEPTACLE	
WATER PUMP			1,800	10G	20		1 20		1,200	360	MAINTENANCE I FLOOD LIGHTIN	Line Printer Brief and record	
		1,800	1,800	10G	20	2	1 20 1 20		1,200		SPARE	G	
SPACE 1 SPACE						1	1				SPACE SPACE		
SPACE						1	1				SPACE		
5 SPACE 7 SPACE						1	1				SPACE SPACE		
SPACE SPACE						1	1				SPACE SPACE		
SPACE						1	1				SPACE		
SUBTOTAL TOTAL PHASE A - VA 5,160	LOAD	3,600	3,600	<u> </u>	Lee		LOAD		1,560	360	DF	SUBTOTAL	
TOTAL PHASE A - VA 5,160 AMPS 43	COOLIN	G	CONN. V	A	1.00		REFRIG	3		CONN. VA	1.00		
TOTAL PHASE B - VA 3,960 AMPS 33	HEATING		1,560		0 1.25	JL	SIGN/D				1.25 1.00		
TOTAL PNLBD - VA 9,120	RECEPT	TACLES	360		1.0/.5		EXISTI	I G			1.00		
AMPS 38	MOTORS SUPP HI		7,200		1.00	Jl	LRG M		/		1.25 1.25	TOTAL DEMAND 9,51	IO VA
NEL DO ADD MOTEO	MISC EC	QUIP			1.00		LTG TF	ACK			1.00		40 A
NELBOARD NOTES PROMDE GROUND FAULT RATE	ED CIRCUI	IT BREAK	ER OR RE	CEPT	ACLE								
ANELBOARD: A EXIST S AMPS: 125A N SIZE/TYPE: 125A MCB	ΓING			SER	/ES: M	ODU	JLAR U	NIT 'A'	RATEDSY	STEM		EQUIPMENT GRO	UND
.TS/PHASE: 240D/120V, 1PH, 3W CTION: 1							JRFACE TERIOR		ILAR UNIT	'A'			
T DESCRIPTION		VOLTAM A	PS/PHASE B	4	BKR AMP	Р	P BKI		VOLTAM A	PS/PHASE B		DESCRIPTION	
HVAC UNIT 'A'		6,840	В	NO. 6	60	2			1,440	В	(7) OPEN OFFIC	E RECEPT	
			6,840	10G			1 20	12		1,344	LIGHTING CHRONOMITE		
(6) PRIVATE OFFICE RECEPT (2) FLC		1,080	600	12 12	20	1	2 30	10 10G	3,500	3,500			_
(1) HEAT TAPE SPACE		1,500		12	20	-	1				SPACE SPACE		
SUBTOTAL		9,420	7,440	1			''		4,940	4,844	OI ACL	SUBTOTAL	
			CONN. V	Α	DF	J L	LOAD		(CONN. VA			
TOTAL PHASE A - VA 14,360	LOAD					, .		_			1.00		
AMPS 120	COOLIN		13,680		1.00	l l	REFRIC						
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102	COOLING HEATING LIGHTIN	3 G	13,680 1,344		0 1.25		SIGN/D KITCHE	ISP EN			1.25 1.00		
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644	COOLIN	G FACLES	13,680		0 1.25 1.0/.5		SIGN/D	ISP EN IG			1.25 1.00 1.00	TOTAL DEMAND	
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111	COOLING HEATING LIGHTING RECEPT MOTORS SUPP HI	G FACLES S EAT QUIP	13,680 1,344 2,520 9,100		0 1.25 1.0/.5 1.00 1.00		SIGN/D KITCHE EXISTII LRG M SHOW LTG TR	ISP IN IG DTOR WNDW ACK	/		1.25 1.00 1.00	26,98	80 VA 112 A
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG	G FACLES S EAT QUIP	13,680 1,344 2,520 9,100	JILDIN	0 1.25 1.0/.5 1.00 1.00 1.00	NUF	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF	ISP EN NG DTOR WNDW ACK	S RATED SY	STEM	1.25 1.00 1.00 1.25 1.25	26,98	112 A
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS G	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG	G FACLES S EAT QUIP	13,680 1,344 2,520 9,100	JILDIN AIC R SERV	0 1.25 1.0/.5 1.00 1.00 1.00	NUF.	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF	ISP EN IG DTOR WNDW ACK ER		STEM	1.25 1.00 1.00 1.25 1.25	26,98 1	112 A
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS G ANELBOARD SHEDULE WAS G S AMPS: 125A N SIZE/TYPE: 125A MCB LTS/PHASE: 240D/120V, 1PH, 3W CTION: 1	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG	G G FACLES S EAT QUIP	13,680 1,344 2,520 9,100 DULAR BU	AIC R SERV MOU! LOCA	0 1.25 1.0/.5 1.00 1.00 1.00 G MAN	NUF,	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10k ULAR U JRFACE TERIOR	ISP EN IG DTOR WNDW ACK ER SERIES NIT 'C' E MODU	RATED SY	'C'	1.25 1.00 1.00 1.25 1.25	26,98	112 A
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS G ANELBOARD: C EXIST S AMPS: 125A N SIZE/TYPE: 125A MCB	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG	G G FACLES S EAT QUIP	13,680 1,344 2,520 9,100	AIC R SERV MOU! LOCA	0 1.25 1.0/.5 1.00 1.00 1.00 G MAN	NUF,	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10k ULAR U JRFACE TERIOR	ISP EN IG DTOR WNDW ACK ER ISERIES NIT 'C' E MODU	RATED SY	'C'	1.25 1.00 1.00 1.25 1.25	26,98 1	112 A
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS G ANELBOARD SHEDULE WAS G ANELBOARD SHEDULE WAS G S AMPS: 125A N SIZE/TYPE: 125A MCB TS/PHASE: 240D/120V, 1PH, 3W CTION: 1 T DESCRIPTION	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG	G G FACLES S EAT QUIP ED BY MOD	13,680 1,344 2,520 9,100 DULAR BU	AIC R SERV MOUI LOCA MRE NO.	0 1.25 1.0/.5 1.00 1.00 1.00 G MAN VES: M NTING ATION: BKR AMP	NUF,	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10k ULAR U JRFACE TERIOR P BK AM 1 20	ISP EN NG DTOR WNDW ACK ER MODU R WRE NO.	RATED SY	PS/PHASE B	1.25 1.00 1.00 1.25 1.25 1.00	EQUIPMENT GRO	112 A
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS G S AMPS: 125A N SIZE/TYPE: 125A MCB LTS/PHASE: 240D/120V, 1PH, 3W CTION: 1 DESCRIPTION I.	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG	G G FACLES S EAT QUIP ED BY MODE WOLTAM A	13,680 1,344 2,520 9,100 DULAR BU	AIC R SERV MOU! LOCA WIRE NO.	0 1.25 1.0/.5 1.00 1.00 1.00 G MAN VES: M NTING ATION: BKR AMP	S: HOD!	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K ULAR U JRFACE TERIOR P BKI AMI	ISP EN NG DTOR WNDW ACK ER MODU R WRE NO.	LAR UNIT	'C' PS/PHASE	1.25 1.00 1.00 1.25 1.25 1.00	EQUIPMENT GRO	112 A
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS G SAMPS: 125A N SIZE/TYPE: 125A MCB TS/PHASE: 240D/120V, 1PH, 3W CTION: 1 T DESCRIPTION HVAC UNIT 'C' SPACE SPACE SPACE	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG	G G FACLES S EAT QUIP ED BY MODE WOLTAM A	13,680 1,344 2,520 9,100 DULAR BU	AIC R SERV MOUI LOCA MRE NO.	0 1.25 1.0/.5 1.00 1.00 1.00 G MAN VES: M NTING ATION: BKR AMP	S: HOD!	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10k ULAR U JRFACE TERIOR P BK AM 1 20 1 20 1 1	ISP EN NG DTOR WNDW ACK ER MODU R WRE NO.	LAR UNIT	PS/PHASE B	1.25 1.00 1.00 1.25 1.25 1.00 RECEPTACLES LIGHTING 'C' SPACE SPACE	EQUIPMENT GRO	112 A
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS G ANELBOARD SHEDULE WAS G ANELBOARD SHEDULE WAS G ANELBOARD SHEDULE WAS G ANELBOARD SHEDULE WAS G TOTAL PNLBD - VA 26,644 AMPS 111 DESCRIPTION TOTAL PHASE SHEDULE WAS G TOTAL PNLBD - VA 26,644 AMPS 111 TOTAL PHASE SHEDULE WAS G TOTAL PNLBD - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 TOTAL PNLBD - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 TOTAL PNLBD - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 TOTAL PNLBD - VA 26,644 AMPS	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG	G G FACLES S EAT QUIP ED BY MODE WOLTAM A	13,680 1,344 2,520 9,100 DULAR BU	AIC R SERV MOUI LOCA MRE NO.	0 1.25 1.0/.5 1.00 1.00 1.00 G MAN VES: M NTING ATION: BKR AMP	S: HOD!	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K ULAR U JRFACE TERIOR P BK AM 1 20 1 20 1	ISP EN NG DTOR WNDW ACK ER MODU R WRE NO.	LAR UNIT	PS/PHASE B	1.25 1.00 1.00 1.25 1.25 1.00 RECEPTACLES LIGHTING 'C'	EQUIPMENT GRO	112 A
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS G ANELBOARD SHEDULE WAS G AN	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPP HI MISC EG	G G FACLES S EAT QUIP ED BY MODE WOLTAM A	13,680 1,344 2,520 9,100 DULAR BL PS/PHASE B 6,840	AIC R SERV MOUL LOCA WRE NO.	0 1.25 1.0/.5 1.00 1.00 1.00 G MAN VES: M NTING ATION:	S: NODIO: SX SX P	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K ULAR U JRFACE IERIOR P BK AM 1 20 1 1 1 1 1 1 1 1	ISP EN NG DTOR WNDW ACK ER MODU R WRE NO.	FRATED SY ULAR UNIT VOLTAM A 1,440	PS/PHASE B 1,536	RECEPTACLES LIGHTING 'C' SPACE SPACE SPACE SPACE	EQUIPMENT GRO	112 A
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS G SAMPS: 125A N SIZE/TYPE: 125A MCB TS/PHASE: 240D/120V, 1PH, 3W CTION: 1 DESCRIPTION HVAC UNIT 'C' SPACE SPACE SPACE SPACE SPACE	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG	C G G FACLES S EAT DUIP ED BY MODE A G,840 G,840	13,680 1,344 2,520 9,100 DULAR BU B 6,840 6,840 CONN. V	AIC R SERV MOUI LOCA NO. 6 10G	0 1.25 1.0/.5 1.00 1.00 1.00 G MAN XATING YES: M NTING ATION: BKR AMP 60	S: (ODI) S: SL EX	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10k ULAR U JRFACE TERIOR P BK AM 1 20 1 20 1 1 1 1	ISP EN ING DTOR WNDW ACK ER SERIES NIT 'C' E MODU R WRE NO. 12 12	FRATED SY ULAR UNIT VOLTAM A 1,440	PS/PHASE B 1,536	RECEPTACLES LIGHTING 'C' SPACE SPACE SPACE SPACE	26,98 1 EQUIPMENT GRO DESCRIPTION 'C'	112 A
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AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 IELBOARD NOTES PANELBOARD SHEDULE WAS G ANELBOARD SHEDULE WAS G AMPS: 125A MCB TS/PHASE: 240D/120V, 1PH, 3W CTION: 1 T DESCRIPTION HVAC UNIT 'C' SPACE SP	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG SENERATE FING LOAD COOLIN HEATING LIGHTIN RECEPT MOTORS SUPPH MISC EG SENERATE	FACLES FACLES FACLES FAT QUIP VOLTAM A 6,840 G G G FACLES S EAT QUIP	13,680 1,344 2,520 9,100 DULAR BL PS/PHASE B 6,840 CONN. V. 13,680 1,536 1,440	AIC R SERV MOUI LOCA WRE NO.	0 1.25 1.0/.5 1.00 1.00 1.00 1.00 G MAN EXTING VES: M NTING ATION: BKR AMP 60 1.25 1.0/.5 1.00 1.00	S:	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10k ULAR U JRFACE TERIOR P BKI AMI 1 20 1 20 1 1 1 1 1 1 1 1 1 1 1 1 1 T 1 T 1 T 1 T	ISP EN IG DTOR WNDW ACK ER SERIES NIT 'C' E MODU R NO. 12 12 12 12 12 12 15 ISP EN ING DTOR WNDW ACK	RATED SY ULAR UNIT VOLTAM A 1,440	PS/PHASE B 1,536	1.25 1.00 1.00 1.25 1.25 1.00 RECEPTACLES 1.00 1.00 SPACE	26,98 1 EQUIPMENT GRO DESCRIPTION 'C' SUBTOTAL TOTAL DEMAND	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 IELBOARD NOTES PANELBOARD SHEDULE WAS GENERAL STATE OF THE PHASE SHAPE SPACE S	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE LOAD COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE	FACLES FACLES FACLES FAT QUIP VOLTAM A 6,840 G G G FACLES S EAT QUIP	13,680 1,344 2,520 9,100 DULAR BL 6,840 6,840 13,680 1,536 1,440 DULAR BL	AIC R SERV MOULLOCA NO. 6 10G A	0 1.25 1.0/.5 1.00 1.00 1.00 1.00 G MAN ATION: BKR AMP 60 1.25 1.0/.5 1.00 1.00 1.00	NUF.	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K ULAR U JRFACE TERIOR P BKI AMI 1 20 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ISP EN ING DTOR WNDW ACK ER SERIES NIT 'C' E MODU R NO. 12 12 12 12 12 12 EN ING DTOR WNDW ACK ER SERIES EN ING DTOR WNDW ACK ER	RATED SY ULAR UNIT VOLTAM A 1,440	PS/PHASE B 1,536 1,536 CONN. VA	1.25 1.00 1.00 1.25 1.25 1.00 RECEPTACLES 1.00 1.00 SPACE	26,98 1 EQUIPMENT GRO DESCRIPTION 'C' SUBTOTAL TOTAL DEMAND	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 IELBOARD NOTES PANELBOARD SHEDULE WAS GOOD SHED TO SHED	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE LOAD COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE	FACLES FACLES FACLES FAT QUIP VOLTAM A 6,840 G G G FACLES S EAT QUIP	13,680 1,344 2,520 9,100 DULAR BL PS/PHASE B 6,840 1,536 1,440 DULAR BL	AIC R SERV MOULLOCA NO. 10G AC	0 1.25 1.0/.5 1.00 1.00 1.00 1.00 G MAN ATION: BKR AMP 60 1.25 1.00 1.00 1.00 1.00	NUF. S: BODIO S: SL P 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K 42K/10K 1 20 1 20 1 20 1 20 1 1 20 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ISP IN ING DTOR WNDW ACK IS SERIES NIT 'C' IN IND IN INC IN IN INC IN I	RATED SY JLAR UNIT VOLTAM A 1,440 1,440	PS/PHASE B 1,536 1,536 CONN. VA	1.25 1.00 1.00 1.25 1.25 1.00 RECEPTACLES 1.00 1.00 SPACE	EQUIPMENT GRO DESCRIPTION 'C' SUBTOTAL TOTAL DEMAND 17,04	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 IELBOARD NOTES PANELBOARD SHEDULE WAS G SAMPS: 125A N SIZE/TYPE: 125A MCB TS/PHASE: 240D/120V, 1PH, 3W STION: 1 I DESCRIPTION HVAC UNIT 'C' SPACE SP	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE LOAD COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE	FACLES FACLES FACLES FAT QUIP VOLTAM A 6,840 G G G FACLES S EAT QUIP	13,680 1,344 2,520 9,100 DULAR BL 6,840 6,840 1,536 1,440 DULAR BL	AIC R SERV MOULOCA 10G 10G AC	0 1.25 1.0/.5 1.00 1.00 1.00 1.00 G MAN SATING VES: M NTING ATION: 1.00 1.25 1.0/.5 1.00 1.00 1.00 1.00 1.00	NUF. SIDIV	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K ULAR U JRFACE IERIOR 1 20 1 20 1 1 20 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ISP IN ING DTOR WNDW ACK ISERIES NIT 'C' IMODU ING	RATED SY JLAR UNIT VOLTAM A 1,440 1,440 C RATED SY UILDING	PS/PHASE B 1,536 1,536 CONN. VA	1.25 1.00 1.00 1.25 1.25 1.00 RECEPTACLES 1.00 1.00 SPACE	EQUIPMENT GRO DESCRIPTION 'C' SUBTOTAL TOTAL DEMAND 17,04	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 IELBOARD NOTES PANELBOARD SHEDULE WAS GOOD SHED SHED SHED SHED SHED SHED SHED SHE	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE LOAD COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE	FACLES FACLES FACLES FAT RUIP FOR BY MOD GRACIES GRACIES FACLES EAT RUIP FOR BY MOD GRACIES FACLES EAT RUIP FOR BY MOD GRACIES FACLES FACLE	13,680 1,344 2,520 9,100 DULAR BL 6,840 6,840 CONN. V. 13,680 1,536 1,440 DULAR BL	AIC R SERV MOUI LOCA AIC R SERV MOUI LOCA	0 1.25 1.0/.5 1.00 1.00 1.00 1.00 G MAN TION: BKR AMP 60 1.00 1.00 1.00 1.00 1.00 1.00 1.00	NUF. S: NUF. P 2 1 1 1 1 1 1 EXI	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K ULAR U JRFACE TERIOR P BKI AMI 1 20 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SERIES NODU R WNDU R WNDU R NO	RATED SY ILAR UNIT VOLTAM A 1,440 1,440 RATED SY UILDING LAR UNIT	PS/PHASE B 1,536 1,536 CONN. VA	1.25 1.00 1.00 1.25 1.25 1.00 RECEPTACLES 1.00 1.00 SPACE	EQUIPMENT GRO DESCRIPTION 'C' SUBTOTAL TOTAL DEMAND 17,04	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS GENERAL SET 125A MCB TS/PHASE: 240D/120V, 1PH, 3W 2TION: 1 TOTAL PHASE A - VA 8,280 AMPS 69 TOTAL PHASE A - VA 8,376 AMPS 69 TOTAL PHASE B - VA 8,376 AMPS 70 TOTAL PHASE B - VA 16,656 AMPS 69 NELBOARD NOTES PANELBOARD SHEDULE WAS GENERAL SET 125A MCB TOTAL PHASE B - VA 16,656 AMPS 69 NELBOARD NOTES PANELBOARD SHEDULE WAS GENERAL SET 125A MCB SIZE/TYPE: 125A MCB TS/PHASE: 240D/120V, 1PH, 3W 110N: 1 DESCRIPTION	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE LOAD COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE	FACLES FACLES FACLES FAT RUIP FOR BY MOD GRACIES GRACIES FACLES EAT RUIP FOR BY MOD GRACIES FACLES EAT RUIP FOR BY MOD GRACIES FACLES FACLE	13,680 1,344 2,520 9,100 DULAR BL 6,840 6,840 1,536 1,440 DULAR BL	AIC R SERV MOULLOCA WARE NO. AIC R SERV MOULLOCA WIRE WI	0 1.25 1.0/.5 1.00 1.00 1.00 1.00 G MAN TION: BKR AMP 60 1.00 1.00 1.00 1.00 1.00 1.00 1.00	NUF. S: NUF. P 2 1 1 1 1 1 1 1 1 1 EXI	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K ULAR U JRFACE TERIOR P BKI AMI 1 20 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SERIES WODU R WIDW ACK SERIES WODU R WIDW ACK SERIES WODU R WIDW ACK W	RATED SY JLAR UNIT VOLTAM A 1,440 1,440 C RATED SY UILDING	PS/PHASE B 1,536 1,536 CONN. VA	1.25 1.00 1.00 1.25 1.25 1.00 RECEPTACLES 1.00 1.00 SPACE	EQUIPMENT GRO DESCRIPTION 'C' SUBTOTAL TOTAL DEMAND 17,04	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS G S AMPS: 125A N SIZE/TYPE: 125A MCB LTS/PHASE: 240D/120V, 1PH, 3W CTION: 1 T DESCRIPTION HVAC UNIT 'C' SPACE	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE LOAD COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE	FACLES SEAT RUIP OUTAM A 6,840 G G G G G FACLES S EAT RUIP OUTAM A VOLTAM A VOLTAM A VOLTAM A VOLTAM	13,680 1,344 2,520 9,100 DULAR BL 6,840 6,840 13,680 1,536 1,440 DULAR BL	AIC R SERV MOUILOCA AIC R SERV MOUILOCA WIRE NO. 6	0 1.25 1.0/.5 1.00 1.00 1.00 G MAN ATING (ES: IN NTING TION: BKR ATING (ES: IN NTING TION: BKR ATION: BKR ATION: BKR	NUF. S: NODIO S: SL EXT P IDIO EXT P	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K ULAR U JRFACE TERIOR T 1 20 T 1 1	ISP IN ING DTOR WNDW ACK ER SERIES NIT 'C' IMODU INTER INTE	RATED SY ULAR UNIT VOLTAM A 1,440 1,440 RATED SY UILDING LAR UNIT	PS/PHASE B 1,536 1,536 CONN. VA	1.25 1.00 1.00 1.25 1.25 1.25 1.00 RECEPTACLES LIGHTING 'C' SPACE SPACE SPACE SPACE SPACE SPACE 1.00 1.25 1.00 1.25 1.00 1.25 1.00 1.00	EQUIPMENT GROUND TOTAL DEMAND 17,04 EQUIPMENT GROUND TOTAL DEMAND 17,04	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 1111 NELBOARD NOTES PANELBOARD SHEDULE WAS G SAMPS: 125A N SIZE/TYPE: 125A MCB LTS/PHASE: 240D/120V, 1PH, 3W CTION: 1 T DESCRIPTION DESCRIPTION DESCRIPTION TOTAL PHASE A - VA 8,280 AMPS 69 TOTAL PHASE B - VA 8,376 AMPS 70 TOTAL PHASE B - VA 16,656 AMPS 69 NELBOARD NOTES PANELBOARD SHEDULE WAS G NELBOARD SHEDULE WAS G AMPS 69 NELBOARD NOTES PANELBOARD SHEDULE WAS G NELBOARD SHEDULE WAS G	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE LOAD COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE	FACLES SEAT QUIP VOLTAM A 6,840 G G G G G G G FACLES S EAT QUIP VOLTAM A A A A A A A B B C C C C C C C C C C C	13,680 1,344 2,520 9,100 DULAR BL PS/PHASE B 6,840 1,536 1,440 DULAR BL	AIC R SERV MOUI LOCA AIC R SERV MOUI LOCA WIRE NO.	0 1.25 1.0/.5 1.00 1.00 1.00 1.00 G MAN ATING ATION: BKR AMP 60 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1	NUF. S: NUF. P 2 1 1 1 1 1 1 1 2 EXI	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K ULAR U JRFACE TERIOR T ACTUR ACTUR 42K/10K AM T ACTUR 42K/10K AM T ACTUR	ISP IN ING DTOR WNDW ACK ER SERIES NIT 'C' MODU ING TOTOR WNDW ACK ER SERIES NO. ING DTOR WNDW ACK ING DTOR I	RATED SY JLAR UNIT VOLTAM A 1,440 1,440 RATED SY UILDING LAR UNIT VOLTAM A	PS/PHASE B 1,536 1,536 CONN. VA	1.25 1.00 1.00 1.25 1.25 1.00 RECEPTACLES 1.00 RECEPTACLES LIGHTING 'C' SPACE SPACE SPACE SPACE SPACE SPACE 1.00 1.25 1.00 1.25 1.00 1.25 1.00	EQUIPMENT GROUND TOTAL DEMAND 17,04 EQUIPMENT GROUND TOTAL DEMAND 17,04	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS G SAMPS: 125A N SIZE/TYPE: 125A MCB LTS/PHASE: 240D/120V, 1PH, 3W CTION: 1 T DESCRIPTION HVAC UNIT 'C' SPACE	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE LOAD COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE	FACLES SEAT QUIP VOLTAM A 6,840 G G G G G G G FACLES S EAT QUIP VOLTAM A A A A A A A B B C C C C C C C C C C C	13,680 1,344 2,520 9,100 DULAR BL 6,840 6,840 13,680 1,536 1,440 DULAR BL	AIC R SERV MOUILOCA AIC R SERV MOUILOCA WIRE NO. 6	0 1.25 1.0/.5 1.00 1.00 1.00 1.00 G MAN ATING ATION: BKR AMP 60 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1	S: NUF. P 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K 1	ISP IN ING DTOR WNDW ACK ER SERIES NIT 'C' IMODU INTER INTE	RATED SY JLAR UNIT VOLTAM A 1,440 1,440 RATED SY UILDING LAR UNIT VOLTAM A	PS/PHASE B 1,536 1,536 CONN. VA	1.25	EQUIPMENT GROUND TOTAL DEMAND 17,04 EQUIPMENT GROUND TOTAL DEMAND 17,04	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS GENERAL SET 125A MCB TS/PHASE: 240D/120V, 1PH, 3W TION: 1 TOTAL PHASE A - VA 8,280 AMPS 69 TOTAL PHASE B - VA 8,376 AMPS 69 TOTAL PHASE B - VA 8,376 AMPS 69 TOTAL PHASE B - VA 16,656 AMPS 69 NELBOARD NOTES PANELBOARD SHEDULE WAS GENERAL SET 125A MCB TOTAL PHASE B - VA 8,376 AMPS 69 TOTAL PHASE B - VA 16,656 AMPS 69 NELBOARD NOTES PANELBOARD SHEDULE WAS GENERAL SET 125A MCB TS/PHASE: 240D/120V, 1PH, 3W TION: 1 DESCRIPTION HVAC UNIT 'E' SPACE SPACE SPACE SPACE SPACE SPACE SPACE SPACE	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE LOAD COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE	FACLES SEAT QUIP VOLTAM A 6,840 G G G G G G G FACLES S EAT QUIP VOLTAM A A A A A A A B B C C C C C C C C C C C	13,680 1,344 2,520 9,100 DULAR BL 6,840 6,840 13,680 1,536 1,440 DULAR BL	AIC R SERV MOUILOCA AIC R SERV MOUILOCA WIRE NO. 6	0 1.25 1.0/.5 1.00 1.00 1.00 1.00 G MAN ATING ATION: BKR AMP 60 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1	S: NUF. P 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K ULAR U JRFACE TERIOR P BKI AMI 1 20 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ISP IN ING DTOR WNDW ACK ER SERIES NIT 'C' IMODU INTER INTE	RATED SY JLAR UNIT VOLTAM A 1,440 1,440 RATED SY UILDING LAR UNIT VOLTAM A	PS/PHASE B 1,536 1,536 CONN. VA	1.25	EQUIPMENT GROUND TOTAL DEMAND 17,04 EQUIPMENT GROUND TOTAL DEMAND 17,04	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 111 NELBOARD NOTES PANELBOARD SHEDULE WAS GENERAL STAFF AND ST	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE LOAD COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE	FACLES SEAT QUIP VOLTAM A 6,840 G G G G G G G FACLES S EAT QUIP VOLTAM A A A A A A A B B C C C C C C C C C C C	13,680 1,344 2,520 9,100 DULAR BL 6,840 6,840 13,680 1,536 1,440 DULAR BL	AIC R SERV MOUILOCA AIC R SERV MOUILOCA WIRE NO. 6	0 1.25 1.0/.5 1.00 1.00 1.00 1.00 G MAN ATING ATION: BKR AMP 60 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1	S: NUF. P 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR ACTUR ACTUR AMERICAN AM	ISP IN ING DTOR WNDW ACK ER SERIES NIT 'C' IMODU INTER INTE	RATED SY JLAR UNIT VOLTAM A 1,440 1,440 RATED SY UILDING LAR UNIT VOLTAM A	PS/PHASE B 1,536 1,536 CONN. VA	1.25	EQUIPMENT GROUND TOTAL DEMAND 17,04 EQUIPMENT GROUND TOTAL DEMAND 17,04	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 1111 NELBOARD NOTES PANELBOARD SHEDULE WAS G SAMPS: 125A N SIZE/TYPE: 125A MCB LTS/PHASE: 240D/120V, 1PH, 3W CTION: 1 T DESCRIPTION HVAC UNIT 'C' SPACE S	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE TING LOAD COOLIN HEATING LIGHTIN RECEPT MOTORS SUPPH MISC EG ENERATE TING LOAD LOAD LOAD	FACLES EAT RUIP OBYMOD OBYMO	13,680 1,344 2,520 9,100 DULAR BL PS/PHASE B 6,840 1,536 1,440 DULAR BL CONN. W 6,840 CONN. W CONN. W	AIC R SERV MOULOCA INC. AIC R	0	S: NUF. P 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SIGN/D KITCHE KITCHE KITCHE KITCHE EXISTII LRG M SHOW LTG TF ACTUR AMERICAN AM	SERIES WODU R WNDW ACK R WRE NO. 12 12 12 12 12 12 12 12 12 12 12 12 12	RATED SY ULAR UNIT VOLTAM A 1,440 C C C C C C C C C C C C C C C C C C	PS/PHASE B 1,536 1,536 CONN. VA STEM 'E' PS/PHASE B 1,536	1.25	EQUIPMENT GRO DESCRIPTION 'C' SUBTOTAL TOTAL DEMAND 17,04 EQUIPMENT GRO DESCRIPTION 'E'	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 1111 NELBOARD NOTES PANELBOARD SHEDULE WAS G SAMPS: 125A N SIZE/TYPE: 125A MCB LTS/PHASE: 240D/120V, 1PH, 3W CTION: 1 T DESCRIPTION HVAC UNIT 'C' SPACE	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPPHI MISC EG ENERATE TING LOAD COOLIN HEATING LIGHTIN RECEPT MOTORS SUPPH MISC EG SENERATE	FACLES SEAT RUIP OBYMOD OBYM	13,680 1,344 2,520 9,100 DULAR BL PS/PHASE B 6,840 1,536 1,440 DULAR BL	AIC R SERV MOULOCA INC. AIC R	0	S: NUF. P 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR ACTUR ACTUR AM 1	ISP EN ING DTOR WNDW ACK R WND I 12 12 12 12 12 12 12 12 12 12 12 12 12	RATED SY ULAR UNIT VOLTAM A 1,440 C C C C C C C C C C C C C C C C C C	PS/PHASE B 1,536 STEM 'E' PS/PHASE B 1,536	1.25	EQUIPMENT GRO DESCRIPTION 'C' SUBTOTAL TOTAL DEMAND 17,04 EQUIPMENT GRO DESCRIPTION 'E'	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 1111 NELBOARD NOTES PANELBOARD SHEDULE WAS G SAMPS: 125A N SIZE/TYPE: 125A MCB TS/PHASE: 240D/120V, 1PH, 3W TION: 1 DESCRIPTION HVAC UNIT 'C' SPACE SPA	COOLING HEATING LIGHTING RECEPT MOTORS SUPPHING COOLING HEATING LIGHTING RECEPT MOTORS SUPPHING COOLING RECEPT MISC EXCENTED TO THE MISC EXCENTED TO	FACLES SEAT RUIP VOLTAM A 6,840 G G G G G G G G G G G G G G G G G G	13,680 1,344 2,520 9,100 DULAR BU PS/PHASE B 6,840 CONN. V 13,680 1,536 1,440 CONN. V 13,680 1,536	AIC R SERV MOUI LOCA AIC R SERV MOUI LOCA WIRE NO. 6 10G	0	S: (ODI) S: SL P 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K ULAR U JRFACE TERIOR P BK AM 1 20 1 1 1 1 1 1 1 1 1 1 1 20 1 20	ISP IN ING DTOR WNDW ACK R WNDU R WNDU ISP IN ING DTOR WNDW ACK ER SERIES NOD. I 12	RATED SY ULAR UNIT VOLTAM A 1,440 C C C C C C C C C C C C C C C C C C	PS/PHASE B 1,536 STEM 'E' PS/PHASE B 1,536	1.25	EQUIPMENT GRO DESCRIPTION 'C' SUBTOTAL TOTAL DEMAND 17,04 EQUIPMENT GRO DESCRIPTION 'E'	UND
AMPS 120 TOTAL PHASE B - VA 12,284 AMPS 102 TOTAL PNLBD - VA 26,644 AMPS 1111 NELBOARD NOTES PANELBOARD SHEDULE WAS G SAMPS: 125A N SIZE/TYPE: 125A MCB LTS/PHASE: 240D/120V, 1PH, 3W CTION: 1 T DESCRIPTION HVAC UNIT 'C' SPACE	COOLINI HEATING LIGHTIN RECEPT MOTORS SUPP HI MISC EG GENERATE LOAD COOLINI HEATING LIGHTIN RECEPT MOTORS SUPP HI MISC EG COOLINI HEATING COOLINI HEATING HEATING	FACLES G FACLES S EAT QUIP VOLTAM A 6,840 G G G G FACLES S EAT QUIP O O O O O O O O O O O O O	13,680 1,344 2,520 9,100 DULAR BL PS/PHASE B 6,840 CONN. W 13,680 1,536 1,440 DULAR BL CONN. W 13,680 CONN. W 13,680	AIC R SERV MOUI LOCA AIC R SERV MOUI LOCA WIRE NO. 6 10G	0	S:	SIGN/D KITCHE EXISTII LRG M SHOW LTG TF ACTUR 42K/10K ULAR U JRFACE TERIOR T AM T A	SERIES NODU R WNDW ACK ISP MODU R NO. I12 I12 I13 IISP IN IIS	RATED SY ULAR UNIT VOLTAM A 1,440 C C C C C C C C C C C C C C C C C C	PS/PHASE B 1,536 STEM 'E' PS/PHASE B 1,536	1.25	EQUIPMENT GRO DESCRIPTION 'C' SUBTOTAL TOTAL DEMAND 17,04 EQUIPMENT GRO DESCRIPTION 'E'	UND

PANELBOARD SHEDULE WAS GENERATED BY MODULAR BUILDING MANUFACTURER

P	NELBOARD: F	AB EX	ISTING	j											EQUIPMENT GROUND	BUS
BU	S AMPS: 125A					AIC RATING: 42K/10K SERIES RATED SYSTEM										
MA	N SIZE/TYPE: 125A MCB					SERVES: FABRICATION										
VOLTS/PHASE: 240D/120V, 1PH, 3W						MOU	NTING	: Sl	JRF	ACE						
SE	CTION: 1					LOCA	ATION:	EX	TER	IOR F	EDES	STAL MOU	INT			
CK	T DESCRIPTIO	N		VOLTAN	PS/PHASE	WRE	BKR	Р	Р	BKR	WRF	VOLTAM	PS/PHASE		DESCRIPTION	СКТ
NC		100		Α	В		AMP		_	- Canada	NO.	Α	В		2233	NO.
1	FLOOD LIGHTING CIR	CUIT 1		1,200		10	20	1	1	20	10	1,440		FLEXIBLE	E CABLE RECEPTACLE QUAD 1	2
3	FLOOD LIGHTING CIR	CUIT 2			1,200	10	20	1	1	20	10		1,440	FLEXIBLE	E CABLE RECEPTACLE QUAD 2	4
5	FLOOD LIGHTING CIR	UCIT 3		1,200		10	20	1	1	20	10	1,440		FLEXIBLE	E CABLE RECEPTACLE QUAD 3	6
7	30 AMP WELDING REG	CEPTACLE			2,750	8	30	2	1	20	10		1,440	FLEXIBLE	E CABLE RECEPTACLE QUAD 4	8
9				2,750		10G			1	20	10	1,440		FLEXIBLE	E CABLE RECEPTACLE QUAD 5	10
11	30 AMP WELDING REG	CEPTACLE			2,750	8	30	2	1	20	10		1,440	TRALER	MOUNTED FUEL PUMP	12
13				2,750		10G			1	20				SPARE		14
	SPACE							1	1					SPACE		16
17	SPACE							1	1					SPACE		18
19								1	1					SPACE		20
21								1	1					SPACE		22
23	SPACE							1	1					SPACE		24
	SUBTOTAL			7,900	6,700							4,320	4,320		SUBTOTAL	
	TOTAL PHASE A - VA	12,220	LOAD		CONN. V	Ά	DF		LO	AD		(CONN. VA	DF		
	AMPS	102	COOLIN	G			1.00		RE	FRIG				1.00		
	TOTAL PHASE B - VA	11,020	HEATING	3			0		SIG	N/DIS	P			1.25		
	AMPS	92	LIGHTIN	G	3,600		1.25		KIT	CHEN	I			1.00		
	TOTAL PNLBD - VA	23,240	RECEPT		8,640		1.0/.5			STINC				1.00		_
	AMPS	97	MOTOR	3			1.00			G MOT				1.25	TOTAL DEMAND	
			SUPP H	EAT			1.00		SH	OWW	NDW			1.25	24,140 VA	
			MISC EC	UIP	11,000		1.00		LTO	3 TRA	CK			1.00	101 A	
	NELBOARD NOTES PROMDE GROUND FA	AULT RATE	ED CIRCU	IT BREAK	ER OR RE	CEPT	ACLE									

PANELBOARD: B EXISTIN	G										EQUIPMENT GROUN	ID BUS
BUS AMPS: 125A		Ale	C RATING		42k	(/10K S	FRIES I	RATEDSY	STEM			2 200
MAIN SIZE/TYPE: 125A MCB			ERVES: M	-				иншон	O I LIVI			
VOLTS/PHASE: 240D/120V, 1PH, 3W			DUNTING				11 0					
							100111	AD LIMIT	IDI			
SECTION: 1			CATION:	-		en e a e n	V21-0-1-0-1-					
CKT DESCRIPTION	VOLTAME	PS/PHASE W	RE BKR	Р	Р	BKR	WRE	VOLTAM	PS/PHASE		DESCRIPTION	CK
NO.	Α	B N	O. AMP			AMP	NO.	Α	В			NO
1 HVAC UNIT 'B'	6,840		6 60	2	1	20	12	1,800		RECEPTACI	_ES 'B'	2
3	,	6,840 1	0G		1	20	12	,	1,536	LIGHTING 'B)	4
5 SPACE				1	1				·	SPACE		6
7 SPACE				1	1					SPACE		8
9 SPACE				1	1					SPACE		10
11 SPACE				1	1					SPACE		12
SUBTOTAL	6,840	6,840						1,800	1,536		SUBTOTAL	
TOTAL PHASE A - VA 8,640 LC	DAD	CONN. VA	DF		LO	AD		(CONN. VA	DF		
AMPS 72 CC	OOLING	13,680	1.00		RE	FRIG				1.00		
TOTAL PHASE B - VA 8,376 HE	EATING		0		SIG	SN/DIS	SP			1.25		
AMPS 70 LIC	GHTING	1,536	1.25		KIT	CHEN	1			1.00		
TOTAL PNLBD - VA 17,016 RE	ECEPTACLES	1,800	1.0/.5		EX	ISTING	3			1.00		
	OTORS		1.00		LR	G MO	OR			1.25	TOTAL DEMAND	\neg
SU	JPP HEAT		1.00		SH	OWV	NDW			1.25	17,400 \	VΑ
MI	SC EQUIP		1.00		LT	G TRA	CK			1.00	73	3 A
PANELBOARD NOTES							-			<u> </u>		
PANELBOARD SHEDULE WAS GENE	ERATED BY MOD	ULAR BUILI	DING MAN	IUF	AC	TURE	₹					

PANELBOARD: D EXISTING	EQUIPMENT GROUND BUS
BUS AMPS: 125A AIC RATING: 42K/10K SERIES RATED SYSTEM	
MAIN SIZE/TYPE: 125A MCB SERVES: MODULAR UNIT 'D'	
VOLTS/PHASE: 240D/120V, 1PH, 3W MOUNTING: SURFACE	
SECTION: 1 LOCATION: EXTERIOR MODULAR UNIT 'D'	
CKT DESCRIPTION VOLTAMPS/PHASE WIRE BKR P P BKR WIRE VOLTAMPS/PHASE	DESCRIPTION CKT
NO. A B NO. AMP AMP NO. A B	NO.
1 HVAC UNIT 'D' 6,840 6 60 2 1 20 12 1,440	RECEPTACLES 2
3 6,840 10G 1 20 12 1,766	LIGHTING 4
5 LIGHTING 1,088 12 20 1 1 20 12 720	RECEPTACLES 6
7 LIGHTING 952 12 20 1 1	SPACE 8
9 LIGHTING 1,102 12 20 1 1	SPACE 10
11 SPACE 1 1 1	SPACE 12
SUBTOTAL 9,030 7,792 2,160 1,766	SUBTOTAL
TOTAL PHASE A - VA 11,190 LOAD CONN. VA DF LOAD CONN. VA	A DF
AMPS 93 COOLING 13,680 1.00 REFRIG	1.00
TOTAL PHASE B - VA 9,558 HEATING 0 SIGN/DISP	1.25
AMPS 80 LIGHTING 4,908 1.25 KITCHEN	1.00
TOTAL PNLBD - VA 20,748 RECEPTACLES 2,160 1.0/.5 EXISTING	1.00
AMPS 86 MOTORS 1.00 LRG MOTOR	1.25 TOTAL DEMAND
SUPP HEAT 1.00 SHOW WNDW	1.25 21,975 VA
MISC EQUIP 1.00 LTG TRACK	1.00 92 A
PANELBOARD NOTES	
PANELBOARD SHEDULE WAS GENERATED BY MODULAR BUILDING MANUFACTURER	

SERIES RATING LABEL

LABEL ALL EQUIPMENT WITH BREAKERS PART OF A SERIES RATED SYSTEM:

"CAUTION - SERIES COMBINATION SYSTEM RATED _____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED."

Lighting | Engineering | Design |

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PROJECT: RLE 190048 |
ENGINEER | FROM STATE | FROM STATE |
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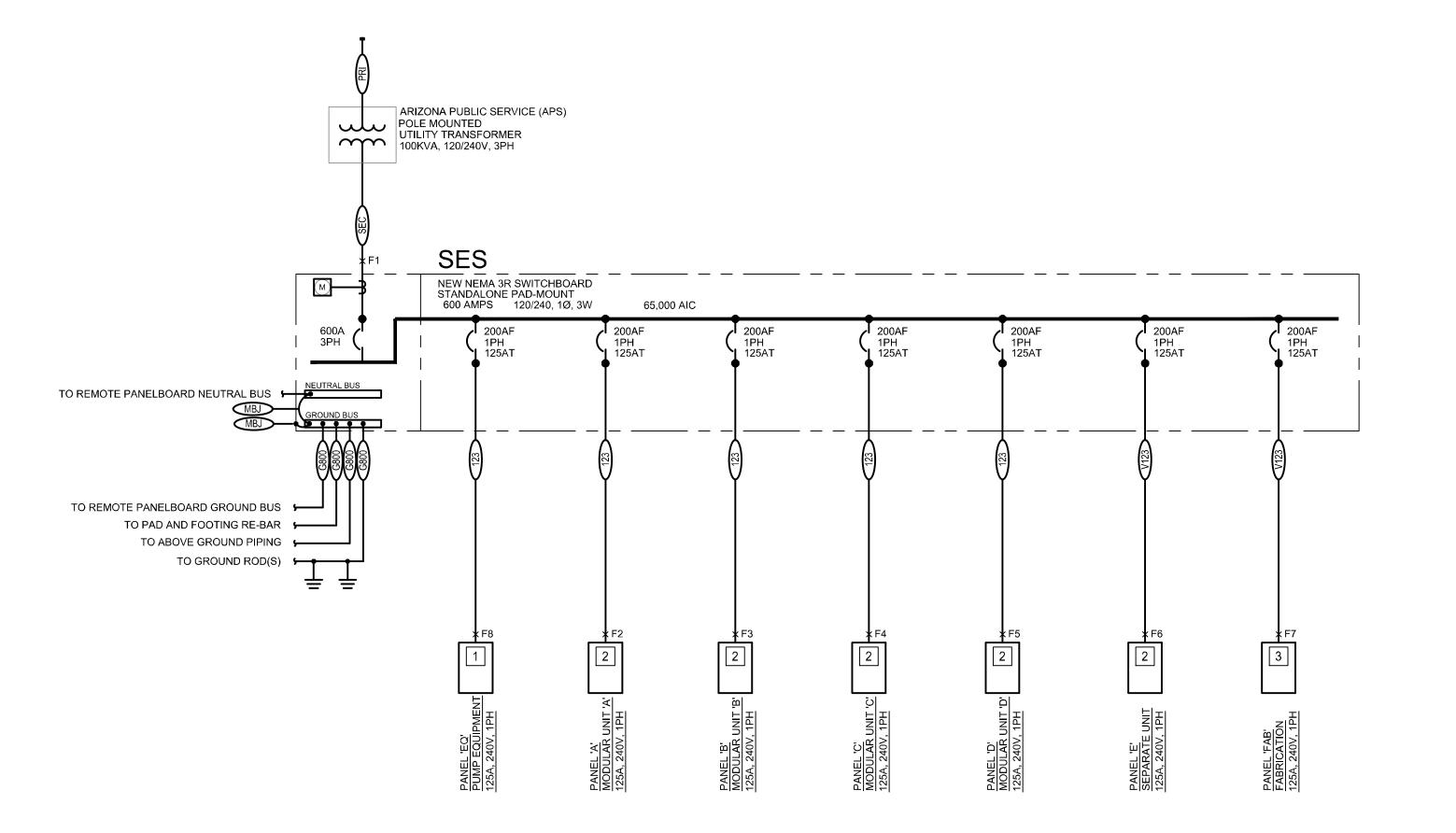
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ELECTRICAL
PANEL SCHEDULES

SHEET NUMBER

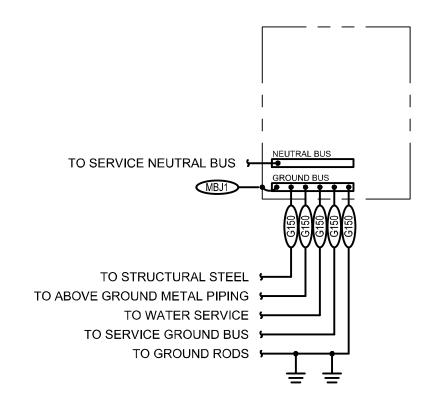
E3.



ONE-LINE DIAGRAM

8 PANEL 'EQ'

BUILDING OCCUPANCY TYPE:	В	SERVICE DESCRIPTION:					
BUILDING SQUARE FOOTAGE:	3,000	24	240Y/120V, 3PH				
LOAD DESCRIPTION		Connected KVA	Demand FACTOR	Demar KVA			
HVAC - SUMMER		68.40	100%	68.			
HVAC - WINTER		0.00	100%	0.			
LIGHTING (PER NEC-220)		10.86	125%	13.			
RECEPTACLES		18.00	100%;50%	14.			
MOTOR LOADS		0.00	100%	0.			
LARGEST MOTOR LOAD		0.00	125%	0.			
MISCELLANEOUS EQUIPMENT		20.10	100%	20.			
EXTERIOR LIGHTING		3.60	125%	4.			
TOTAL LOAD		120.96	KVA	120			
TOTAL AMPACITY **		504.00	AMPS	502			
SERVICE AMPACITY		600	AMPS	600.			
SPARE CAPACITY			AMPS				



REMOTE PANEL GROUNDING DETAIL
N.T.S.

Short-Circuit and Voltage Drop Calculations Distances are for calculation purposes only and shall not be used for contractor takeoffs nor bidding - Contractor shall notify Engineer of any field condition that results in a change of 10% or greater circuit distance The following calculations are based on the "Point-by-Point" method where: VOLTAGE DROP (3Ø): $f_{(3\emptyset)} = 1.732 \times L \times lsc$ XFMR: $f_{(3\emptyset)} = IP(sca)x Vp x 1.73 x %Z$ $%VD = ((R \times cos(arccos(pf)) + X \times sin(arccos(pf))) \times L/\# \times I \times 1.73) / E$ $ISC_{(2)} = ISC_{(1)} \times M_{(1)}$ $IS_{(sca)} = Vp x M x IP_{(sca)}$ ISC $_{(1)}$ = short circuit current at fault point 1 100,000 x KVA VOLTAGE DROP (1Ø): CxE ISC $_{(2)}$ = short circuit current at fault point 2 $f_{(1\emptyset)} = 2 \times L \times lsc$ $f_{(1\emptyset)} = IP(sca)x Vp x \%Z$ %VD= ((R x cos(arccos(pf)) + X x sin(arccos(pf))) x 2 x L/# x I) / E 100,000 x KVA CxE IP = Primary short circuit current Vp = Primary voltage IS= Secondary short circuit current %VD CUM= Cumulative Voltage Drop from Fault Point 1 to Fault Point # Vs= Secondary voltage R= resistance in ohms per LF X= reactances in ohms per LF L = Length of circuit E = Line to line volts C = "C" Factor from Bussman table where "C" = 1 / impedance per linear foot Feeder Types = NM - Non Magnetic Conduit, M - Magnetic Conduit, FB - Feeder Busway, PB - Plug-in Busway, TX - Transformer (Fault Phase Isc Conduit (amps) Type/TX Material Phase & Neutral Size Feeder Conductor 'C' Value (E) Circuit Load Voltage Length Factor (nf) Conductor Transformer Fault Voltage Cumulative Fault Circuit Load Resistance Reactance Arccos (pf) Bus/Feeder Description M Current Drop Voltage Point New Existing Secondary Tap (E) (L) Factor (pf) (Amperage) (R) (amps) (%VD) Drop (%VD) (F#) (X) (Radians) Xfmr Z Xfmr Z Voltage Setting Rise Source Isc + 6X Motor Contribution = 38897 1 Utility Service Point 35,297 at the secondary of the utility transformer Motor Contribution 2 PANEL 'A' 600 The connected full load motor amps (includes compressors) on the system 1 1 38897 NM CU 1 Set(s) of 1 1 38897 NM CU 1 Set(s) of 1 1 38897 NM CU 1 Set(s) of 1 AWG 7493 - 240 60 0.9 112 0.000150 0.000046 0.451027 1 AWG 7493 - 240 50 0.9 73 0.000150 0.000046 0.451027 1 AWG 7493 - 240 50 0.9 71 0.000150 0.000046 0.451027 2.596 0.28 10818 -0.87% -0.87% 2 2.163 0.32 12298 -0.47% -0.47% 3 2.163 0.32 12298 -0.46% -0.46% 4 3 PANEL 'B' 4 PANEL 'C' 7493 -- 240 60 0.9 92 0.000150 0.000046 0.451027 5 PANEL 'D' 1 AWG 2.596 0.28 10818 -0.71% -0.71% 5 1 1 38897 NM CU 1 Set(s) of 6 PANEL 'E' 11424 -- 240 125 0.9 71 0.000100 0.000043 0.451027 3.547 0.22 8555 -0.80% -0.80% 6 1 1 38897 NM CU 1 Set(s) of 2/0 AWG 7 PANEL 'FAB' 1 1 38897 NM CU 1 Set(s) of 2/0 AWG 11424 -- 240 175 0.9 100 0.000100 0.000043 0.451027 4.965 0.17 6520 -1.59% -1.59% 7

1 1 38897 NM CU 1 Set(s) of 3/0 AWG 13923 -- 240 10 0.9 40 0.000077 0.000042 0.451027

GENERAL NOTES

- A. ALL TERMINATIONS SHALL BE RATED FOR THE SAME TEMPERATURE AS THE CONDUCTOR INSULATION.
- B. REFER TO E0.0 'ELECTRICAL SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES' FOR ADDITIONAL INFORMATION BEFORE ESTIMATING
- OR CONSTRUCTION FROM THIS SHEET.

 C. COMPLY WITH ALL SPECIFICATIONS OUTLINED

ON SHEET E5.1, E5.2, AND E5.3.

- D. PROVIDE ALL NECESSARY ITEMS TO MEET THE INSTALLATION REQUIREMENTS AND PROVIDE A FULLY OPERATIONAL SYSTEM.
- E. LABEL ALL EQUIPMENT WITH BREAKERS PART OF A SERIES RATED SYSTEM: "CAUTION SERIES COMBINATION SYSTEM RATED _____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED."

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FEEDER LEGEND

PRI PRIMARY ELECTRICAL UTILITY SERVICE LATERAL - (1) 4" SCHEDULE 80 PVC CONDUIT, CONDUCTORS BY APS.

SEC SECONDARY ELECTRICAL UTILITY SUPPLY, PROVIDE (3) 4" SCHEDULE 40 PVC CONDUITS, CONDUCTORS BY APS.

MBJ8 #2/0 MAIN BONDING JUMPER

(G800) #2/0 GROUNDING ELECTRODE CONDUCTOR
(MBJ1) #6 MAIN BONDING JUMPER

©150 #6 GROUNDING ELECTRODE CONDUCTOR

123 125A - (4) #1 CU, (1) #6 CU GROUND IN 1-1/2" PVC CONDUIT A MINIMUM OF 24" BELOW GRADE

V123 125A - (4) #2/0 CU, (1) #6 CU GROUND IN 1-1/2"

PVC CONDUIT A MINIMUM OF 24" BELOW GRADE

KEYED NOTES

- 1. CONTRACTOR SHALL INSTALL TWO SECTIONS
 OF UNIVERSAL MOUNTING CHANNEL
 (UNI-STRUT) TO ONE END OF THE ELECTRICAL
 SERVICE EQUIPMENT AND INSTALL NEW
 PANELBOARD. PROVIDE MAINTENANCE
 RECEPTACLE, MAINTENANCE LIGHTING, AND
 ANY REQUIRED MOTOR CONTROLLERS FOR
 WATER AND SEWER PUMPING SYSTEMS ON
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 ON SHEET E3.1 FOR ADDITIONAL INFORMATION.
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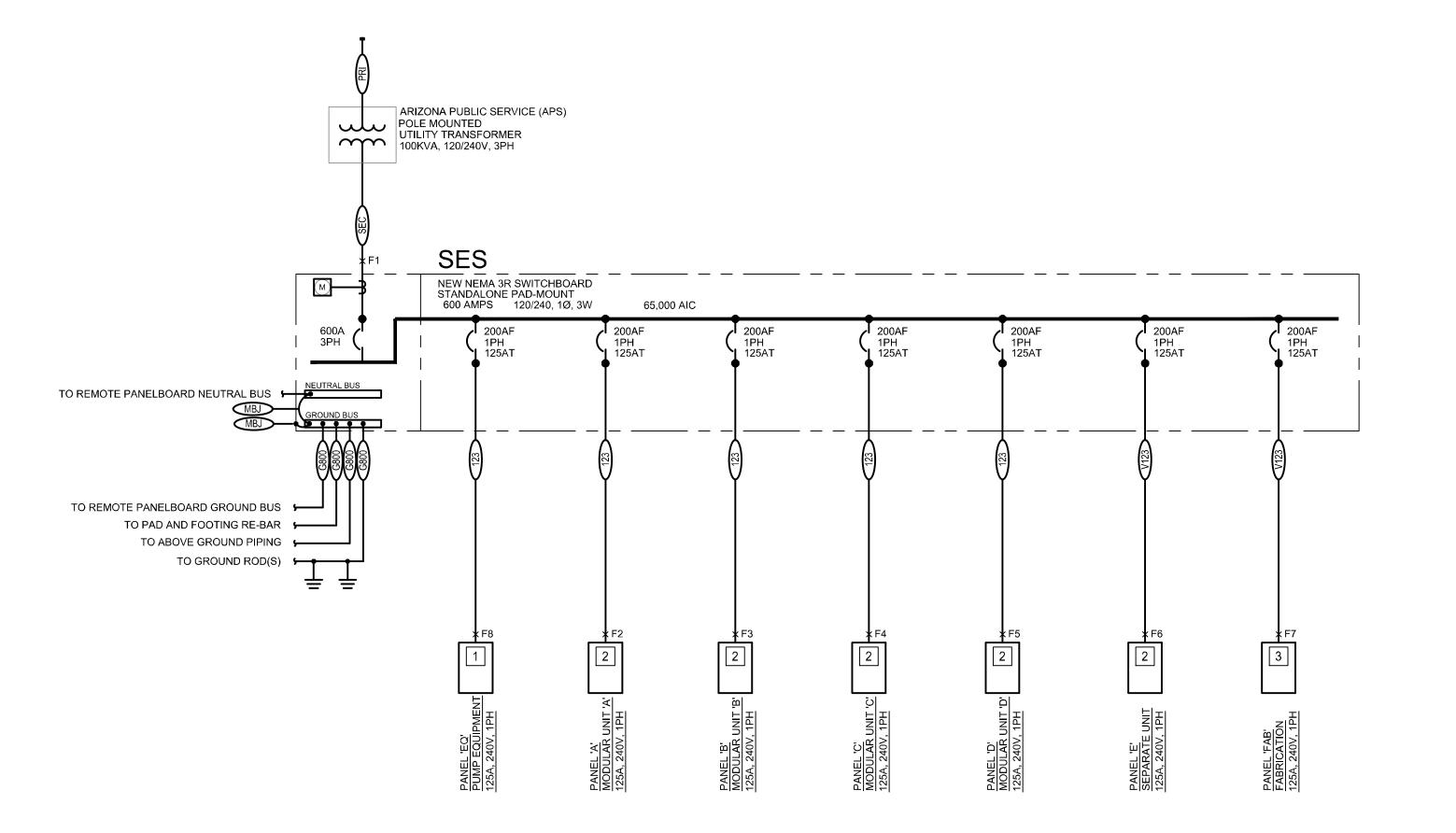
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SHEET NUMBER

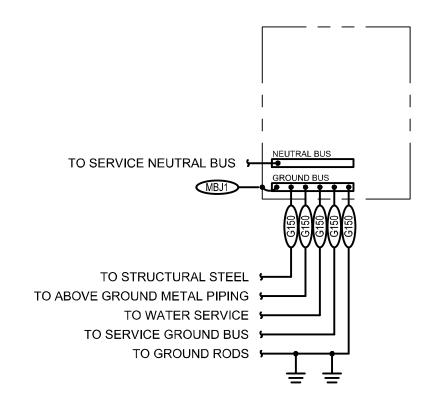
E4.1



ONE-LINE DIAGRAM

8 PANEL 'EQ'

BUILDING OCCUPANCY TYPE:	В	SERVICE DESCRIPTION:					
BUILDING SQUARE FOOTAGE:	3,000	24	240Y/120V, 3PH				
LOAD DESCRIPTION		Connected KVA	Demand FACTOR	Demar KVA			
HVAC - SUMMER		68.40	100%	68.			
HVAC - WINTER		0.00	100%	0.			
LIGHTING (PER NEC-220)		10.86	125%	13.			
RECEPTACLES		18.00	100%;50%	14.			
MOTOR LOADS		0.00	100%	0.			
LARGEST MOTOR LOAD		0.00	125%	0.			
MISCELLANEOUS EQUIPMENT		20.10	100%	20.			
EXTERIOR LIGHTING		3.60	125%	4.			
TOTAL LOAD		120.96	KVA	120			
TOTAL AMPACITY **		504.00	AMPS	502			
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SHEET NAME
ELECTRICAL
ONE-LINE DIAGRAM AND
CALCULATIONS

SHEET NUMBER

E4.1

26 00 00 - GENERAL ELECTRICAL REQUIREMENTS

- A. General Requirements
- apply to this section 2. Where the requirements of this section and division exceed those of the general and
- supplementary conditions, the requirements of this section take precedence 3. Become thoroughly familiar with all of its contents as to requirements that affect this
- 4. Work required under this section includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications, or reasonable inferred to be necessary to facilitate the function of the system and design intent.

1. All requirements under the architects general and supplementary conditions, if provided,

- 5. The specifications and drawings for the project are complementary, and any portion of work described in one shall be provided as if described in both
- 6. In the event of discrepancies between specifications and drawings, notify the engineer and request clarification prior to proceeding with the work involved. 7. Limitations to drawings:
- a. Drawings are graphic representations of the work upon which the contract is based. b. Drawings show the materials and their relationship to one another, including sizes, shapes, locations, and connections.
- c. Drawings convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements
- d. Contractor shall use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, which when installed per manufacturers' requirements, will ensure a complete, coordinated, and properly
- e. Exact location of any component shall be confirmed and/or dimensioned by architect prior to rough-in. Do not rely on engineer to provide any exact locations.

B. Definitions

- Abbreviations/Acronyms:
- a. AHJ (Authority Having Jurisdiction): The local code and/or inspection agency (Authority) Having Jurisdiction over the Work.
- b. EPDM: Ethylene-Propylene-Diene-Terpolymer Rubber, used as a highly effective conductor insulating material and vibration isolator.
- c. NBR: Acrynlonitrile-Butadiene Rubber d. NRTL: Nationally Recognized Testing Laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA), and acceptable to the AHJ over this project.
- e. PCF: Pounds per Cubic Foot 2. Trade/Industry Terminology: a. Architect: Registred design professional responsible for the overall structural concept
- of the facility constructed under this scope of work. In addition the Architect is typically the central authority for full design team and is the primary point of contact for coordination with the design team. Coordination of exact placement of any product or item associated with the division 26 specifications shall be coordinated with the Architect
- b. Approved equal: Used synonymously with Equivalent and/or Equal, and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, certified, or all three, by an NRTL, and acceptable to the AHJ and/or Architect assigned to this
- c. <u>Engineer</u>: Where referenced in this Division, "Engineer" is the Engineer of Record and the Design Professional for the work under this division, and is a consultant to. and an authorized representative of the Architect, Contractor, and/or Owner. When used in this division, Engineer means increased involvement by and obligations to the Engineer, in addition to involvement by and obligations to the Architect.
- d. <u>Furnish</u>: "to supply and deliver to the project site, ready for unloading, unpacking, assembling, installing, and similar operations. e. Furnished by Owner or Furnished by Others: "an item furnished by the Owner or
- under other divisions or contracts, and installed under the requirements of this division, complete, and ready for the intended use, including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the warranty required by this division.
- f. Homerun: That portion of an electrical circuit originating at a junction box, termination box, receptacle, or switch with termination at an electrical panelboard. Note: Where MC cable is utilized for receptacle and/or lighting branch circuiting loads, the originating point of the homerun shall be at the first load in the circuit or at a junction box located in an accessible ceiling space as close as possible to the first
- g. Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying,
- dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use." h. <u>Provide</u>: "to furnish and install."
- Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals.
- j. <u>Value Engineering</u>: A systematic method to improve the "value" of goods and services by using an examination of function. Value, as defined, is the ratio of function to cost. Value can therefore be increased by either improving the function or reducing the cost. The goal of VE is to achieve the desired function at the lowest overall cost consistent with required performance.

C. Material and Workmanship 1. Unless indicated otherwise on the Drawings, provide all material and equipment new, of

- the best quality and design, free from defects and imperfections and with markings or a nameplate identifying the manufacturer and providing sufficient reference to establish quality, size and capacity. Provide all material and equipment of the same type from the same manufacturer whenever practicable. 2. Model numbers listed in the specifications or shown on the drawings are not necessarily
- intended to designate the required trim, written descriptions of the trim govern model numbers. Vendors shall confirm product with submittals prior to ordering. 3. Furnish only material and equipment that are listed, labeled, certified, or all three, by an
- NRTL whenever any listing or labeling exists for the types of material and equipment specified.
- 4. Unless specified otherwise, manufactured items of the same types specified within this Division shall have been installed and used, without modification, renovation, or repair for not less than one year prior to date of bidding for this Project. 5. Install all Work in strict conformance with all manufacturers' requirements and
- recommendations, unless these Documents exceed those requirements. 6. Install all equipment and materials in a neat and professional
- manner, aligned, leveled, and adjusted for satisfactory operation, in accordance with NECA 1 (latest edition), "Standard Practices for Good Workmanship in Electrical 7. All workmanship shall be of the finest possible by experienced mechanics of the proper
- trade. In general, provide Industrial Specification Grade for all materials and equipment. 8. Provide all hoists, scaffolds, staging, runways, tools, machinery, and equipment required for the performance of the electrical work. Store and maintain material and equipment in clean condition, and protected from weather, moisture, and physical damage.

D. Coordination 1. Visit the site and ascertain the conditions to be encountered in installing the Work under

- this Division, verify all dimensions and locations before purchasing equipment or commencing work, and make due provisions for same in the bid. Failure to comply with this requirement shall not be considered justification for omission, alteration, and incorrect or faulty installation of any of the Work under this Division or for additional compensation for any Work covered by this Division.
- 2. Maintain an Electrical Foreman at the job site to coordinate electrical work with the following: a. Construction Drawings and Specification Sections of other trades
- b. Relevant equipment drawings, shop drawings, and submittal documents to
- determine the extent of clear spaces. c. Make all offsets required to clear equipment, beams and other structural members,
- and to facilitate concealing conduit in the manner anticipated in the design. d. Ensure various system components are installed at the proper time, fit the available space, and allow proper service access.
- e. Products are ordered and provided with necessary trim to properly fit the types of ceiling, wall, or floor finishes actually installed.
- 3. Contractor shall keep informed as to the work of other trades engaged in the construction of the project and shall execute work in a manner as to not interfere with or delay the work of other trades.
- 4. Figured dimensions by the Architect shall be taken in preference to scale dimensions. Contractor shall take his own measurements at the building to confirm, as variations may
- 5. Contractor shall be held responsible for errors that could have been avoided by proper checking and inspection.
- 6. Model numbers listed in the specifications or shown on the drawings are not intended to designate the required trim.
- 7. Products shall be ordered and provided with necessary trim to properly fit the types of ceiling, wall, or floor finishes actually installed.
- 8. Unless otherwise indicated, the General Contractor shall provide chases and openings in building construction required for installation of the systems specified herein. Contractor shall furnish the General Contractor with information where chases and openings are
- 1. Electronic drawing files are the intellectual property of the design professional stated on teh drawings and are covered under United States Copyright Laws. E. Ordinances and Codes 2. Requests for electronic drawing files will be considered on a case by case basis.

1. Work performed under this contract shall, at a minimum, be in conformance with

any amendments and standards as set forth by the following:

a. IBC

b. IECC

c. ADA

d ANSI

f. IES

g. NEC

i NEMA

h. NECA

j. NFPA

k. OSHA

with the most stringent.

G. Protection of Equipment and Materials

contractors under this contract.

Contract Documents and the design concept.

manufacturer recommended service clearances.

components will accommodate the substituted product.

this time for re-submittals, if required.

b. Applicable specification section

7. Submittals shall contain:

c. Submittal data

other trades.

h. Performance sheets

that are being proposed.

signature of the Engineer.

8. Requirements to prevent submittal rejection:

specified equipment or materials.

to access the submittals.

of the Architect and Engineer.

f. Shop drawings

g. Product data

9. Electronic Submittals:

J. Substitutions

eguivalent.

K. Electronic Drawing Files

a. The project name

for final resolution.

I. UL

e. ASTM

International Building Code

Americans with Disabilities Act

Illuminating Engineering Society

National Electrical Code, NFPA 70

National Fire Protection Association

Occupational Safety and Health Act

Underwriter's Laboratories

as well as any other local or national codes where applicable.

standards, etc., the contract documents shall take precedence.

acceptance from these authorities having jurisdiction.

temperature variations, store inside in conditioned spaces.

in use to prevent the entrance of debris into the systems.

National Electrical Contractors Association

3. In addition to code sections listed above, Contractor shall comply with rules and

4. Where the contract documents exceed the requirements of the referenced codes,

6. Promptly bring all conflicts observed between codes, ordinances, rules, regulations,

7. Procure and pay for permits and licenses required for the accomplishment of the work

herein described. Contractor will be held responsible for any violation of the law.

9. Perform all electrical work in compliance with applicable safety regulations, including

2. For materials and equipment susceptible to changing weather conditions, dampness, or

3. For other materials and equipment, cover with waterproof, tear-resistant, heavy tarp or

4. Equipment and material damaged by construction activities shall be rejected, and

polyethylene plastic as required to protect from plaster, dirt, paint, water, or physical

Contractor shall furnish new equipment and material of a like kind at his own expense.

5. Keep premises broom clean of foreign material created during work performed under this

6. Conduit, equipment, etc. shall have a neat and clean appearance at the termination of the

7. Plug or cap open ends of conduits while stored and installed during construction when not

1. Assemble and submit for review shop drawings, material lists, manufacturer product

literature for equipment to be furnished, and items requiring coordination between

3. Prior to transmitting submittals, verify that the equipment submitted is mutually compatible

5. Transmit submittals as early as required to support the project schedule. Allow two weeks

e. Contractors review stamp to certify that the submittal has been checked by the

Contractor, complies with the drawings and specifications, and is coordinated with

i. Highlight, mark, list, or indicate the materials, performance criteria, and accessories

f. Label the catalog data with the equipment identification acronym or number as used

materials, finishes, wiring diagrams, electrical requirements and deviations from

on the drawings and include performance curves, capacities, sizes, weights,

a. Contractor shall notify the Architect and Engineer that the submittals have been

b. Contractor shall include the website, user name, and password information needed

c. For submittals sent by e-mail, Contractor shall copy the designated representatives

d. Contractor shall allow two weeks for the Engineer review time as specified above.

10. The checking and subsequent acceptance of submittals by the Engineer and/or Architect

shall not relieve the Contractor from responsibility for deviations from the drawings and

specifications, errors in dimensions, details, sizes of equipment, or quantities, omissions of components or fittings, coordination of electrical requirements, and not coordinating

items with actual building conditions and adjacent work. Contractor shall request and

secure written acceptance from the Engineer and Architect prior to implementing any

11. Review of submittals are considered the Engineers last opportunity to provide final

beyond the change in 'product' cost only not 'product and labor' cost.

appearance and quality to be met by the proposed substitution.

to the Engineer, Architect, and/or Owner the following:

of replacement parts.

verification that elements represented on contract documents are accurate. Rarely

specified in the contract documents. This adjustment shall not incur additional fees

substituted products, he/she/they waives and releases the engineer from any and all

responsibility for the proper fit, performance, and/or safety of the specified product.

12. If Contractor fails to provide submittals prior to ordering or installing any specified or

1. Materials, products, equipment, and systems described in the Bidding Documents are

2. The burden of proof of the proposed substitution is solely upon the proposer. Reviewer

specified as a 'Basis of Design' and establish a standard of required function, dimension,

retains the right to request any information deemed necessary to approve the proposed

3. Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants

a. Proposed substitution has been fully investigated and determined to meet or exceed

b. Proposed substitution is consistent with the Contract Documents and will produce

c. Proposed substitution has received necessary approvals of authorities having

d. Same warranty will be furnished for proposed substitution as for specified Work.

substitute material or system with that originally specified and bear costs incurred

e. If accepted substitution fails to perform as required, Contractor shall replace

f. Coordination, installation and changes in the Work as necessary for accepted

substitution will be complete in all respects at contractors expense.

the specified Work in all respects unless stated otherwise in the substitution request.

indicated results, including functional clearances, maintenance service, and sourcing

Engineer may request coordination with contractor to implement a product not originally

a. Submittals and shop drawings shall not contain firm name, logo, the seal, or

for Engineer review time, plus to/from mailing time via the Architect, plus a duplication of

2. Provide submittals in sufficient detail so as to demonstrate compliance with these

with and suitable for the intended use, will fit the available space, and maintain

4. If the size of equipment furnished makes necessary any change in location or

Update submittals to verify upon approval of substitution requests all required

configuration, submit a shop drawing showing the proposed layout.

d. Equipment identifications acronym as used on the drawings

b. They shall not be copies of the work product of the Engineer.

c. Separate submittals according to individual specification sections

e. Catalog data shall be properly bound, identified, indexed and tabbed

d. Illegible submittals will be rejected and returned without review

OSHA regulations. All safety lights, guards, and warning signs required for the

performance of the electrical work shall be provided by the Contractor.

1. Store and protect from damage equipment and materials delivered to job site.

8. Obtain timely inspections by the constituted authorities having jurisdiction; and, upon final

completion of the Work, obtain and deliver to the Owner executed final certificates of

regulations of public utilities or municipal departments affected by connection of services,

5. Where conflicts between various codes, ordinances, rules, and regulations exist, comply

referenced standards, and these documents to the attention of the Architect and Engineer

National Electrical Manufactures' Association

International Energy Conservation Code

American National Standards Institute

American Society of Testing Materials

applicable national, state and local codes having jurisdiction. 2. Equipment furnished and associated installation work performed under this contract shall be in strict compliance with current applicable codes adopted by the local AHJ, including

L. Record Drawings (As-built Documents)

1. During progress of the work in this division, Contractor shall maintain an accurate record of all changes made during the installation of the system.

3. Optimized-LED retains the right to charge for additional usage of the company's

intellectual property outside of the original contractual agreement.

considered an acceptable form of written request.

2. Upon completion of the work, accurately transfer all record information to three identical sets of the approved shop drawings.

4. Request shall be made in writing to utilize electronic drawing files for any reason. Email is

3. If requested in project contract, Contractor may be requested to submit as-built drawings to Engineer to be incorporated into a CAD produced As-Built set.

N. Warranties

- 1. Warrant each system and each element thereof against all defects due to faulty workmanship, design, or material for a period of 12 months from date of Substantial Completion unless specific items are noted to carry a longer warranty in these construction documents or manufacturer's standard warranty exceeds 12 months.
- 2. Remedy all defects occurring within the warranty period(s). 3. Warranties shall include labor and material, including travel expenses.
- 4. Make repairs or replacements without any additional costs to the Owner, and to the
- satisfaction of the Owner, Architect, and Engineer. 5. Perform the remedial work promptly, upon written notice from the Owner.

- 6. Also warrant the following additional items:
- a. All raceways are free from obstructions, holes, crushing, or breaks of any nature. b. All raceway seals are effective.
- c. The entire electrical system is free from all short circuits and unwanted open circuits and grounds.
- 7. At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed, including term limits for warranties extending beyond the one year period and any actions the Owner must take in order to maintain warranty status.
- 8. Each warranty instrument shall be addressed to the Owner and state the commencement date and term.

26 05 05 - SELECTIVE DEMOLITION FOR ELECTRICAL

precautions in prosecuting the work.

A. Excavation and Backfilling

- 1. General:
- a. Perform excavation of every description, of whatever substance encountered and to the depth required in connection with the installation of the work under this Division.
- b. Excavation shall be in conformance with applicable Divisions and sections of the
- c. Erect barricades around excavations, for safety, and place an adequate number of amber lights on or near the work and keep those burning from dusk to dawn. Be responsible for all damage that any parties may sustain in consequence of neglecting the necessary
- d. Install sediment and erosion control measures in accordance with local codes and e. Prevent surface water and subsurface or ground water from flowing into excavations and
- from flooding project site and surrounding area. f. Do not allow water to accumulate in excavations. Remove water to prevent softening of
- bearing materials. Provide and maintain dewatering system components necessary to convey water away from excavations
- g. Restore roads, alleys, streets and sidewalks damaged during this Work to the satisfaction of Authorities Having Jurisdiction. Trenching:
- a. Trenches shall be of sufficient width.
- b. Crib or brace trenches to prevent cave-in or settlement.
- c. Do not excavate trenches close to columns and walls of new building without prior consultation with the Architect.
- d. Use pumping equipment if required to keep trenches free of water. e. Backfill trenches in maximum 6-inch layers of well tamped dry earth in a manner to
- prevent future settlement. Excavation:
- a. Excavation as specified herein shall be classified as common excavation. b. Slope sides of excavations to comply with local, state and federal codes and
- ordinances. Shore and brace as required for stability of excavation. c. Dispose of excavated materials that are considered unsuitable for backfill, and surplus of excavated material, which is not required for backfill, all to the satisfaction of the Engineer.
- 4. Backfill and Compaction
- a. Backfill excavations after completion of the following: Inspection, testing, approval, and locations have been recorded.

accordance with ASTM D 2049 for cohesionless soils

density for cohesionless soils.

- Removal of concrete formwork.
- Removal of shoring and bracing, and backfilling of voids.
- Removal of trash and debris. b. Place backfill and fill materials in layers of not more than 8 inches in loose depth for material compacted by heavy equipment, and not more than 4 inches in loose depth for material
- compacted by hand-operated tampers. c. Support raceways from permanent structures or undisturbed earth at no less that 10-foot intervals, while placing backfill materials, so that raceways are not deflected, crushed, broken, or otherwise damaged by the backfill placement.
- d. Where soil material must be moisture conditioned before compaction, uniformly apply water. Apply water in minimum quantity necessary to achieve required moisture content and to
- prevent water appearing on surface during, or subsequent to, compaction operations. e. Compact soil to not less than the following percentages of maximum density, in accordance with ASTM D 1557 for cohesion soils and the following percentages of relative density, in
- Areas Under Structures, Building Slabs and Steps, Pavements: Compact top 12 inches of subgrade and each layer of backfill or fill material to 90 percent maximum density for cohesive material, or 95 percent relative density for cohesionless material. • Areas Under Walkways: Compact top 6 inches of subgrade and each layer of backfill
- or fill material to 90 percent maximum density for cohesive material, or 95 percent relative density for cohesionless material. Other Areas: Compact top 6 inches of subgrade and each layer of backfill or fill material to 85 percent maximum density for cohesive soils, and 90 percent relative

B. Cutting and Patching

2. Obtain permission of the Architect prior to cutting.

1. Cut walls, floors, ceilings, and other portions of the facility as required to install work under

- 3. Do not cut or disturb structural members without prior approval from the Architect.
- 4. Cut holes as small as possible.
- 5. Patch walls, floors, and other portions of the facility as required by work under this
- 6. Patching shall match the original material and construction including fire ratings, if applicable.
- 7. Repair and refinish areas disturbed by work to the condition of adjoining surfaces in a
- manner satisfactory to the Architect.

C. Coincidental Damage 1. Repair streets, sidewalks, drives, paving, walls, finishes, and other facilities damaged in

- the course of this Work.
- 2. Repair materials shall generally match existing construction. 3. Repair work shall meet all requirements of the Owner, local authorities having jurisdiction,
- and meet the satisfaction of the Architect.
- 4. Repair work shall be thoroughly first class.

26 05 19 - LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES A. General Requirements

- 1. Provide wiring products for the completion of the work by a manufacturer which complies with the specification requirements of this section. 2. Sizes of conductors and cables indicated or specified are in American Wire Gage (AWG -
- 3. If no conductor size is indicated on the Drawings for a branch circuit, contact engineer.

B. Conductors 1. Single Phase Insulated Conductors

- a. Annealed (soft) copper complying with ICEA S-95-658/NEMA WC70 and UL
- standards 44 or 83 as applicable. c. Conductor Insulation Types: 90-degree C-rated, Type THHN/THWN-2 or XHHW-2
- complying with ICEA S-95-658/NEMA WC70. d. All feeder and branch circuit conductors No. 8 AWG and larger: Stranded.
- e. All conductors, No. 10 AWG and smaller: Solid copper.

- 2. Control Wiring: a. Stranded copper conductors, 600V insulation

f. All Branch Circuit Wiring: Not smaller than No. 12 AWG., except where specifically

- b. Type, size, and number as required to accomplish specified function. c. Minimum size: No. 14 AWG, unless noted otherwise.
- 3. Flexible Cords and Cables:
- a. Stranded copper conductors for all, unless noted otherwise.

specified in residential projects.

C Terminations

- 1. Tinned, mechanical type only; NRTL-listed for copper and aluminum conductors at 75 degrees C minimum.
- 2. Where aluminum conductors terminate using compression connections:
- a. Use hydraulic-compression type connectors with a zinc base, anti-oxidizing
- b. Use compression tools of the type that will not release unless the correct pressure has been applied.
- 3. Measure the temperature of all conductors at all splices and terminations. Make each test under typical building load Conditions after the building is occupied and in operation for a minimum of two weeks.
- a. Replace all joints or splices indicating excessive heating.
- b. Take measurements with a non contact type infrared thermometer.

D. Conductor Installation

- 1. General Requirements a. Install all wiring in approved raceway and enclosures, except:
- Properly rated low-voltage wiring Where type MC cable is indicated or specified as acceptable
- b. Install all conductors and cables continuous without taps or splices between accessible boxes.
- c. Splice or tap only in approved boxes and enclosures with approved solderless connectors and keep to the minimum required. Insulate all splices, taps, and joints as required by codes.
- d. All materials used to terminate, splice, or tap conductors shall be NRTL listed for the specific application and conductors involved, and installed in strict accordance with the manufacturer's recommendations.
- e. At a minimum provide a junction box or accessible location every 360 degrees of conduit bends for pulling and splicing conductors.
- f. Provide an equipment-grounding conductor or bonding jumper, as applicable, in all feeders and branch circuits, sized in accordance with NFPA 70 Tables 250.66 or
- g. Voltage drop in branch circuits shall not exceed 3 percent. h. Home Run:
 - In general, the direction of branch circuit "home run" routing is indicated on the drawings, complete with circuit numbers and panelboard designation.
 - Continue all such "home run" wiring to the designated panelboard, as though "circuit runs" were indicated in their entirety.
 - At contractor's discretion circuits may be combined to multi-wire branch circuits (i.e., shared neutral). In these instances, they shall be provided with a means that will simultaneously disconnect all ungrounded conductors at the point the branch circuit originates. Multi-pole breakers or 3 single-pole breakers with a handle tie are acceptable means.
 - When multiple home runs are combined into a single raceway the total circuits shall not exceed three and total current carrying conductors including the neutral shall not exceed 4. Unless specifically indicated on the drawings.
- i. GFCI Protected Circuits: Provide a dedicated neutral and not be shared.
- the most remote receptacle or load on the GFCI circuit.

• Limit the one-way conductor length to 100 feet between the panelboard and

- Secure and support cable per NFPA 70 Article 330. Secure cable within 12 inches of every box or fitting.
- Securing and supporting intervals shall not exceed six feet. Maintain consistent spacing to avoid derating due to bundling per NFPA 70 Section
- Utilize steel cable hangers, Arlington SMC series or equivalent, to support wherever possible so cables can be routed in a neat and workmanship like manner

26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

A. General Requirements

- 1. Provide raceways, junction boxes, pull boxes, cabinets, and wireways wherever necessary for proper installation of various electrical systems according to NFPA 70 and where indicated on the drawings.
- 2. Size as required for the specific function or as required by NFPA 70, whichever is larger. Construction shall be of a NEMA design suitable for the environment installed.

B. Metallic Conduit and Tubing for Electrical Systems

- a. Electrical Metallic Tubing, Couplings, and Fittings (EMT): ANSI C80.3, UL 797. Only
- steel products allowed. Reduced wall EMT is not allowed. b. Flexible Metal Conduit (FMC): Zinc-coated steel or aluminum, UL 1. Reduced-wall
- c. Intermediate Metal Conduit (IMC): Hot-dip Galvanized Rigid Steel Conduit,
- ANSI C80.6, UL 1242. d. Liquidtight Flexible Metal Conduit (LFMC): Flexible steel conduit with PVC jacket, UL
- 360; fittings: NEMA FB 1
- e. Hot-dip Galvanized Rigid Steel Conduit (GRS): ANSI C80.1, UL 6.
- f. Plastic-Coated IMC, RMC, and Fittings: NEMA RN 1, NRTL listed. Coating thickness of 0.04 inches minimum.

g. IMC and RMC Fittings: NEMA FB 1; compatible with conduit type and material,

NRTL listed.

- C. Non-Metallic Conduit and Tubing for Electrical Systems
 - a. Rigid Nonmetallic Conduit (RNC): Schedule 40 PVC, 90 deg C rated,
 - b. Electrical Nonmetallic Tubing (ENT): NEMA TC 13, NRTL listed.
 - c. Liquidtight Flexible Nonmetallic Conduit (LFNC): UL 1660.
 - d. ENT and LFNC Fittings: Compatible with conduit/tubing type and material, NRTL Fittings:

a. NEMA TC 3, TC 6; UL 651, compatible with conduit/tubing type and material, NRTL

D. Outlet Boxes

- 1. Galvanized steel knockout boxes, suitable in design to the purpose they serve and the space they occupy.
- 2. Size as required for the specific function or as required by NFPA 70, whichever is larger. 3. Set all outlet boxes in walls, columns, floors, or ceilings so they are flush with the finished surface, accurately set, and rigidly secured in position. Provide plaster rings, extension
- rings and/or masonry rings as required for flush mounting. 4. Provide approved cast outlet boxes with hubs and weatherproof covers in all areas subject to damp, wet, or harsh conditions.

5. Coordinate locations of outlet boxes prior to rough-in, consult architect for exact locations.

- 6. Applications: a. Light fixture
 - b. Switch c. Receptacles
- E. Junction and Pull Boxes

a. NEMA FB1

- 1. Small sheet metal pull and junction boxes: NEMA OS1 2. Cast-Metal Pull and Junction Boxes
 - b. Cast [Iron] [Aluminum] with gasketed cover

F. Installation

Raceways

- a. Install raceways to requirements of structure, other work on the project, and to clear all openings, depressions, pipes, ducts, reinforcing steel, and other immovable
- b. Install raceways continuous between connections to outlets, boxes, and cabinets
- with a minimum possible number of bends and not more than the equivalent of four 90-degree bends between connections.
- e. Ream raceway ends, thoroughly clean raceways before installation, and keep clean after installation. Plug or cover openings and boxes as required to keep raceways clean during construction and fish all raceways clear of obstructions before pulling
- conductor wires f. Provide raceways of ample size for pulling of wire, not smaller than code requirements and not less than 1/2-inch in size, unless indicated otherwise on
- g. Homeruns containing more than one branch circuit shall not be less than 3/4-inch in
- h. Protect all raceway installations against damage during construction. Repair all raceways damaged or moved out of line after roughing-in to meet Engineer's approval without additional cost to the Owner.
- i. Align and install true and plumb all raceway terminations at panelboards,
- switchboards, motor control equipment, and junction boxes. . Install approved expansion/deflection fittings where raceways pass through (if embedded) or across (if exposed) expansion joints, and when using RNC or RAC in exposed environments in accordance with NFPA 70 and expansion/contraction properties of RNC or RAC.
- k. Install a pull wire in each empty raceway that is left for installation of conductors or cables under other divisions or contracts. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 24 inches of slack at each end of pull wire.
- I. Make all joints and connections in a manner that will ensure mechanical strength and electrical continuity.

2. Above Ground Raceways

- a. Install raceways parallel and perpendicular to building lines.
- b. Use manufactured elbows for all 45- and 90-degree bends, unless approved by the Engineer in advance. Make other bends smooth and even and without flattening raceway or flaking galvanizing or enamel. Radii of bends shall be as long as possible and never shorter than the corresponding trade elbow.
- c. Install all circular raceways concealed above suspended ceilings or concealed in walls or floors wherever possible except where otherwise indicated.
- d. Provide GRS for all conduits exposed to any forms of damage, physical, chemical, or weather related. e. Securely fasten raceways in place with approved straps, hangers, and steel supports as required. Attach raceway supports to the building structure. Hang single raceways for feeders with supports spaced not more than 10 feet. Securely clamp vertical

feeder raceways to structural steel members attached to structure. Install cable

12 inches of all bends, on both sides of the bends. Do not support raceways from

clamps for support of vertical feeders where required. Add raceway supports within

- suspended ceiling components.
- 4. Junction and Outlet Boxes c. Solidly mount all junction boxes to structural elements.
- d. Concrete Block Walls: As long as ADA requirements are maintained, dimensions above may be adjusted slightly as required to compensate for variable joint dimensions such that bottom or top of boxes, as applicable, are at block joints.

f. Unless noted otherwise, install wiring devices vertically aligned at height indicated on

e. Set all outlet boxes in walls, columns, floors, or ceilings so they are flush with the finished surface, accurately set, and rigidly secured in position. Provide plaster rings, extension rings and/or masonry rings as required for flush mounting.

Equipment Connections a. Use FMC or LMFC (liquid or vapor areas) for final connection to each motor,

construction drawings.

transformer, and any device that would otherwise transmit motion, vibration, or noise. Provide all FMC and LFMC with an insulated green or bare copper bonding ground Bushings and Locknuts

a. Rigidly terminate conduits entering sheet metal enclosures to the enclosure with a

d. Use insulated, grounding, or combination bushings wherever connection is subject to

bushing and locknut on the inside and a locknut or an approved hub on the outside. Conduit shall enter the enclosure squarely. b. Provide bushings and locknuts made of galvanized malleable iron with sharp,

vibration or moisture, when required by NFPA 70.

clean-cut threads. c. Where EMT enters a box, provide approved EMT compression connectors.

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ISSUED FOR: 12/18/19 | PERMIT/CONSTRUCTION

ELECTRICAL SPECIFICATIONS 1

SHEET NUMBER

SHEET NAME

- 1. Provide equipment identification nameplates:
- Feeder devices in switchboards

- a. Engraved, contrasting color, three-layer, laminated plastic, indicating the name of the equipment, load, or circuit as designated on the drawings and in the specifications:
- b. Field-applied permanent epoxy adhesive, compatible with the equipment finish.
- c. Self-adhering, with a permanent weatherproof adhesive.
- d. Attached with stainless steel screws and hardware.
- e. Attachment method shall be acceptable to the manufacturers of the equipment to which the nameplates are being applied.
- a. Black background with white letters for Normal Power;
- b. Red background with white letters for Emergency Power.
- 1. Label all conductors with vinyl stick-on circuit markers equating to the corresponding
- 2. Provide an equipment-grounding conductor or bonding jumper, as applicable, in all
- feeders and branch circuits, sized in accordance with NFPA 70 Tables 250,66 or 250,122.
- 3. Voltage drop in branch circuits shall not exceed 3 percent.
- a. Wiring shall have insulation of the proper color to match color code system in the table below unless there is a color system currently in use by the facility, in which case the colors are to match the existing system. In larger sizes where properly colored insulation is not available, use vinyl plastic electrical tape of the appropriate
- color around each conductor at all termination points, junctions, and pull boxes.
- Isolated Ground: Green with yellow stripe

26 05 63 - MISCELANEOUS EQUIPMENT CONNECTIONS

- 1. Provide necessary equipment and accessories that are not provided by the equipment supplier or Owner to complete installation and/or final connection to equipment furnished by others in locations indicated on the drawings, specified herein, or both.
- 2. Equipment and accessories not provided by the equipment supplier may include flexible cords and plugs as required for proper operation of the complete system, in accordance
- 3. Contractor shall be responsible for correct rough-in dimensions, and verify them with Architect and/or equipment supplier prior to rough-in and service installations.

- 1. Provide all raceways and power wiring for all Division 23 equipment requiring electrical
 - d. Line-voltage control and interlock wiring not provided under Division 23.
- 2. Connect per manufacturers' wiring diagrams
- a. Coordinate with mechanical contractor for disconnects and variable frequency drives
- (VFD) furnished with equipment
- b. Verify all disconnect switches and final connections as required
- c. After installing wiring, verify that each motor load has the correct phase rotation. d. Verify the actual "Maximum Overcurrent Protection" (MOCP) device ratings and "Minimum Circuit Ampacity" (MCA) conductor sizing for mechanical equipment
- e. Verify actual electrical requirements with mechanical equipment submittals and nameplates prior to rough-in. Provide properly sized electrical wiring and equipment without extra cost to the Owner. Notify the Engineer of all changes required in the electrical installation due to equipment variances so that the effects on feeders, branch circuits, panelboards, fuses and circuit breakers can be checked prior to
- f. Contractor is responsible for coordinating with mechanical contractor to verify the actual ampacities and correct sizes of all conductors and overcurrent protective
- a. If VFD is separate or does not have an integral disconnect feature, provide disconnect switch with auxiliary contact such that motor will be turned off if switch is
- b. Provide VFD cable, Belden or approved equivalent, for connection of VFD to motor
- 5. Provide all raceways, power wiring, line-voltage control, and interlock wiring not provided under Division 23, including but not limited to:
- b. All raceways, wiring, and connections of devices to energy management system that
- c. Temperature control devices and controls, such as:
- 6. See mechanical drawings for locations and temperature control diagrams.
- 7. Low-voltage conductors for thermostats and temperature control system may be run exposed above finished accessible ceilings, if approved and listed for this purpose.

26 20 00 - LOW-VOLTAGE ELECTRICAL DISTRIBUTION

26 21 00 - LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

- e. NEMA Ratings
- f. Existing or New Equipment
- 2. Site voltage verification: a. Coordinate with the serving utility to ensure that provided voltage at project site is

- within acceptable limits (+/- 2.5%).
- b. Arrange correcting means with the serving utility prior to installation to provide proper regulation voltage to the project site.
- c. Submit to the Owner a report of maximum and minimum voltage and a copy of the recording voltmeter chart.

- - 1. Contractor shall provide and install all required raceways, terminations, and miscellaneous
- B. Connection to Serving Utilities
- equipment as required for electrical service connection by the serving utility. 2. Contractor shall become fully acquainted with serving utility installation guide, applicable
- codes in the jurisdiction, and install in strict compliance with such guidelines. 3. Contractor shall fully understand the division of work between the installing contractor and
- the utility prior to commencing work on-stie. 4. Contractor shall initiate a new service contract with providing electrical utility within two
- weeks of notice to proceed.
- 5. Contractor shall pay all applicable charges required by the serving electrical utility.
- 6. Contractor shall complete and provide necessary information to the utility company without delay. If concern about missing information arises contact the electrical engineer.
- Required information may include but is not limited to:
- - a. Site Plan
- b. One-Line Diagram
- c. Load calculations
- d. Load calculation forms
- e. Load readings f. Submittal documentation
- 7. Contractor shall order electrical service with proper metering provisions that meet the requirements of the serving electrical utility.

C. Grounding

- 1. Permanently and effectively ground and bond the electrical installation in a thorough and efficient manner.
- 2. All grounding shall meet or exceed the requirements of NFPA.
- 3. Where grounding on plans indicates grounding above minimum code requirements, drawings shall take precedence.
- 4. Use bare or green insulated conductors as specified herein, and other materials indicated on the Drawings.

26 24 00 - SWITCHBOARDS AND PANELBOARDS

A. Switchboards

- 1. Service entrance and power distribution switchboards must conform with the requirements
- of the local codes and serving utility. 2. Shall be manufactured according to current requirements of UL 891, "Dead-Front Switchboards"; NRTL listed and permanently labeled for service entrance use when
- 3. Short circuit interrupting and bracing rating shall exceed the maximum calculated
- fault-current value indicated on the drawings.
- 4. Provide main circuit breaker and feeder circuit breakers as indicated on the drawings. 5. Provide integral ground fault relays and operators, self-powered, where indicated or
- required by NFPA 70. 6. Contained in a single factory-assembled dead-front enclosure with front accessible
- connections to incoming mains and outgoing feeder overcurrent protection devices. 7. Provide card holder for circuit identification at each feeder overcurrent protection device.
- Label according to one-line diagram. 8. Propagate with quantity and type of overcurrent protection devices indicated on the drawings and in accordance with specification section 'LOW-VOLTAGE PROTECTIVE
- DEVICES'. 9. Label equipment and overcurrent protection devices in accordance section 'EQUIPMENT
- 10. Provide Surge Suppression Device where indicated on drawings in accordance with specification section 'SURGE SUPPRESSION DEVICES'.

B. Lighting and Appliance Panelboard - Circuit Breaker

- a. Provide equipment with over-current protection devices indicated on the drawings and in accordance with specification section 'LOW-VOLTAGE PROTECTIVE
- b. Dead-front finished cabinet
- c. Fully-rated and with the integrated short circuit current ratings indicated on the
- drawings
- d. All two- and three-pole breakers shall be of the common trip type. e. Typewritten card directory indicating exactly what each circuit breaker controls fully-rated and with the integrated short circuit current ratings indicated on the
- 2. Accessories: a. Handle Clamp:
- Loose attachment for holding circuit breaker handle in "on" position • Use for all circuits containing emergency lighting loads, fire alarm loads, and as indicated on drawings
- Breakers serving fire alarm loads must have a permanently-affixed red label stating "FA" in white letters adjacent to the circuit breaker.
- b. Handle padlocking device: • Fixed attachment for locking circuit breaker handle in "on" or "off" position. Use as indicated on drawings.

26 27 00 - LOW-VOLTAGE DISTRIBUTION EQUIPMENT

- A. Wiring Devices
- General Requirements a. The catalog numbers listed for wiring devices are generally for 20A rated devices. b. Where 15A rated devices are indicated on the drawings or required for circuit rating
- limitations, provide wiring devices equivalent to those specified for 20A, but rated for c. All receptacles located outdoors or in damp or wet locations: Listed as 'weather
- Resistant', designated by a 'WR' on the faceplate. d. Minor changes relative to the location of electrical equipment may be made to comply with structural and building requirements as determined in the course of
- construction, but do not move more than 12" horizontally. e. Contractor shall provide all wiring devices of the same manufacturer and not mixed on the project, to the maximum extent possible. Provide color of toggles and
- receptacles as requested by the Engineer.
- Receptacles
- a. General Duplex Receptacle b. General Quadplex Receptacle
- c. GFCI Duplex Receptacle d. GFCI Double Duplex Receptacle
- e. Arc-Fault Receptacle f. Wireless Control Receptacle
- g. Tamper Resistant Receptacle h. Water Resistant Receptacle
- B. Cover Plates 1. General Requirements
 - a. Contractor shall provide cover plates by the same manufacturer as the wiring devices; complying with NFPA 70 ARTICLES 406.9 (A) or (B).

that cords are plugged in and that the GFCI is functioning.

d. Basis of Design: Intermatic WP1000RC/HRC or equal.

- 2. Outdoor Wet Applications
- a. Provide GFCI receptacles for designated weatherproof receptacles, unless indicated otherwise on the drawings. b. In-use, NEMA 3R, recessed or flush mount, NRTL labeled plates molded from a clear high impact ultraviolet stabilized polycarbonate material for easy verification
- c. Back box must be suitable for conduit connecting. Coordinate back box with wall
- C. Installation
- 1. General Requierments
- a. Solidly mount all junction boxes to structural elements.

b. Concrete Block Walls: As long as ADA requirements are maintained, dimensions above may be adjusted slightly as required to compensate for variable joint dimensions such that bottom or top of boxes, as applicable, are at block joints.

a. Set all outlet boxes in walls, columns, floors, or ceilings so they are flush with the

- Outlet Boxes
- finished surface, accurately set, and rigidly secured in position. Provide plaster rings, extension rings and/or masonry rings as required for flush mounting. b. Unless noted otherwise, install wiring devices vertically aligned at height indicated on
- 1. See Electrical Cover Sheet for specific mounting heights if not called out elsewhere in the
 - a. Unless indicated otherwise, install vertically with the ground slot mounted at the
 - b. Where installed horizontally, install with the neutral slot mounted at the top. c. Above counter: mount vertically aligned.

 - b. Mechanical and electrical equipment rooms and janitors closets: mount vertically
- d. Garages: mount vertically aligned.
- e. Weatherproof exterior receptacles: vertically aligned.
- f. GFCI receptacles: Same as general receptacles. g. Isolated ground receptacles: Same as general receptacles.

26 28 00 - LOW-VOLTAGE CIRCUIT PROTECTIVE DEVICES

- A. Circuit Breakers
- 1. General Requirements a. Comply with:
 - UL 489

construction drawings.

D. Mounting

Receptacles:

- NEMA AB1
- NEMA AB3
- b. Short Circuit Interrupting capacity shall exceed the value indicated on the drawings c. Engraved nameplates for circuit identification of each circuit breaker in accordance with specification section 'IDENTIFICATION OF ELECTRICAL SYSTEMS'.
- 2. Molded-Case Thermal Magnetric breakers: a. Quick-make, quick-break, Clip-in type
- b. Standard frame, trip, and number of poles
- c. inverse time-current element for low-level overloads d. Magnetric trip element for short circuits
- e. Magnetic element shall be adjustable for breakers over 250A. Types:

a. SWD Circuit Breakers:

- Use when breaker serves as a switch for 120V or 277V lighting circuits. b. GFCI Circuit Breakers:
 - Single- and two-pole configurations with Class A ground-fault protection (6-mA) trip). Use as indicated on drawings.
- Standard frame, trip, and number of poles Class A ground fault 6mA trip

a. Provide each circuit and set of fuse clips throughout the work with sizes and types as required or indicated.

General Requirements

B. Fuses

c. Furnish three spare fuses of each size and type used on the project (except for main switch fuses, furnish one spare), neatly contained in a properly labeled cabinet.

b. All fused devices shall be labeled as to type and size of fuse required.

- a. Fuses larger than 600A
- UL Class L, similar to type KRP-C Bussmann Low Peak or equal. b. Fuses used to protect motors:
- c. Fuses used to protect all other electrical equipment • UL Class RK1, dual element, Bussmann LPS/LPN or equal.

UL Class RK5, Bussmann Fusetron or equal.

- 26 28 16 ENCLOSED SWITCHES AND CIRCUIT BREAKERS A. Enclosed (Safety) Switches
 - 1. Heavy-duty, fused or non-fused (as indicated on drawings or required) NEMA KS1, externally operated, visible-blade safety switches
 - 2. NEMA enclosure type indicated on the drawings or suitable for the environment in which
 - a. Based on fusible switch and fuse sizes indicated, include Class R, J, or L fuse provisions as applicable. b. Where indicated, provide fusible switches permanently labeled as suitable for use as
 - service entrance equipment c. Provide integral and separate neutral and ground assemblies, suitable for the sizes of conductors indicated

3. Provide switches where not furnished with the starting equipment, at all other points

- d. Do not double-lug any terminations not specifically listed as suitable for more than one conductor.
- required by NFPA 70, and where indicated on the drawings.

type thermal overload relays

- 26 29 00 LOW-VOLTAGE CONTROLLERS
- A. General Requirements 1. Manual starters shall consist of a manually operated switch equipped with melting alloy
- a. Thermal unit shall be of one-piece construction and interchangeable b. Starter shall be inoperative if thermal unit is removed.
- 2. Provide flush mounted units in finished areas and surface mounted units in unfinished

3. Starters shall have NEMA I general purpose enclosure, unless otherwise indicated, and

4. Provide with handle guard with locking provisions and an integral pilot light

B. Types

3. Motor starting switches:

1. Fractional horsepower manual controller: 2. Integral horsepower manual controller:

guard with locking provisions.

be rated for the motor horsepower required

a. Motor starting switches shall consist of a toggle operated two- or three-pole switch b. Contacts shall be double break silver alloy, visible from both sides of the switch, and shall have a direct linkage to the operator for positive break

c. Provide flush mounted units in finished areas and surface mounted units in

unfinished areas. Starters shall have NEMA I general purpose enclosure, unless

otherwise indicated, and be rated for the motor horsepower required. Provide handle

REVISIONS:

ELECTRICAL SPECIFICATIONS 2

SHEET NAME

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SHEET NUMBER

26 00 00 - GENERAL ELECTRICAL REQUIREMENTS

A. General Requirements

- 1. All requirements under the architects general and supplementary conditions, if provided, apply to this section
- 2. Where the requirements of this section and division exceed those of the general and supplementary conditions, the requirements of this section take precedence
- 3. Become thoroughly familiar with all of its contents as to requirements that affect this
- 4. Work required under this section includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications, or reasonable inferred to be necessary to facilitate the function of the system and design intent.
- 5. The specifications and drawings for the project are complementary, and any portion of work described in one shall be provided as if described in both
- 6. In the event of discrepancies between specifications and drawings, notify the engineer and request clarification prior to proceeding with the work involved. 7. Limitations to drawings:
- a. Drawings are graphic representations of the work upon which the contract is based. b. Drawings show the materials and their relationship to one another, including sizes, shapes, locations, and connections.
- c. Drawings convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations, offsets, control
- lines, and other installation requirements. d. Contractor shall use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, which when installed per manufacturers' requirements, will ensure a complete, coordinated, and properly
- e. Exact location of any component shall be confirmed and/or dimensioned by architect prior to rough-in. Do not rely on engineer to provide any exact locations.

B. Definitions

- 1. Abbreviations/Acronyms:
- a. AHJ (Authority Having Jurisdiction): The local code and/or inspection agency (Authority) Having Jurisdiction over the Work.
- b. EPDM: Ethylene-Propylene-Diene-Terpolymer Rubber, used as a highly effective conductor insulating material and vibration isolator.
- c. NBR: Acrynlonitrile-Butadiene Rubber d. NRTL: Nationally Recognized Testing Laboratory, as defined and listed by OSHA in
- 29 CFR 1910.7 (e.g., UL, ETL, CSA), and acceptable to the AHJ over this project. e. PCF: Pounds per Cubic Foot 2. Trade/Industry Terminology:
- a. Architect: Registred design professional responsible for the overall structural concept of the facility constructed under this scope of work. In addition the Architect is typically the central authority for full design team and is the primary point of contact
- for coordination with the design team. Coordination of exact placement of any product or item associated with the division 26 specifications shall be coordinated with the Architect b. Approved equal: Used synonymously with Equivalent and/or Equal, and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or
- manufacturer specified". The term "approved" shall mean labeled, listed, certified, or all three, by an NRTL, and acceptable to the AHJ and/or Architect assigned to this c. <u>Engineer</u>: Where referenced in this Division, "Engineer" is the Engineer of Record
- and the Design Professional for the work under this division, and is a consultant to. and an authorized representative of the Architect, Contractor, and/or Owner. When used in this division, Engineer means increased involvement by and obligations to the Engineer, in addition to involvement by and obligations to the Architect.
- d. Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembling, installing, and similar operations. e. Furnished by Owner or Furnished by Others: "an item furnished by the Owner or
- under other divisions or contracts, and installed under the requirements of this division, complete, and ready for the intended use, including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the warranty required by this division. f. Homerun: That portion of an electrical circuit originating at a junction box,
- termination box, receptacle, or switch with termination at an electrical panelboard. Note: Where MC cable is utilized for receptacle and/or lighting branch circuiting loads, the originating point of the homerun shall be at the first load in the circuit or at a junction box located in an accessible ceiling space as close as possible to the first
- g. Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying,
- dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use." h. <u>Provide</u>: "to furnish and install."
- Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals.
- j. Value Engineering: A systematic method to improve the "value" of goods and services by using an examination of function. Value, as defined, is the ratio of function to cost. Value can therefore be increased by either improving the function or reducing the cost. The goal of VE is to achieve the desired function at the lowest overall cost consistent with required performance.

C. Existing Conditions

- 1. Existing conditions indicated on the Drawings are taken from the best information available from the Owner, existing record drawings, and from limited, in-situ, visual site
- observations. They are not to be construed as "AS BUILT" conditions. 2. Contractor shall visit the project site and become fully aquatinted with actual existing
- conditions at the project site prior to submission of bid. 3. Contractor shall not be relieved of any necessary effort to address the Work indicated that
- could have been prevented by proper inspection of existing conditions. 4. Failure to comply with this requirement for any reason, shall not be considered sufficient justification to request or obtain extra compensation over and above the contract price.

D. Material and Workmanship

- 1. Unless indicated otherwise on the Drawings, provide all material and equipment new, of the best quality and design, free from defects and imperfections and with markings or a nameplate identifying the manufacturer and providing sufficient reference to establish quality, size and capacity. Provide all material and equipment of the same type from the same manufacturer whenever practicable
- 2. Model numbers listed in the specifications or shown on the drawings are not necessarily intended to designate the required trim, written descriptions of the trim govern model numbers. Vendors shall confirm product with submittals prior to ordering. 3. Furnish only material and equipment that are listed, labeled, certified, or all three, by an
- NRTL whenever any listing or labeling exists for the types of material and equipment 4. Unless specified otherwise, manufactured items of the same types specified within this
- Division shall have been installed and used, without modification, renovation, or repair for not less than one year prior to date of bidding for this Project.
- 5. Install all Work in strict conformance with all manufacturers' requirements and recommendations, unless these Documents exceed those requirements.
- 6. Install all equipment and materials in a neat and professional manner, aligned, leveled, and adjusted for satisfactory operation, in accordance with NECA 1 (latest edition), "Standard Practices for Good Workmanship in Electrical
- 7. All workmanship shall be of the finest possible by experienced mechanics of the proper trade. In general, provide Industrial Specification Grade for all materials and equipment.
- 8. Provide all hoists, scaffolds, staging, runways, tools, machinery, and equipment required for the performance of the electrical work. Store and maintain material and equipment in clean condition, and protected from weather, moisture, and physical damage.

E. Coordination 1. Visit the site and ascertain the conditions to be encountered in installing the Work under

- this Division, verify all dimensions and locations before purchasing equipment or commencing work, and make due provisions for same in the bid. Failure to comply with this requirement shall not be considered justification for omission, alteration, and incorrect or faulty installation of any of the Work under this Division or for additional compensation for any Work covered by this Division
- 2. Maintain an Electrical Foreman at the job site to coordinate electrical work with the following:
- a. Construction Drawings and Specification Sections of other trades b. Relevant equipment drawings, shop drawings, and submittal documents to
- determine the extent of clear spaces. c. Make all offsets required to clear equipment, beams and other structural members, and to facilitate concealing conduit in the manner anticipated in the design.
- d. Ensure various system components are installed at the proper time, fit the available space, and allow proper service access.
- e. Products are ordered and provided with necessary trim to properly fit the types of ceiling, wall, or floor finishes actually installed.
- 3. Contractor shall keep informed as to the work of other trades engaged in the construction
- of the project and shall execute work in a manner as to not interfere with or delay the work 4. Figured dimensions by the Architect shall be taken in preference to scale dimensions.

Contractor shall take his own measurements at the building to confirm, as variations may

5. Contractor shall be held responsible for errors that could have been avoided by proper

- 6. Model numbers listed in the specifications or shown on the drawings are not intended to
- designate the required trim 7. Products shall be ordered and provided with necessary trim to properly fit the types of
- ceiling, wall, or floor finishes actually installed. 8. Unless otherwise indicated, the General Contractor shall provide chases and openings in building construction required for installation of the systems specified herein. Contractor shall furnish the General Contractor with information where chases and openings are
- F. Ordinances and Codes
- 1. Work performed under this contract shall, at a minimum, be in conformance with applicable national, state and local codes having jurisdiction.
 - 2. Equipment furnished and associated installation work performed under this contract shall be in strict compliance with current applicable codes adopted by the local AHJ, including any amendments and standards as set forth by the following: a. IBC International Building Code
 - b. IECC International Energy Conservation Code . ADA
 - Americans with Disabilities Act
 - d. ANSI American National Standards Institute e. ASTM American Society of Testing Materials
 - f. IES Illuminating Engineering Society
 - National Electrical Code, NFPA 70 g. NEC h. NECA National Electrical Contractors Association
 - i. NEMA National Electrical Manufactures' Association National Fire Protection Association j. NFPA

acceptance from these authorities having jurisdiction.

- k. OSHA Occupational Safety and Health Act
- I. UL Underwriter's Laboratories
- 3. In addition to code sections listed above, Contractor shall comply with rules and regulations of public utilities or municipal departments affected by connection of services, as well as any other local or national codes where applicable.
- 4. Where the contract documents exceed the requirements of the referenced codes, standards, etc., the contract documents shall take precedence.
- with the most stringent. 6. Promptly bring all conflicts observed between codes, ordinances, rules, regulations, referenced standards, and these documents to the attention of the Architect and Engineer

5. Where conflicts between various codes, ordinances, rules, and regulations exist, comply

- for final resolution. 7. Procure and pay for permits and licenses required for the accomplishment of the work
- herein described. Contractor will be held responsible for any violation of the law. 8. Obtain timely inspections by the constituted authorities having jurisdiction; and, upon final completion of the Work, obtain and deliver to the Owner executed final certificates of
- 9. Perform all electrical work in compliance with applicable safety regulations, including OSHA regulations. All safety lights, guards, and warning signs required for the performance of the electrical work shall be provided by the Contractor.

G. Protection of Equipment and Materials

- 1. Store and protect from damage equipment and materials delivered to job site. 2. For materials and equipment susceptible to changing weather conditions, dampness, or temperature variations, store inside in conditioned spaces.
- 3. For other materials and equipment, cover with waterproof, tear-resistant, heavy tarp or polyethylene plastic as required to protect from plaster, dirt, paint, water, or physical
- 4. Equipment and material damaged by construction activities shall be rejected, and Contractor shall furnish new equipment and material of a like kind at his own expense. 5. Keep premises broom clean of foreign material created during work performed under this contract.
- 6. Conduit, equipment, etc. shall have a neat and clean appearance at the termination of the
- 7. Plug or cap open ends of conduits while stored and installed during construction when not in use to prevent the entrance of debris into the systems.

H. Submittals

- 1. Assemble and submit for review shop drawings, material lists, manufacturer product literature for equipment to be furnished, and items requiring coordination between contractors under this contract. 2. Provide submittals in sufficient detail so as to demonstrate compliance with these
- Contract Documents and the design concept. 3. Prior to transmitting submittals, verify that the equipment submitted is mutually compatible
- with and suitable for the intended use, will fit the available space, and maintain manufacturer recommended service clearances
- 4. If the size of equipment furnished makes necessary any change in location or configuration, submit a shop drawing showing the proposed layout.
- 5. Transmit submittals as early as required to support the project schedule. Allow two weeks for Engineer review time, plus to/from mailing time via the Architect, plus a duplication of this time for re-submittals, if required.
- 6. Update submittals to verify upon approval of substitution requests all required components will accommodate the substituted product.
- 7. Submittals shall contain:
- a. The project name b. Applicable specification section
- c. Submittal data
- d. Equipment identifications acronym as used on the drawings
- e. Contractors review stamp to certify that the submittal has been checked by the Contractor, complies with the drawings and specifications, and is coordinated with other trades
- f. Shop drawings
- g. Product data
- h. Performance sheets
- i. Highlight, mark, list, or indicate the materials, performance criteria, and accessories that are being proposed.

8. Requirements to prevent submittal rejection:

- a. Submittals and shop drawings shall not contain firm name, logo, the seal, or signature of the Engineer.
- b. They shall not be copies of the work product of the Engineer.
- c. Separate submittals according to individual specification sections d. Illegible submittals will be rejected and returned without review
- e. Catalog data shall be properly bound, identified, indexed and tabbed f. Label the catalog data with the equipment identification acronym or number as used
- materials, finishes, wiring diagrams, electrical requirements and deviations from specified equipment or materials. 9. Electronic Submittals:
- a. Contractor shall notify the Architect and Engineer that the submittals have been

on the drawings and include performance curves, capacities, sizes, weights,

- b. Contractor shall include the website, user name, and password information needed to access the submittals.
- c. For submittals sent by e-mail, Contractor shall copy the designated representatives of the Architect and Engineer. d. Contractor shall allow two weeks for the Engineer review time as specified above.
- 10. The checking and subsequent acceptance of submittals by the Engineer and/or Architect shall not relieve the Contractor from responsibility for deviations from the drawings and specifications, errors in dimensions, details, sizes of equipment, or quantities, omissions of components or fittings, coordination of electrical requirements, and not coordinating items with actual building conditions and adjacent work. Contractor shall request and secure written acceptance from the Engineer and Architect prior to implementing any deviation.
- 11. Review of submittals are considered the Engineers last opportunity to provide final verification that elements represented on contract documents are accurate. Rarely Engineer may request coordination with contractor to implement a product not originally specified in the contract documents. This adjustment shall not incur additional fees beyond the change in 'product' cost only not 'product and labor' cost.
- 12. If Contractor fails to provide submittals prior to ordering or installing any specified or substituted products, he/she/they waives and releases the engineer from any and all responsibility for the proper fit, performance, and/or safety of the specified product.

J. Substitutions

- 1. Materials, products, equipment, and systems described in the Bidding Documents are specified as a 'Basis of Design' and establish a standard of required function, dimension, appearance and quality to be met by the proposed substitution. 2. The base bid shall include only the products from manufacturers specifically named in the
- drawings and specifications, unless pre-approved equals have been provided in writing. 3. To request a pre-approved substitution prior to project award: Send a written request via email to the Architect, Engineer, and/or Owner. Complete and send the substitution

request for each material, product, equipment, or system that is proposed to be

- substituted at least 10 days prior to submission of bid. 4. To request a substitution after award: Provide a single unit price and estimated single unit labor for original item and proposed substituted 'Equal'. Submit this along with cut-sheets, calculations, and any other information to prove equallity of proposed substitution. Upon
- approval an estimated refund to the owner may be requested of the difference in cost less 20% for time and effort of submission. Costs must be on Vendor and/or Manufacturer letter head as an official document by that company.
- 5. The burden of proof of the proposed substitution is solely upon the proposer. Reviewer retains the right to request any information deemed necessary to approve the proposed

- - 6. <u>Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants</u> to the Engineer, Architect, and/or Owner the following:
 - the specified Work in all respects unless stated otherwise in the substitution request. b. Proposed substitution is consistent with the Contract Documents and will produce indicated results, including functional clearances, maintenance service, and sourcing of replacement parts.

a. Proposed substitution has been fully investigated and determined to meet or exceed

- c. Proposed substitution has received necessary approvals of authorities having jurisdiction.
- d. Same warranty will be furnished for proposed substitution as for specified Work. e. If accepted substitution fails to perform as required, Contractor shall replace substitute material or system with that originally specified and bear costs incurred
- f. Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects at contractors expense.

K. Electronic Drawing Files

- 1. Electronic drawing files are the intellectual property of the design professional stated on teh drawings and are covered under United States Copyright Laws.
- 2. Requests for electronic drawing files will be considered on a case by case basis. 3. Optimized-LED retains the right to charge for additional usage of the company's
- intellectual property outside of the original contractual agreement. 4. Request shall be made in writing to utilize electronic drawing files for any reason. Email is

considered an acceptable form of written request.

- L. Record Drawings (As-built Documents)
 - 1. During progress of the work in this division, Contractor shall maintain an accurate record of all changes made during the installation of the system.
 - 2. Upon completion of the work, accurately transfer all record information to three identical sets of the approved shop drawings. 3. If requested in project contract, Contractor may be requested to submit as-built drawings
 - to Engineer to be incorporated into a CAD produced As-Built set.

N. Warranties

- 1. Warrant each system and each element thereof against all defects due to faulty workmanship, design, or material for a period of 12 months from date of Substantial Completion unless specific items are noted to carry a longer warranty in these construction documents or manufacturer's standard warranty exceeds 12 months.
- 3. Warranties shall include labor and material, including travel expenses. 4. Make repairs or replacements without any additional costs to the Owner, and to the

2. Remedy all defects occurring within the warranty period(s).

- satisfaction of the Owner, Architect, and Engineer 5. Perform the remedial work promptly, upon written notice from the Owner. 6. Also warrant the following additional items:
- a. All raceways are free from obstructions, holes, crushing, or breaks of any nature. b. All raceway seals are effective.
- c. The entire electrical system is free from all short circuits and unwanted open circuits and grounds. 7. At the time of Substantial Completion, deliver to the Owner all warranties, in writing and
- properly executed, including term limits for warranties extending beyond the one year period and any actions the Owner must take in order to maintain warranty status. 8. Each warranty instrument shall be addressed to the Owner and state the commencement

26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

26 05 05 - SELECTIVE DEMOLITION FOR ELECTRICAL

- A. Work in Existing Facilities
 - 1. Coordinate any electric service interruption to facilities occupied by Owner or provide temporary electric service
 - 2. Notify Architect, Owner, and Landlord no fewer than two days in advance of proposed interruption of electrical service
 - 3. Do not proceed with interruption of electrical service without Architect, Owner, and Landlord (s)
 - 4. Relocate and reconnect all electrical facilities that must be relocated in order to accomplish the remodeling shown in the Drawings or indicated in the Specifications.
- 5. Where electrical fixtures or equipment are removed, cap all unused raceways behind the floor line or wall line to facilitate restoration of finish, and, remove all existing wiring from abandoned raceways
- Where removal of existing wiring interrupts electrical continuity of circuits that are to remain in use provide necessary wiring, raceways, junction boxes, etc., to ensure continued electrical continuity.

B. Existing Equipment Reuse and Removal

- 1. Provide all demolition of existing electrical systems and new electrical system modifications required because of building remodeling, as noted on the Drawings, or
- necessary for proper operation and new construction. 2. Remove all abandoned cables, wiring and conduit above accessible ceilings and ventilation shafts.
- 3. Remove all existing wiring, light fixtures, exposed conduits, and other electrical materials not reused prior to substantial completion of the work.

4. Cut, patch, and repair where required for new electrical installations, and patch and repair

- 3. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.
- all surface damage resulting from this work. 5. Cut flush with the floor and plug at both ends raceways stubbed above the floor and not
- used at substantial completion of the work. 6. Relocate all existing electrical systems required to be in operation at substantial completion of the contract, if required, as a result of work included under this contract,
- even if not specifically indicated in the drawings or specifications. 7. Existing service entrance conductors and feeder conductors may be reused if all of the following conditions are met:
- a. Conductor sizes meet or exceed the sizes specified on the drawings.
- b. Conductor insulation is in good or better condition. c. Conductor insulation is the correct type for the conditions.

C. Exisitng Utilities

- 1. Schedule and coordinate with the Utility Company, Owner and with the Architect all connections to, relocation of, or discontinuation of normal utility services from any existing utility line. Include all premium time required for all such work in the Bid.
- 2. Repair all existing utilities damaged due to construction operations to the satisfaction of the Owner or Utility Company without additional cost. 3. Do not leave utilities disconnected at the end of a workday or over a weekend unless
- authorized by representatives of the Owner or Architect. 4. Make repairs and restoration of utilities before workmen leave the project at the end of the workday in which the interruption takes place.

5. Include in Bid the cost of furnishing temporary facilities to provide all services during

D. Coincidental Damage

interruption of normal utility service.

- 1. Repair streets, sidewalks, drives, paving, walls, finishes, and other facilities damaged in the course of this Work.
- 2. Repair materials shall generally match existing construction. 3. Repair work shall meet all requirements of the Owner, local authorities having jurisdiction,
- and meet the satisfaction of the Architect. 4. Repair work shall be thoroughly first class.

26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

steel products allowed. Reduced wall EMT is not allowed.

A. General Requirements 1. Provide raceways, junction boxes, pull boxes, cabinets, and wireways wherever

Types:

where indicated on the drawings. 2. Size as required for the specific function or as required by NFPA 70, whichever is larger. Construction shall be of a NEMA design suitable for the environment installed.

necessary for proper installation of various electrical systems according to NFPA 70 and

- B. Metallic Conduit and Tubing for Electrical Systems
 - FMC is not allowed. c. Intermediate Metal Conduit (IMC): Hot-dip Galvanized Rigid Steel Conduit,

b. Flexible Metal Conduit (FMC): Zinc-coated steel or aluminum, UL 1. Reduced-wall

a. Electrical Metallic Tubing, Couplings, and Fittings (EMT): ANSI C80.3, UL 797. Only

ANSI C80.6, UL 1242.

- d. Liquidtight Flexible Metal Conduit (LFMC): Flexible steel conduit with PVC jacket, UL 360; fittings: NEMA FB 1
- e. Hot-dip Galvanized Rigid Steel Conduit (GRS): ANSI C80.1, UL 6.
- f. Plastic-Coated IMC, RMC, and Fittings: NEMA RN 1, NRTL listed. Coating thickness of 0.04 inches minimum.
- g. IMC and RMC Fittings: NEMA FB 1; compatible with conduit type and material,

C. Junction and Pull Boxes

- 1. Small sheet metal pull and junction boxes: NEMA OS1
- 2. Cast-Metal Pull and Junction Boxes b. NEMA FB1
- c. Cast [Iron] [Aluminum] with gasketed cover

Raceways

F. Installation

- a. Install raceways to requirements of structure, other work on the project, and to clear all openings, depressions, pipes, ducts, reinforcing steel, and other immovable
 - b. Install raceways continuous between connections to outlets, boxes, and cabinets with a minimum possible number of bends and not more than the equivalent of four 90-degree bends between connections.
- e. Ream raceway ends, thoroughly clean raceways before installation, and keep clean after installation. Plug or cover openings and boxes as required to keep raceways clean during construction and fish all raceways clear of obstructions before pulling conductor wires.
- f. Provide raceways of ample size for pulling of wire, not smaller than code requirements and not less than 1/2-inch in size, unless indicated otherwise on

g. Homeruns containing more than one branch circuit shall not be less than 3/4-inch in

- h. Protect all raceway installations against damage during construction. Repair all raceways damaged or moved out of line after roughing-in to meet Engineer's approval without additional cost to the Owner.
- i. Align and install true and plumb all raceway terminations at panelboards, switchboards, motor control equipment, and junction boxes. j. Install approved expansion/deflection fittings where raceways pass through (if
- properties of RNC or RAC. k. Install a pull wire in each empty raceway that is left for installation of conductors or cables under other divisions or contracts. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 24 inches of slack at
- I. Make all joints and connections in a manner that will ensure mechanical strength and electrical continuity.

embedded) or across (if exposed) expansion joints, and when using RNC or RAC in

exposed environments in accordance with NFPA 70 and expansion/contraction

2. Above Ground Raceways a. Install raceways parallel and perpendicular to building lines.

walls or floors wherever possible except where otherwise indicated.

b. Use manufactured elbows for all 45- and 90-degree bends, unless approved by the Engineer in advance. Make other bends smooth and even and without flattening raceway or flaking galvanizing or enamel. Radii of bends shall be as long as possible and never shorter than the corresponding trade elbow.

c. Install all circular raceways concealed above suspended ceilings or concealed in

d. Provide GRS for all conduits exposed to any forms of damage, physical, chemical, or weather related. e. Securely fasten raceways in place with approved straps, hangers, and steel supports as required. Attach raceway supports to the building structure. Hang single raceways for feeders with supports spaced not more than 10 feet. Securely clamp vertical feeder raceways to structural steel members attached to structure. Install cable clamps for support of vertical feeders where required. Add raceway supports within

12 inches of all bends, on both sides of the bends. Do not support raceways from suspended ceiling components.

each end of pull wire.

- 4. Junction and Outlet Boxes a. Solidly mount all junction boxes to structural elements.
- b. Concrete Block Walls: As long as ADA requirements are maintained, dimensions above may be adjusted slightly as required to compensate for variable joint dimensions such that bottom or top of boxes, as applicable, are at block joint
- c. Set all outlet boxes in walls, columns, floors, or ceilings so they are flush with the finished surface, accurately set, and rigidly secured in position. Provide plaster rings, extension rings and/or masonry rings as required for flush mounting.

d. Unless noted otherwise, install wiring devices vertically aligned at height indicated on

construction drawings.

- Equipment Connections a. Use FMC or LMFC (liquid or vapor areas) for final connection to each motor, transformer, and any device that would otherwise transmit motion, vibration, or noise. Provide all FMC and LFMC with an insulated green or bare copper bonding ground
- a. Rigidly terminate conduits entering sheet metal enclosures to the enclosure with a bushing and locknut on the inside and a locknut or an approved hub on the outside.
- Conduit shall enter the enclosure squarely. b. Provide bushings and locknuts made of galvanized malleable iron with sharp,

c. Where EMT enters a box, provide approved EMT compression connectors.

d. Use insulated, grounding, or combination bushings wherever connection is subject to vibration or moisture, when required by NFPA 70.

26 05 44 - PENETRATIONS, SLEEVES AND SLEEVE SEALS FOR ELECTRICAL

specified in Division 07 section "Through-Penetration Firestop Systems."

SYSTEMS

- A. Penetrations 1. Coordinate sleeve selection and application with selection and application of fire-stopping
 - Roofs:
 - a. Coordinate all roof penetrations with Engineer, Owner, and as applicable, the roofing contractor providing a roof warranty. b. Keep all raceway penetrations within mechanical equipment curbs wherever possible. Coordinate with Division 01.

Engineer, Owner, or roofing contractor. All roof penetrations shall be leaktight at the termination of the work and shall not void any new or existing roof warranties. 3. Walls and Floors:

a. Steel Pipe Sleeves for Raceways and Cables: ASTM A53/A53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends, and drip rings. b. Cast Iron Pipe Sleeves for Raceways and Cables: Cast or fabricated "wall pipe,"

c. Flash and counterflash all openings through roof, and/or provide pre-fabricated

molded seals compatible with the roof construction installed, or as required by the

unless otherwise indicated. c. Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop,

d. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052 [0.138] inch thickness and of length to suit application.

1. Sealants and accessories shall have fire-resistance ratings indicated, as established by

B. Firestopping

testing identical assemblies in accordance with UL 2079 or ASTM E 814, or other NRTL 2. Through and Membrane Penetration Firestopping Systems Product Schedule: Provide UL

listing, location, wall or floor rating, and installation drawing for each penetration fire stop

3. Where project conditions require modification to qualified testing and inspecting agency's illustrations for a particular firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Include qualifications data for testing agency.

- A. General Requirments
- 1. Provide necessary equipment and accessories that are not provided by the equipment supplier or Owner to complete installation and/or final connection to equipment furnished
- by others in locations indicated on the drawings, specified herein, or both. 2. Equipment and accessories not provided by the equipment supplier may include flexible cords and plugs as required for proper operation of the complete system, in accordance
- 3. Contractor shall be responsible for correct rough-in dimensions, and verify them with Architect and/or equipment supplier prior to rough-in and service installations.

26 20 00 - LOW-VOLTAGE ELECTRICAL DISTRIBUTION

A. Grounding

- 1. Permanently and effectively ground and bond the electrical installation in a thorough and
- 2. All grounding shall meet or exceed the requirements of NFPA.

with the manufacturers' instructions.

- 3. Where grounding on plans indicates grounding above minimum code requirements, drawings shall take precedence.
- 4. Use bare or green insulated conductors as specified herein, and other materials indicated on the Drawings

26 22 00 - LOW-VOLTAGE TRANSFORMERS

A. General Requirements

- 1. Make final conduit connections to transformers with flexible conduit, with at least 6 inches
- of slack in all directions. Minimum flexible conduit length shall be 2 feet. 2. Provide energy-efficient transformers complying with federal regulation 10 CFR 431.192

b. Short Circuit Interrupting capacity shall exceed the value indicated on the drawings

Use when breaker serves as a switch for 120V or 277V lighting circuits.

Class B ground-fault protection (30-mA trip). Use as indicated on drawings.

thru 431,196 requirements. 3. K-rated transformers shall be provided as indicated on the drawings and be listed for 115 degree C rise.

26 28 00 - LOW-VOLTAGE CIRCUIT PROTECTIVE DEVICES

A. Circuit Breakers

1. General Requirements

NEMA AB3

- a. Comply with:
- UL 489 NEMA AB1
- c. Engraved nameplates for circuit identification of each circuit breaker in accordance with specification section 'IDENTIFICATION OF ELECTRICAL SYSTEMS'.

2. Molded-Case Thermal Magnetric breakers

a SWD Circuit Breakers:

a. Quick-make, quick-break, Bolt-on type b. Standard frame, trip, and number of poles

d. Magnetric trip element for short circuits

e. Magnetic element shall be adjustable for breakers over 250A. Types:

c. inverse time-current element for low-level overloads

b. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA

trip). Use as indicated on drawings.

 Standard frame, trip, and number of poles Class A ground fault 6mA trip

c. Ground-Fault Equipment Protection (GFEP) Circuit Breakers:

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PROJECT

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REVISIONS:

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SHEET NAME

SPECIFICATIONS 3

SHEET NUMBER

ELECTRICAL

26 05 63 - MISCELANEOUS EQUIPMENT CONNECTIONS