### MECHANICAL SPECIFICATIONS

### 1. GENERAL:

- A. PROVIDE ALL NECESSARY LABOR, MATERIALS, EQUIPMENT, SERVICES AND INSURANCES TO COMPLETE THE CONDITIONING WORK WITHIN THE FULL INTENT OF THE DRAWINGS AND SPECIFICATIONS CONTAINED HEREO ENTIRE SATISFACTION OF THE ARCHITECT/ENGINEER.
- B. CONTRACTOR TO COORDINATE WITH OWNER'S REPRESENTATIVE FOR OBSERVATIONS REQUIRED ABOVE TH
- C. ALL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES, RULES AND LOCAL REQUIREMENTS.
- D. AIR CONDITIONING WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE I.B.C., U.M.C., U.P.C., APPLICABLE CODES, RULES AND LOCAL REQUIREMENTS.
- E. GUARANTEE ALL WORK AND MATERIALS FOR A PERIOD OF ONE YEAR.
- 2. SUBMITTALS:
- A. SPECIFICATION SHEETS WILL BE REQUIRED ON ALL NEW EQUIPMENT TO BE INSTALLED AND SHALL BE PRESE OWNER'S REPRESENTATIVE BEFORE INSTALLATION. FURNISH SUBMITTALS FOR:
- a. PACKAGED ROOFTOP UNIITS
- b. EXHAUST FANS
- c. DUCTLESS SPLIT SYSTEM
- d. AIR TERMINALS
- 3. EQUIPMENT:
- A. ALL EQUIPMENT SHALL BE AS SCHEDULED ON DRAWINGS
- B. AT CONTRACTORS OPTION EQUIPMENT OF EQUAL QUALITY. CONSTRUCTION AND CAPACITIES CAN BE SUBMI APPROVAL AT TIME. CONTRACTOR MUST SUBMIT A ITEM-BY-ITEM LIST OF CAPACITY AND CONSTRUCTION FEA SHOW THAT SUBSTITUTED EQUIPMENT IS EQUAL OR BETTER THAN THAT SPECIFIED.
- C. THE CONTRACTOR IS RESPONSIBLE FOR ALL REQUIRED MECHANICAL, ARCHITECTURAL, STRUCTURAL AND E CHANGES NECESSARY TO ACCOMMODATE THE SUBSTITUTED EQUIPMENT.
- 4. HVAC WORK:
- A. ADHERE TO GENERAL ROUTING AND METHODS OF DISTRIBUTION SHOWN, FURNISHING ALL LABOR AND MATE APPURTENANCES AS REQUIRED FOR SATISFACTORY OPERATION FOR THE VARIOUS SYSTEMS.
- B. INSTALL IN MOST DIRECT, NEAT AND WORKMANLIKE MANNER EMPLOYING ONLY MECHANICS SKILLED IN EACH EXPOSED LINES PARALLEL WITH OR PERPENDICULAR TO BUILDING LINES. GROUP LINES FOR EASY SERVICE. 5. OTHER MATERIAL:
- A. OTHER MATERIAL, NOT SPECIFICALLY DESCRIBED BUT REQUIRED FOR A COMPLETE JOB, SHALL BE NEW AND QUALITY, FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.
- 6. WORKMANSHIP:
- A. ALL WORK TO BE PERFORMED BY A QUALIFIED PERSONNEL NORMALLY ENGAGED IN THE RESPECTIVE LINE O B. PERFORM ALL WORK IN A MANNER NOT TO DISTURB THE NORMAL OPERATION OF THE DATA ROOM OPERATION COORDINATE ALL WORK THE GENERAL CONTRACTOR AND OWNER.
- C. DEMOLITION WORK SHALL NOT CREATE ANY DUST PROBLEMS IN THE DATA ROOM. CONTRACTOR SHALL PRO TEMPORARY BOUNDARY MATERIAL AS REQUIRED.
- D. COORDINATE DEMOLITION OF SYSTEMS WITH THE GENERAL CONTRACTOR AND OWNER
- E. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING A NEAT AND CLEAN WORK SITE DURING CONST
- F. CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF OTHER TRADES AND WORK SHALL BE ACCEPTABLE MECHANICAL ENGINEER AND OWNER.
- 7. CUTTING, PATCHING, AND PAINTING:
- A. ALL NECESSARY CUTTING AND PATCHING TO BE PERFORMED BY THE GENERAL CONTRACTOR OR PRIME CON B. ALL WORK SHALL BE DONE BY QUALIFIED PERSONNEL NORMALLY ENGAGED IN THE RESPECTIVE WORK REQU SHALL HAVE LICENSE AND INSURANCE FOR SUCH WORK.
- C. CUTTING OF ALL OPENINGS SHALL BE COORDINATED WITH THE OWNER'S ENGINEERING REPRESENTATIVE PR COMMENCEMENT OF CUTTING.
- 8. PRODUCT HANDLING:
- A. PROTECTION: USE ALL MEANS NECESSARY TO PROTECT THE MATERIALS OF THIS SECTION BEFORE, DURING, INSTALLATION AND SHALL PROTECT THE MATERIALS AND WORK OF THE OTHER TRADES.
- B. REPLACEMENTS: IN THE EVENT OF DAMAGE. IMMEDIATELY MAKE ALL REPAIRS AND REPLACEMENTS NECESS. APPROVAL OF THE ENGINEER AND OWNER AT NO ADDITIONAL COST TO THE OWNER.
- 9. TEST AND BALANCE OF SYSTEMS: A. AFTER COMPLETION OF THE INSTALLATION WORK, TEST AND REGULATE ALL COMPONENTS OF THE NEW SYS MODIFIED SYSTEMS TO THE SATISFACTION OF THE MECHANICAL ENGINEER AND OWNER.
- 10. OPERATIONAL TEST AND ADJUSTMENTS:
- A. CONTRACTOR SHALL BE RESPONSIBLE FOR THE ADDITIONAL ITEMS NOTED BELOW:
- B. TESTING AND START-UP OF MECHANICAL EQUIPMENT AND SYSTEMS WILL BE REQUIRED UPON PROJECT COM PERSONNEL AND INSTRUMENTS REQUIRED SHALL BE FURNISHED BY THE CONTRACTOR. MECHANICAL CONTR SHALL COOPERATE WITH EACH OTHER AND THE OWNER'S REPRESENTATIVES IN CONDUCTING TESTS.
- C. ANY FINAL ADJUSTMENTS OR BALANCING FOUND NECESSARY TO BE MADE TO THE EQUIPMENT OR SYSTEMS WILL BE PLACED IN ACCEPTABLE OPERATING CONDITIONS AND MEET THE SPECIFIED PERFORMANCE SHALL DURING ANY OR ALL OF THE TESTS SPECIFIED HEREIN.
- D. ANY EQUIPMENT, SYSTEMS, OR WORK FOUND DEFICIENT DURING ANY TESTS SHALL BE REPLACED OR REVIS REQUIRED.
- E. BEFORE STARTING OR OPERATING ANY EQUIPMENT OF SYSTEMS, A THOROUGH CHECK SHALL BE MADE TO I THAT ALL SYSTEMS HAVE BEEN FLUSHED AND CLEANED AS REQUIRED AND THAT ALL EQUIPMENT HAS BEEN INSTALLED. LUBRICATED AND SERVICED.
- F. DURING TEST PERIOD, FINAL ADJUSTMENTS AND BALANCING SHALL BE MADE TO EQUIPMENT, SYSTEMS, CON CIRCUITS SO THAT ALL ARE PLACED IN FIRST-CLASS OPERATING CONDITION.
- G. UPON COMPLETION OF THE MECHANICAL WORK, OR AT SUCH A TIME PRIOR TO COMPLETION AS MAY BE DETI THE ENGINEER OF RECORD, ALL MECHANICAL EQUIPMENT AND SYSTEMS SHALL BE OPERATED AND TESTED OF AT LEAST FIVE CONSECUTIVE 8 HOUR DAYS TO DEMONSTRATE THE SATISFACTORY OVERALL OPERATION BUILDING OR PROJECT AS A COMPLETED UNIT.
- H. CONTRACTOR SHALL PROVIDE THREE (3) PRINTED COPIES AND AN ELECTRONIC COPY OF OPERATION AND M MANUEL FOR ALL NEW EQUIPMENT PROVIDED ON PROJECT.
- OPENING IN HARD CEILINGS MUST BE LARGE ENOUGH TO REMOVE EXISTING TERMINAL UNITS. IF EXISTING A ARE INADEQUATE, A LARGER OPENING MUST BE MADE. NEW OPENING SHALL BE DEALING WITH NEW ACCESS LARGE ENOUGH TO COVER OPENINGS. IN LIEU OF ACCESS PANELS, OPENINGS CAN BE MADE TO ACCOMMOD CEILING GRID WITH ACOUSTIC TILES.

	GENERAL NO	TES			MECH	ANICAL ABBREVIAT	IONS	
AIR IN AND TO THE	1. EQUIPMENT CAPACITIES 2. DUCT DIMENSIONS SHO 3. EXACT LOCATION OF AL LIGHTING AND REFLEC	S BASED FOR OPERATION AT SIT WN ON DRAWINGS ARE NET INS L GRILLES, DIFFUSERS, AND RE TED CEILING PLANS. WHERE INS	E ELEVATION. IDE DIMENSIONS GISTERS SHALL STALLATIONS CO	BE COORDINATED WITH NFLICT. FINAL LOCATION	NC or AC AFF AHU ASHRAE	A R CONDITIONING ABOVE FIN SHED FLOOR AIR HANDLING UNIT AMERICAN SOCIETY OF HEATING, REFRIGERATION AIR CONDITIONING ENGINEERS	IECC IFC IMC AND CC IPC	INTERNATIONAL ENERGY CONSERVA [10 \ COD= INTERNATIONAL FIRE CODE INNTERNATIONAL MECHANICAL CODE INTERNTIONAL FUEL GA\$ CODE INTERNATIONAL PLUMBING CODE
E CEILINGS.	SHALL BE APPROVED A	ND OBTAINED FROM ARCHITEC	Т.		AV AW	ACID VENT LINE ACID WASTE LINE	KW KWH	KILOWATT KILOWATT HOUR
AND ALL	4. PROVIDE TURNING VAN	ES IN ALL SQUARE (90 DEGREE)	ELBOWS (EXCEP	PT R.A. DUCTWORK).	BTU BTUH	BRITISH THERMAL UNITS BTUS PER HOUR	L LAT	IUIQUID REFRIGERANT UNE LEAVING AIR TEMPERATURE
	6 ELEXIBLE ROUND DUCT	BRANCHES TO SUPPLY DIFFUSE	SPIN-IN DAMPER	II INGS SHALL BE PRE	CA CC	COMBUSTION AIR COOLING COIL	LAV LEED	LAVATORY LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN
	INSULATED AND SHALL	NOT EXCEED 5 FOOT IN TOTAL	LENGTH. ROUND	BRANCH DUCTS AND	CD CDR	CONDENSATE DRAIN LINE CONDENSER WATER RETURN	LWT PA	LEAVING WATER TEMPERATURE MOTORIZED DAMPER
ENTED TO THE	DROPS TO CEILING MO	UNTED DIFFUSERS SHALL BE TH NECK SIZE, UNLESS OTHERWIS	IE SAME NOMINA E NOTED ON DR	AL SIZE AS THE AWING.	CDS CFM	CONDENSER WATER SUPPLY A R FLOW RATE (CUBIC FEE I PER MINU FE)	MAX MCA	MAXIMUM MINIMUM CIRCUIT AMPS
	7. JOINTS AND SEAMS ON	LOW VELOCITY SUPPLY, RETUR	N AND EXHAUST	DUCTS, ROUND OR	CLG CW	CEILING DOMESTIC COLD WATER	MIN MOCP	MINIMUM MAXIMUM OVERCURRENT PROTECTION
	RECTANGULAR, MUST	BE SEALED AIR TIGHT.			CWR CWS	CHILLED WATER RETURN CHILLED WATER SUPPLY	MPG NC	MEDIUM PRESSURE NA1URAL GAS NOISE CRITERIA
	8. CONTRACTOR SHALL CO	SORDINATE AIR CONDITIONING L RADES, TO AVOID CONFLICTS AN	DUCTWORK, PLU D MAINTAIN EQU	MBING, AND SPRINKLER	DEG or <sup>o</sup> DIA or 0	DEGREE DIAMETER	NFPA NTS	NATIONAL FIRE PROTECTION ASSOC1ATION NOT TO SCALE
	SERVICEABILITY TO VA	LVES AND EQUIPMENT.			DB DWR	DOMESTIC HOT WATER RETURN	OD OSA	OVERFLOW DRAIN LINE OUTSIDE AIR
	9. CONTRACTOR SHALL FU	JRNISH ALL NECESSARY STRUC <sup>-</sup> ATION OF MECHANICAL AND PLU	TURES, INSERTS MBING EQUIPME	, SLEEVES, AND HANGING	EA		PD P1-1 or 0	PRESSURE ORO-, PHASE
ITTED FOR ATURES TO	PIPING, ETC. CONTRAC	TOR SHALL COORDINATE INSTA	LLATION OF SUC	H DEVICES WITH GENERAL	ESP	ENERGY EFFICIENCY RATIO EXTERNAL STATIC PRESSURE	PRV RA	RESSURE REDUCINC VALVE RETURN AIR
	THE DEVICES ARE ADE	QUATE AS INTENDED AND DO NO	OT OVERLOAD T	HE BUILDING'S	F	FIRE SPRINKLER LINE	RD RPM	REVOLUTIONS PER MINUTE
ELECTRICAL	STRUCTURAL COMPON	IENTS IN ANY WAY.			FCO	FLOOR CLEANOUT FIRE DAMPFR	RIU S	SUCTION REFRIGERANT LINE
	10. INSULATE DOMESTIC H	OT WATER PIPING WITH 1" THIC	K FIBERGLASS IN	ISULATION.	FLA FLR	FUEL LOAD ANIPS FLOOR	SA SD	SUPPLY AIR STORM DRAIN LINE
ERIALS AND	11. EQUIPMENT SHALL BE	ARY FITTINGS FOR RISES AND OF	FESETS IN DUCT	RECOMMENDATIONS.	FPIVI FS	FLOW SWITCH	SEER SFD	COMBINATION SMOKE/FIRE DAMPER
H TRADE. RUN	WHETHER OR NOT SHO	OWN, FOR PROPER INSTALLATIO	N.		G	LOW PRESSURE NATURAL GAS	SP SYM	STATIC PRESSURE SYMBOL
	13. BRANCH DUCT EXTENS	SIONS TO AIR TERMINAL UNITS S	HALL BE AS SCH	EDULED ON THE	GCO	GRADE CLEANOUT	T& P TEMP	TEMPERATURE AND PRESSURE TEMPERATURE
) FIRST	14. PROVIDE ACCESS PAN	ELS OR DOORS IN INACCESSIBLI	E CEILINGS AND/	OR CHASES FOR ALL	GWR	GEOTHERMAL WATER SUDDLY	TS TYP	TYPICAL
	VALVES, TRAPS, DAMP	ERS, CLEANOUTS, COILS, FANS	CONTROLS, ETC	THEY SHALL BE	HC	HEATING COIL		JRINAL
		VISION 15 AND INSTALLED UNDER		IURAL SPECIFICATIONS.	HVAC	HEATING, VENTILATING, AIR CONDITIONING	VIR	VENT THROUGH ROOF VOLTS
OR WORK. ON.	ACCESSIBLE BY ANY O	THER MEANS. SEE DETAIL.			HWR	HEATING WATER SUPPLY	WC WC	WATER CLOSET
	16. CONTRACTOR SHALL P	ROVIDE RETURN AIR OR TRANS		GS IN CEILING SPACE AT	IBC	INTERNATIONAL BUILDING CODE	WEO	WATER HEATER
DVIDE	DRAWINGS) TO CREATI	E AND/OR MAINTAIN A RETURN A ENINGS WHERE REQUIRED. SEE	IR PATH. FIRE/SI	MOKE DAMPERS SHALL BE E/SMOKE DAMPER	MECH	ANICAL SHEET INDE	X	
TRUCTION.	LOCATIONS. COORDINA ELECTRICAL CONDUIT.	ATE THE LOCATIONS OF ALL DUC	CTWORK WITH AN	NY PLUMBING LINES AND	N41 00			
TO THE	17. THE SPACE ABOVE THE	E CEILING IS LIMITED. IN THE EVE	ENT THAT ANY D	JCT CANNOT BE ROUTED	M1.00 M2.01	MECHANICAL ABBREVIATIO		OLS, NOTES & INDEX
	AS SHOWN ON THE CO	NTRACT DRAWINGS, THE CONTF IG THE SAME NET FREE AREA AS	RACTOR SHALL N	10DIFY THE DUCT AS	M2.02	MECHANICAL HVAC ROOF	PLAN	
NTRACTOR.	SHALL SUBMIT SHOP D	RAWINGS SHOWING THE PROPO	SED CHANGES I	FOR APPROVAL. THIS	M3.01	MECHANICAL SPECIFICATI	ONS	
UIRED AND	SHALL BE DONE AT NO	COST TO THE OWNER.			M3.02	MECHANICAL HVAC DUCT		
RIOR TO	LOCATION OF ALL ROO CONDITIONS.	F AND FLOOR PENETRATIONS W	ITH EXISTING ST	RUCTURAL		MECHANICAL ITVAC DOCT		
, AND AFTER	19. FRAME AROUND EACH	PENETRATION PER ARCHITECT	JRAL / STRUCTU	RAL DRAWINGS.				
,	20.DUCTWORK CONNECTI	ONS TO ALL AIR HANDLING EQU	IPMENT SHALL B	E MADE WITH				
SARY TO THE					-			
STEMS AND	STINIBUL LEG				-			
			SYMBOL	DESCRIPTION	-			
		SUPPLY DIFFUSER (LAY-IN CEILING)		ROOM THERMOSTAT (ELECTRIC)				
MPLETION. ALL		SUPPLY DIFFUSER (FIXED CEILING)	(7)	KEYED NOTE SYMBOL				
RACTORS		RETURN AIR GRILLE	250	_ CFM QUANTITY S=SUPPLY DIFFUSER				
S SO THAT THEY	EXHAUST	REGISTER	12"Ø	= R=RETURN GRILLE E=EXHAUST GRILLE				
BE MADE	A.L. DUCT ACC	DUSTIC LINING		NECK SIZE				
SED AS	SA SUPPLY A	IR III	<u>∕ ACU-4</u> 8,000 CFM	EQUIPMENT SYMBOL CAPACITY				
DETERMINE			·/	DIRECTION OF FLOW				
PROPERLY		_ EXHAUST REGISTER						
NTROLS, AND			()	TOP PIPE CONNECTION, 45° OR 90°				
·		BOW OR MITERED ELBOW	$\overline{\bigcirc}$	BOTTOM PIPE CONNECTION,				
ERMINED BY FOR A PERIOD I OF THE	RETURN A THRU LOV	AIR OR EXHAUST DUCT WER OR UPPER LEVEL		45° OR 90°				
IAINTENANCE	SUPPLY A LOWER O	IR DUCT THRU R UPPER LEVEL					February, 20	
CCESS PANELS S PANELS			FD				ARD A, L	
						INDUSTRIAL ENGINEERING, INC.		ALBOQUERQUE, NM 8. V: 505.262.0193 F: 505.881.9114 E: bobmac Addition
					1	II	1 67 1	





### REGISTER, GRILLE AND DIFFUSER SCHEDULE

LIPE —	MANUFACIURE —	NO	ANGLE BARS	FACE BARS		
		110.	ANOLE	STILL		
D-1	TITUS	TMS-3			STEEL	OFF WHITE
G-1	TITUS	50F-3	-	EGG GRATE	ALUMINUM	OFF WHITE

1. CEILING DIFFUSER WITH FRAME FOR LAY-IN CEILING AND RADIAL DAMPER. DIFFUSER NECK SHALL BE THE SAME SIZE AS THE DUCT. 2. 1/2"x1/2"x1/2" EGG GRATE STYLE GRILLE WITH TYPE 3 FRAME (LAY-IN CEILING) SIZE AS SHOWN ON PLAN.







					Ν	/ECHANICAL	FURNACE	(GAS HE	EAT) SC	HEDULE				
	FLOW R	ATE	STATIC PRESSURE	ELE	ECTRICA	al data	DX COC	LING	GAS	HEATING				
TAG	SUPPLY	OA	EXTERNAL	MCA	MOCP		SENSIBLE	TOTAL	INPUT	OUTPUT	BASIS	OF DESIGN	WEIGHT	
	CFM	CFM	IN WG	AMPS	AMPS		MBH	MBH	MBH	MBH	MANUFACTURER	MODEL OR SERIES		
RTU-1	1,800	475	1.5	31.0	45	208/3/60	47	0	125	105	BRYANT	582JP06A125	543	1
RTU-2	1,800	475	1.5	31.0	45	208/3/60	47	0	125	105	BRYANT	582JP06A125	543	

SHUT DOWN WITH MANUAL RESTART ON UNITS OVER 2000 CFM. PROVIDE REGULATOR TO REDUCE PRESSURE AS REQUIRED BY MANUFACTURER.



# **DIVISION 23 MECHANICAL SPECIFICATIONS**

PART 1 - GENERAL

1.01 WORK INCLUDED

A. RELOCATING DUCTWORK AND DIFFUSERS

- 1.02 GENERAL MECHANICAL REQUIREMENTS
- A. SCOPE: FURNISH ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, AND SERVICES FOR ALL MECHANICAL WORK AS SPECIFIED AND AS SHOWN ON THE DRAWINGS. THIS SECTION APPLIES TO ALL PROJECT MECHANICAL WORK. ALL MECHANICAL EQUIPMENT AND DEVICES FURNISHED OR INSTALLED UNDER OTHER DIVISIONS OF THIS SPECIFICATION (OR BY THE OWNER) WHICH REQUIRE CONNECTION TO ANY MECHANICAL SYSTEMS (I.E., PLUMBING SYSTEMS, DUCT SYSTEMS OR CONTROLS) SHALL BE CONNECTED UNDER THIS DIVISION OF THE SPECIFICATIONS.
- B. GENERAL: ALL WORK SHALL CONFORM WITH THE GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, AND ALL OTHER PROVISIONS OF THE CONTRACT DOCUMENTS.
- C. COMPLETE SYSTEMS: FURNISH AND INSTALL ALL MATERIALS, APPURTENANCES, DEVICES, AND MISCELLANEOUS ITEMS NOT SPECIFICALLY MENTIONED HEREIN OR NOTED ON THE DRAWINGS, BUT WHICH ARE NECESSARY TO MAKE A COMPLETE WORKING INSTALLATION OF ALL MECHANICAL SYSTEMS. NOT ALL ACCESSORIES OR DEVICES ARE SHOWN OR SPECIFIED THAT ARE NECESSARY TO FORM COMPLETE AND FUNCTIONAL SYSTEMS.
- D. REVIEW AND COORDINATION: TO ELIMINATE ALL POSSIBLE ERRORS AND INTERFERENCES, THOROUGHLY EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS BEFORE WORK IS STARTED, AND CONSULT AND COORDINATE WITH EACH OF THE VARIOUS TRADES REGARDING THE WORK. SUCH COORDINATION SHALL BEGIN PRIOR TO ANY WORK STARTING, AND CONTINUE THROUGHOUT THE PROJECT.
- E. CONFLICTS: NOTIFY THE ARCHITECT/ENGINEER OF ANY DISCREPANCIES OF CONFLICTS WITHIN THE CONTRACT DOCUMENTS OR BETWEEN THE CONTRACT DOCUMENTS AND FIELD CONDITIONS. DO NOT PROCEED WITH ANY WORK OR THE PURCHASING OF ANY MATERIALS FOR THE AREA(S) OF CONFLICT UNTIL OBTAINING WRITTEN INSTRUCTIONS FROM THE ARCHITECT/ENGINEER ON HOW TO PROCEED. ANY WORK DONE AFTER DISCOVERY OF SUCH DISCREPANCIES OR CONFLICTS AND PRIOR TO OBTAINING THE ARCHITECT/ENGINEER'S INSTRUCTIONS ON HOW TO PROCEED SHALL BE DONE AT THE CONTRACTOR'S EXPENSE. IN CASE OF A CONFLICT BETWEEN THESE REQUIREMENTS AND OTHER PROJECT REQUIREMENTS, THE MOST STRINGENT AND EXPENSIVE (AS JUDGED BY THE ARCHITECT/ENGINEER) SHALL PREVAIL.
- F. FIELD CONDITIONS:
  - 1. CHECK FIELD CONDITIONS AND VERIFY ALL MEASUREMENTS AND RELATIONSHIPS INDICATED ON THE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
  - 2. IN VERIFYING EXISTING CONDITIONS, THE CONTRACTOR SHALL VERIFY BY DIRECT PHYSICAL INSPECTION, COMPLETE TRACING OUT OF SYSTEMS, BY APPLYING TEST PRESSURES, BY EXCAVATION AND INSPECTION, USE OF PIPELINE CAMERAS AND OTHER SUITABLE ABSOLUTE CERTAIN METHODS TO CONFIRM THE ACTUAL PHYSICAL CONDITIONS THAT EXIST.
- G. DRAWINGS AND SPECIFICATIONS: DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY AND WHAT IS CALLED FOR IN EITHER IS BINDING AND IS CALLED FOR IN BOTH.
- H. OFFSETS/FITTINGS: THE DRAWINGS ARE DIAGRAMMATIC AND SHOW THE GENERAL ARRANGEMENT OF THE CONSTRUCTION AND THEREFORE DO NOT SHOW ALL OFFSETS, FITTINGS AND ACCESSORIES WHICH ARE REQUIRED TO FORM A COMPLETE AND OPERATING INSTALLATION.
  - 1. DUCT SYSTEMS: INCLUDE IN BID ALL NECESSARY FITTINGS, OFFSETS, AND TRANSITIONS TO COMPLETELY CONNECT ALL SYSTEMS, MAINTAIN CLEAR ACCESS PATHS, AND COMPLY WITH ALL PROJECT REQUIREMENTS. CONTRACTOR IS RESPONSIBLE TO DETERMINE THE QUANTITY OF OFFSETS AND FITTINGS REQUIRED, AND THE LABOR INVOLVED.
- I. LOCATIONS: UNLESS DIMENSIONED LOCATIONS FOR MECHANICAL ITEMS ARE SHOWN, SELECT THE PRECISE LOCATION OF THE ITEM IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND SUBJECT TO THE ARCHITECT/ENGINEER'S REVIEW. NO ALLOWANCES WILL BE GRANTED FOR FAILURE TO OBTAIN THE ARCHITECT/ENGINEER'S REVIEW.
- J. DESIGN: THE LEVEL OF DESIGN PRESENTED IN THE DOCUMENTS REPRESENTS THE EXTENT OF THE DESIGN BEING FURNISHED TO THE CONTRACTOR; ANY ADDITIONAL DESIGN NEEDED SHALL BE PROVIDED BY THE CONTRACTOR. ALL DESIGN BY THE CONTRACTOR SHALL BE PERFORMED BY INDIVIDUALS SKILLED AND EXPERIENCED IN SUCH WORK, AND WHERE REQUIRED BY LOCAL CODE (OR ELSEWHERE IN THE DOCUMENTS) SHALL BE PERFORMED BY ENGINEERS LICENSED IN THE STATE WHERE THE PROJECT IS LOCATED. THE CONTRACTOR SHALL INCLUDE IN HIS BID THE COSTS OF ALL SUCH ADDED DESIGN INCLUDING ENGINEERING, DRAFTING, COORDINATION, AND ALL RELATED ACTIVITIES AND WORK. SUCH DESIGNS SERVICES ARE REQUIRED FOR MANY BUILDING SYSTEMS; INCLUDING BUT NOT LIMITED TO FIRE SPRINKLER SYSTEMS, CONTROL SYSTEMS, HANGER/SUPPORT SYSTEMS, TEMPORARY DUCT/PIPING SYSTEMS, SYSTEM OFFSET/ADJUSTMENTS TO SUIT STRUCTURE, AND FOR METHODS/MEANS OF ACCOMPLISHING THE WORK.
- K. EXPERIENCE: ALL WORK SHALL BE PERFORMED BY INDIVIDUALS EXPERIENCED AND KNOWLEDGEABLE IN THE WORK THEY ARE PERFORMING, AND EXPERIENCED WITH THE SAME TYPE OF SYSTEMS AND BUILDING TYPE AS THIS PROJECT.
- SUSTAINABLE BUILDING REQUIREMENTS: NOT APPLICABLE TO THIS PROJECT
- 1.03 REMODELING AND DEMOLITION WORK IN EXISTING BUILDING
- A. REMOVE, RELOCATE OR REROUTE EXISTING WORK AS REQUIRED FOR THE INSTALLATION OF CONSTRUCTION. MATERIALS AND EQUIPMENT REMOVED SHALL BE SHOWN TO AND INSPECTED BY THE OWNER. THOSE MATERIALS AND EQUIPMENT NOT CLAIMED BY THE OWNER SHALL BE REMOVED FROM THE SITE. DUST, NOISE AND VIBRATION SHALL BE CONTROLLED AND HELD TO A MINIMUM. PIPING AND DUCTWORK SHALL BE CAPPED BEHIND FINISHED SURFACES.
- THIS PROJECT WILL CONSIST OF ALTERATION WORK WITHIN, AND CONSTRUCTION OF BUILDING ADDITIONS TO AN OPERATING FACILITY. DEMOLITION WORK SHALL BE COORDINATED AND CONDUCTED IN A MANNER THAT WILL NOT INTERFERE WITH THE NORMAL OPERATION OF THE BUILDING. ALL WORK SHALL BE PLANNED IN ADVANCE WITH THE OWNER AND ARCHITECT.
- C. MATERIALS AND EQUIPMENT NOTED TO BE REUSED SHALL BE EXAMINED AND REPAIRED AS REQUIRED TO PUT THESE MATERIALS AND EQUIPMENT IN ACCEPTABLE WORKING ORDER.
- D. IT MAY BE FOUND NECESSARY TO INTERRUPT SERVICES TO EXISTING BUILDING OR PORTIONS THEREOF DURING THE PROGRESS OF THIS WORK. WHEN SUCH INTERRUPTIONS ARE LIKELY TO OCCUR, MAKE PREVIOUS ARRANGEMENTS WITH THE OWNER AS TO THE MOST CONVENIENT TIME FOR SUCH INTERRUPTIONS. TEMPORARY SERVICE CONNECTIONS SHALL BE PROVIDED WHERE THE OWNER CANNOT PERMIT SERVICE INTERRUPTIONS. THE EXISTING OR TEMPORARY SERVICES SHALL BE MAINTAINED IN OPERATION UNTIL SUCH TIME THAT THE NEW SERVICES HAVE BEEN INSTALLED AND ARE READY FOR PERMANENT OPERATION.

1.04 QUALITY ASSURANCE REQUIREMENTS

- A. CODE: ALL WORK SHALL BE DONE TO MEET OR EXCEED ALL APPLICABLE CODES AND ORDINANCES.
- CODE KNOWLEDGE: CONTRACTOR AND WORKERS ASSIGNED TO THIS PROJECT SHALL BE FAMILIAR AND KNOWLEDGEABLE OF ALL APPLICABLE CODES AND ORDINANCES.
- C. PROOF OF CODE COMPLIANCE: ON COMPLETION OF THE WORK, SATISFACTORY EVIDENCE SHALL BE FURNISHED TO SHOW THAT ALL WORK HAS BEEN INSTALLED IN ACCORDANCE WITH ALL CODES AND THAT ALL INSPECTIONS REQUIRED HAVE BEEN SUCCESSFULLY PASSED.
- PERMITS AND FEES: D.
- 1. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, LICENSES, FEES AND INSPECTIONS AS REQUIRED BY THE GOVERNING CODES AND AS SPECIFIED HEREIN (UNLESS NOTED OTHERWISE IN THE CONTRACT DOCUMENTS).
- 2. FEES WHICH THIS CONTRACTOR SHALL PAY INCLUDE ALL CHARGES MADE BY ANY UTILITY COMPANY OR MUNICIPALITY FOR MATERIAL, LABOR OR SERVICES INCIDENT TO THE CONNECTION OF SERVICE (UNLESS NOTED OTHERWISE IN THE CONTRACT DOCUMENTS).
- ASME: ALL PRESSURE VESSELS, SAFETY DEVICES, AND APPURTENANCES SHALL COMPLY WITH THE STANDARDS OF, AND BEAR THE STAMP OF ASME.
- ELECTRICAL: ALL ELECTRICAL DEVICES AND WIRING AND EQUIPMENT SHALL COMPLY WITH STANDARDS OF NEC AND DIVISION 16 SPECIFICATIONS. ALL ELECTRICAL DEVICES SHALL BE UL (OF OTHER APPROVED AGENCY) LISTED AND SO IDENTIFIED.

- G. INSTALLATION: ALL ITEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND RECOMMENDATIONS. H. QUALITY ASSURANCE CHECKS: PRIOR TO ORDERING ITEMS OR MATERIALS, CONFIRM THE FOLLOWING FOR EACH: 1. GENERAL: ITEM IS SUITABLE FOR THE INTENDED PURPOSE AND COMPLIES WITH THE CONTRACT DOCUMENTS. 2. MANUFACTURER: ITEM'S MANUFACTURER IS LISTED AS AN ACCEPTABLE MANUFACTURER, IN THE CONTRACT DOCUMENT'S OR A SUBSTITUTION REQUEST (WHERE ALLOWED) HAS BEEN SUBMITTED AND THE MANUFACTURER HAS BEEN LISTED AS ACCEPTABLE. 3. ELECTRICAL (FOR ITEMS REQUIRING ELECTRICAL POWER):
- A. ITEM IS FOR USE WITH THE VOLTAGE/PHASE AS INDICATED ON THE ELECTRICAL PLANS (OR FOR THE ELECTRICAL CIRCUIT THE ITEM WILL BE CONNECTED TO).
- B. ITEM'S AMPACITY REQUIREMENTS (MCA) DO NOT EXCEED THAT INDICATED ON THE ELECTRICAL PLANS (OR FOR THE ELECTRICAL CIRCUIT THE ITEM WILL BE CONNECTED TO).
- 4. WEIGHT: ITEM'S WEIGHT IS NO GREATER THAN THAT INDICATED ON THE PLANS.
- 5. ADEQUATE SPACE: ITEM WILL FIT IN THE SPACE AVAILABLE AND ALONG THE PATH AVAILABLE TO INSTALL THE ITEM. 6. INSTALLATION: A SUITABLE METHOD FOR INSTALLING THE ITEMS HAS BEEN SELECTED WHICH MEETS THE PROJECT SCHEDULE AND OTHER REQUIREMENTS.
- 7. LEAD TIME: THE ITEM'S FABRICATION, SHIPPING, AND DELIVERY PERIOD MEETS THE PROJECT SCHEDULE REQUIREMENTS. I. CHECK-OUT: THE CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY THAT PROPER INSTALLATION AND PROPER CONNECTIONS HAVE BEEN PROVIDED FOR ALL MECHANICAL WORK. CONTRACTOR SHALL PROVIDE INSTALLATION CHECKOUT, START-UP SERVICES, AND PERFORM AND THOROUGH CHECK OF ALL SYSTEMS TO PROVE PROPER OPERATION. CONTRACTOR SHALL OPERATE ALL ITEMS MULTIPLE TIMES UNDER VARYING CONDITIONS TO CONFIRM PROPER OPERATION. CONTRACTOR SHALL SUBMIT A CHECKLIST LISTING ALL EQUIPMENT, FIXTURES, AND SIMILAR ITEMS FURNISHED ON THIS PROJECT, WITH A DATE AND INITIALS INDICATING WHEN THE ITEM WAS CHECKED, A LIST OF WHAT WAS CHECKED, AND BY WHOM, SUCH CHECK SHALL, AS A MINIMUM UTILIZE DOCUMENTS PROVIDED BY THE EQUIPMENT MANUFACTURER. SUCH A CHECK-OUT IS IN ADDITION TO ANY COMMISSIONING ACTIVITIES SPECIFIED (UNLESS NOTED OTHERWISE).
- 1.05 RECORD DATA
- A. FIELD RECORD DRAWINGS: THE CONTRACTOR SHALL MAINTAIN A SET OF FULL SIZE CONTRACT PLANS AT THE PROJECT SITE UPON WHICH ALL CHANGES FROM THE AS-BID PLANS ARE NOTED. THESE PLANS SHALL ALSO INCLUDE ACTUAL LOCATIONS (WITH DIMENSIONS) OF ALL UNDERGROUND AND CONCEALED MECHANICAL SYSTEMS. CONNECTION POINTS TO OUTSIDE UTILITIES SHALL BE LOCATED BY FIELD MEASUREMENTS AND SO NOTED ON THESE RECORD DRAWINGS. ALL ADDENDA, CHANGE ORDER, FIELD ORDERS, DESIGN CLARIFICATIONS, REQUEST FOR INFORMATION, AND ALL OTHER CLARIFICATIONS AND REVISIONS TO THE PLANS SHALL ALSO BE MADE A PART OF THESE RECORD DRAWINGS. PLANS SHALL BE AVAILABLE FOR WEEKLY REVIEW BY THE ARCHITECT/ENGINEER. LABEL DRAWING "AS-BUILTS" WITH DATE, NAME OF CONTRACTOR, AND NAME OF INDIVIDUAL OVERSEEING THE WORK.

### PART 2 - PRODUCTS

#### 2.01 ELECTRICAL

- A. ALL ELECTRICAL WORK, CONDUIT, BOXES AND DEVICES IN CONNECTION WITH CONTROL WIRING AS REQUIRED TO INSTALL THE CONTROL EQUIPMENT AS SPECIFIED HEREIN OR SHOWN ON THE DRAWINGS SHALL BE FURNISHED AND INSTALLED COMPLETE BY THE MECHANICAL CONTRACTOR.
- B. ALL ELECTRICAL WORK PERFORMED UNDER THIS SECTION OF THE SPECIFICATIONS SHALL CONFORM TO ALL APPLICABLE PORTIONS OF THE DIVISION 26 SPECIFICATIONS AND SHALL CONFORM TO ALL GOVERNING CODES.
- C. AL STARTING SWITCHES AND DISCONNECT SWITCHES PROVIDED BY THIS CONTRACTOR SHALL BE LABELED TO IDENTIFY THE EQUIPMENT SERVED AND USAGE. SUCH LABELING SHALL MATCH THAT SPECIFIED IN DIVISION 16.
- D. ALL EQUIPMENT SHALL BE FACTORY WIRED TO A JUNCTION BOX FOR CONNECTION OF ELECTRICAL SERVICE.

#### 2.02 PRODUCT LISTINGS

- GENERAL: ANY PIECE OF EQUIPMENT USED IN THIS PROJECT AND HEREINAFTER SPECIFIED WHICH REQUIRES ELECTRICAL HOOK-UP, SUCH AS FANS, PUMPS, HOT WATER TANKS, BOOSTERS, AIR HANDLING EQUIPMENT, ETC. SHALL BE PROVIDED WITH AN APPROVED LABEL FROM AN AGENCY ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION DOES NOT REQUIRE IT.
- B. COMPLETE ASSEMBLY: APPROVAL OF AGENCY SHALL BE FOR THE COMPLETE ASSEMBLY (APPROVAL OF INDIVIDUAL COMPONENTS NOT ACCEPTABLE) AND ALL LABELS MUST BE LOCATED OUTSIDE OF EQUIPMENT AND SHALL BE VISIBLE TO INSPECTOR.
- RESPONSIBILITY: IT SHALL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR OR THE EQUIPMENT SUPPLIER TO MEET THE REQUIREMENTS OF THIS SECTION. ALL AGENCY COSTS TO PROVIDE APPROPRIATE LABEL FOR A PIECE OF EQUIPMENT SHALL BE INCLUDED IN THE BID.

#### PART 3 - EXECUTION

#### 3.01 GENERAL

- WORKMANSHIP: THIS CONTRACTOR SHALL FURNISH AND INSTALL ALL EQUIPMENT INCLUDED IN THE CONTRACT TO PROVIDE COMPLETE AND FUNCTIONING SYSTEMS WITH A NEAT AND FINISHED APPEARANCE. IF, IN THE JUDGMENT OF THE ARCHITECT/ENGINEER, ANY PORTION OF THE WORK HAS NOT BEEN INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS AND IN A NEAT WORKMANLIKE MANNER. OR HAS BEEN LEFT IN A ROUGH. UNFINISHED MANNER. THE CONTRACTOR SHALL BE REQUIRED TO REVISE THE WORK SO THAT IT COMPLIES WITH THE SPECIFICATIONS AND IS ACCEPTABLE TO THE ARCHITECT/ENGINEER, AT NO INCREASE IN COST TO THE OWNER.
- B. OPENINGS AND CUTTING AND PATCHING IN NEW CONSTRUCTION:
- 1. OPENINGS GENERAL: THE GENERAL CONTRACTOR SHALL PROVIDE ALL REQUIRED SPACES AND PROVISIONS IN STRUCTURES OF NEW CONSTRUCTION FOR THE INSTALLATION OF WORK OF ALL OTHER CONTRACTORS OR SUBCONTRACTORS.
- 2. COORDINATION: THE DIVISION 23 CONTRACTOR SHALL FURNISH TO THE GENERAL CONTRACTOR (IN A TIMELY MANNER) ALL NEEDED DIMENSIONS AND A LOCATION OF OPENINGS TO ALLOW FOR THESE OPENINGS TO BE PROVIDED AS THE CONSTRUCTION ADJACENT TO THE OPENING IS BEING DONE.
- 3. CUTTING AND PATCHING: CUTTING AND PATCHING OF STRUCTURES IN PLACE MADE NECESSARY TO ADMIT WORK, REPAIR DEFECTIVE WORK, OR BY NEGLECT OF CONTRACTORS AND SUBCONTRACTORS TO PROPERLY ANTICIPATE THEIR REQUIREMENTS, SHALL BE DONE BY THE GENERAL CONTRACTOR AT THE EXPENSE OF THE CONTRACTORS OR SUBCONTRACTORS RESPONSIBLE. SUCH CUTTING AND PATCHING SHALL COMPLY WITH SUBPARAGRAPHS 2, 3 AND 4 OF PARAGRAPH C, "OPENINGS AND CUTTING AND PATCHING IN EXISTING CONSTRUCTION."
- 4. PATCHING MATERIALS: PATCHING SHALL BE WITH MATERIALS OF LIKE KIND AND QUALITY OF THE ADJOINING SURFACE BY SKILLED LABOR EXPERIENCED IN THAT PARTICULAR TRADE.

### 3.02 INSTALLATION

- A. REPLACEMENT AND MAINTENANCE: INSTALL MECHANICAL EQUIPMENT TO PERMIT EASY ACCESS FOR NORMAL MAINTENANCE, AND SO THAT PARTS REQUIRING PERIODIC REPLACEMENT OR MAINTENANCE (E.G., COILS, SHEAVES, FILTERS, METERS, BEARINGS, ETC.) CAN BE REMOVED. RELOCATE ITEMS WHICH INTERFERE WITH ACCESS
- B. ACCESS DOORS: PROVIDE ACCESS DOORS IN BUILDING, EQUIPMENT, AND DUCTS AS REQUIRED TO ALLOW FOR INSPECTION, SERVICE, AND PROPER MAINTENANCE.
- C. MANUALLY OPERATED COMPONENTS: VALVES, DAMPER OPERATORS, AND OTHER DEVICES WHICH ARE MANUALLY ADJUSTED OR OPERATED SHALL BE LOCATED SO AS TO BE EASILY ACCESSIBLE BY A PERSON STANDING ON THE FLOOR. ANY SUCH ITEMS WHICH ARE NOT IN THE OPEN SHALL BE MADE ACCESSIBLE THROUGH ACCESS DOORS IN THE BUILDING CONSTRUCTION.
- D. MONITORING COMPONENTS: GAUGES, THERMOMETERS, INSTRUMENTATION AND OTHER COMPONENTS WHICH ARE INSTALLED TO MONITOR EQUIPMENT PERFORMANCE, OPERATING CONDITIONS, ETC., SHALL BE ORIENTED SO AS TO BE EASILY READ BY A PERSON STANDING ON THE FLOOR. PROVIDE NECESSARY BRACKETS AND HANGERS AS NEEDED.
- E. DIFFICULT INSTALLATION: IF CIRCUMSTANCES AT A PARTICULAR LOCATION MAKE THE ACCESSIBLE INSTALLATION OF AN ITEM

DIFFICULT OR INCONVENIENT, THE SITUATION SHALL BE DISCUSSED WITH THE ARCHITECT/ENGINEER BEFORE INSTALLING THE ITEM IN A POOR ACCESS LOCATION

F. ROTATING PARTS: BELTS, PULLEYS, COUPLINGS, PROJECTING SETSCREWS, KEYS AND OTHER ROTATING PARTS WHICH MAY POSE A DANGER TO PERSONNEL SHALL BE FULLY ENCLOSED OR GUARDED IN ACCORDANCE WITH APPLICABLE CODES, AND SO AS NOT TO PRESENT SAFETY HAZARD.

G. EQUIPMENT PADS: ALL GROUND AND SLAB MOUNTED MECHANICAL EQUIPMENT SHALL BE INSTALLED ON A MINIMUM 4 INCH THICK CONCRETE PAD, UNLESS INDICATED OTHERWISE. WHERE THE LARGEST DIMENSION FOR ANY PAD EXCEEDS 6 FEET PROVIDE A 6 X 6 - 10 GA. X 10 GA. WELDED WIRE FABRIC REINFORCEMENT IN THE PAD (UNLESS NOTED OTHERWISE).

H. DISSIMILAR METALS: PROVIDE SEPARATIONS BETWEEN ALL DISSIMILAR METALS. WHERE NOT SPECIFIED IN ANY OTHER WAY, USE 10 MIL PLASTIC TAPE WRAPPED AT POINT OF CONTACT OR PLASTIC CENTERING INSERTS.

I. ELECTRICAL OFFSETS: PROVIDE OFFSETS AROUND ALL ELECTRICAL PANELS (AND SIMILAR ELECTRICAL EQUIPMENT) TO MAINTAIN SPACE CLEAR ABOVE AND BELOW ELECTRICAL PANELS TO STRUCTURE AND CLEARANCE OF 3 FEET DIRECTLY IN FRONT OF PANEL EXCEPT WHERE INDICATED OTHERWISE OR REQUIRED BY NEC TO BE MORE.

J. PIPING THROUGH FRAMING: PIPING THROUGH FRAMING SHALL BE INSTALLED IN THE APPROXIMATE CENTER OF THE MEMBER. WHERE LOCATED SUCH THAT NAILS OR SCREWS ARE LIKELY TO DAMAGE THE PIPE, A STEEL PLATE AT LEAST 1/16 INCH THICK SHALL BE INSTALLED TO PROVIDE PROTECTION. AT METAL FRAMING, WRAP PIPING TO PREVENT CONTACT OF DISSIMILAR METALS. AT METAL AND WOOD FRAMING, PROVIDE PLASTIC PIPE INSULATORS AT PIPING PENETRATIONS THROUGH FRAMING NEAREST EACH FIXTURE AND ON AT LEAST 32 INCH CENTERS.

K. SAFETY PROTECTION: ALL DUCTWORK, PIPING AND RELATED ITEMS INSTALLED BY THIS CONTRACTOR THAT PRESENT A SAFETY HAZARD (I.E., ITEMS INSTALLED AT/NEAR HEAD HEIGHT, ITEMS PROJECTING INTO MAINTENANCE ACCESS PATHS, ETC.) SHALL BE COVERED (AT HAZARDOUS AREA) WITH 3/4" THICK ELASTOMERIC INSULATION AND REFLECTIVE RED/WHITE SELF-STICKING SAFETY TAPE. ALL SHARP CORNERS ON SUPPORTS AND OTHER INSTALLED ITEMS SHALL BE GROUND SMOOTH.

L. MANUFACTURERS' INSTRUCTIONS: INSTALLATION SHALL COMPLY WITH MANUFACTURERS INSTALLATION INSTRUCTIONS. SUBMIT SUCH INSTRUCTION FOR ENGINEERS REVIEW PRIOR TO BEGINNING INSTALLATION.

3.03 FINAL INSPECTION AND INSTRUCTION

A. INSTRUCTION:

1. THE O&M MANUALS SHALL BE SUBMITTED AND APPROVED BY THE ENGINEER AND OWNER PRIOR TO CONDUCTING THE INSTRUCTION PERIODS.

2. INSTRUCTION SHALL INCLUDE A MINIMUM OF 32 HOURS CLASSROOM TIME, DISCUSSION ON THE SYSTEM'S OPERATION AND PRESENTATION OF INFORMATION FROM MAINTENANCE MANUALS WITH APPROPRIATE REFERENCES TO DRAWINGS, FOLLOWED BY TOURS OF EQUIPMENT SPACES EXPLAINING MAINTENANCE REQUIREMENTS, ACCESS METHODS, SERVICING, AND MAINTENANCE SCHEDULES, PROCEDURES, TEMPERATURE SETTINGS AND AVAILABLE SYSTEM AND EQUIPMENT ADJUSTMENTS. 3. FIELD INSTRUCTIONS AND DEMONSTRATIONS OF MAINTENANCE PROCEDURES FOR ALL ITEMS COVERED IN THE O&M MANUAL (REFERENCE SECTION 15015) SHALL BE PROVIDED. SUCH FIELD INSTRUCTION AND DEMONSTRATION SHALL BE FOR A MINIMUM OF 16 HOURS.

4. THE CONTRACTOR'S REPRESENTATIVES WHO CONDUCT THESE INSTRUCTIONS AND DEMONSTRATIONS SHALL BE QUALIFIED FOREMEN OR SUPERINTENDENTS ACQUAINTED WITH THIS PROJECT AND THE TRADES INVOLVED. MANUFACTURER'S AUTHORIZED SERVICE REPRESENTATIVE OR DIRECT EMPLOYEE SHALL PROVIDE INSTRUCTION FOR ALL MAJOR EQUIPMENT AND SYSTEMS AND WHERE SPECIFIED.

5. NOTICE OF THE CONTRACTOR'S READINESS TO CONDUCT THE INSTRUCTION AND DEMONSTRATIONS SHALL BE GIVEN TO OWNER AND ARCHITECT/ENGINEER AT LEAST TWO (2) WEEKS PRIOR TO PROPOSED INSTRUCTION PERIODS AND MUTUALLY AGREED UPON TIMES ARRANGED.

B. FINAL INSPECTION AND FIELD INSTRUCTION:

1. PRIOR TO ACCEPTANCE OF THE MECHANICAL WORK, THE CONTRACTOR SHALL PUT ALL MECHANICAL SYSTEMS INTO OPERATION FOR A PERIOD OF NOT LESS THAN FIVE (5) WORKING DAYS SO THAT THEY MAY BE INSPECTED BY THE ARCHITECT/ENGINEER AND THE OWNER'S REPRESENTATIVES.

2. THE TIME OF THE FINAL INSPECTION SHALL BE MUTUALLY AGREED TO BY THE OWNER. ENGINEER AND CONTRACTOR. 3. THE CONTRACTOR SHALL FURNISH ADEQUATE STAFF TO OPERATE THE MECHANICAL SYSTEMS DURING INSPECTION 4. DURING THE FINAL INSPECTION PERIOD, THE CONTRACTOR SHALL DEMONSTRATE TO THE OWNER'S REPRESENTATIVES THE OPERATION OF ALL EQUIPMENT, SHOWING THAT IT OPERATES AND IS CONTROLLED PROPERLY. SUCH DEMONSTRATION PERIOD SHALL INCLUDE A SIXTEEN (16) HOUR FIELD INSTRUCTION PERIOD. CONTRACTOR SHALL HAVE REPRESENTATIVES PRESENT OF THE EQUIPMENT MANUFACTURERS, TO EXPLAIN MAINTENANCE PROCEDURES.



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/: 505.262.0193 F: 505.881.9114 E: bobmacarch@mac.com SHEET NO. M3.02





# PLUMBING SPECIFICATIONS

- A. THE PLUMBING WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE APPLICABLE PROVISIONS INTERNATIONAL BUILDING CODE) THE UNIFORM PLUMBING CODE) THE UNIFORM MECHANICAL CODE, AS AD AND INTERPRETED BY THE STATE OF NEW MEXICO, CITY OF ALBUQUERQUE, AND THE NATIONAL FIRE PROT ASSOCIATION (NFPA REGULATIONS), CURRENT ADOPTED EDITION, REGARDING FIRE PROTECTION, HEATING VENTILATING AND AIR CONDITIONING SYSTEMS AND ELECTRICAL SYSTEMS, ALL MATERIALS AND LABOR NECESSARY TO COMPLY WITH THESE, REGULATIONS AND ORDINANCES SHALL BE PROVIDED,
- B. THE CONTRACTOR SHALL FURNISH THE ARCHITECT SIX COPIES OF SHOP DRAWINGS FOR APPROVAL AND COMPLETE OPERATING AND MAINTENANCE INSTRUCTIONS COVERING ALL UNITS OF MECHANICAL EQUIPME HEREIN SPECIFIED TOGETHER WITH PARTS LISTS, FURNISH FOUR (4) COPIES OF ALL THE LITERATURE) EACH BE SUITABLY BOUND IN LOOSE LEAF BOOK FORM.
- C. DOMESTIC WATER PIPING 4' AND SMALLER SHALL BE EITHER TYPE 'L' OR 'K' COPPER, ASTM B88.
- D. FITTINGS FOR COPPER PIPING SHALL BE WROUGHT COPPER OR CAST BRASS CONFORMING TO ANSI B16.22 B16.23, WITH 95-5 SOLDER JOINTS ABOVE GRADE AND SILVER SOLDER JOINTS BELOW GRADE.
- E. DOMESTIC WATER PIPING SHALL BE INSULATED WITH 1' (COLD WATER) AND 1-1/2° (HOT WATER) THICK R-4(M FIBERGLASS PREFORMED PIPE INSULATION WITH ALL SERVICE JACKET (ASJ). FITTINGS SHALL BE FINISHED FITTING MASTIC REINFORCED WITH FIBERGLASS FITTING TAPE AND FINISHED TO A SMOOTH SURFACE.
- F. ALL NEW WATER PIPING SHALL BE CHARGED WITH A CHLORINE SOLUTION CONTAINING NOT LESS THAN 50 AVAILABLE CHLORINE, THE SOLUTION SHALL REMAIN IN THE PIPING FOR A PERIOD OF 24 HOURS, DURING WATER VALVES SHALL BE OPENED AND CLOSED TO PERMIT A SMALL FLOW OF THE SOLUTION, AT THE END OF HOURS, THE SOLUTION SHALL BE TESTED AND MUST CONTAIN A RESIDUAL OF AT LEAST 5-10 PPM CHLORIN SYSTEM SHALL THEN BE DRAINED AND FLUSHED TO PROVIDE SATISFACTORY POTABLE WATER BEFORE FIN CONNECTION IS MADE TO THE EXISTING DISTRIBUTION SYSTEM,
- G. SOIL, WASTE, AND VENT PIPING BELOW SLAB ON GRADE SHALL BE SCHEDULE 40 DWV-PVC,
- H. DIELECTRIC INSULATING FITTINGS SHALL BE PROVIDED TO CONNECT DISSIMILAR METALS, SUCH AS COPPE TO FERROUS METAL PIPE.
- I. GAS PIPING SHALL BE SCHEDULE 40 BLACK STEEL. ALL PIPING 2° AND SMALLER SHALL HAVE THREADED FIT AND ALL PIPING LARGER THAN 2' SHALL HAVE WELDED FITTINGS. ALL PIPING SHALL BE INSTALLED AND TES THE REQUIREMENTS OF NFPA 54.
- J. ALL PIPING SHALL BE RIGIDLY SUPPORTED FROM THE BUILDING STRUCTURE BY MEANS OF HANGER ASSEM PROPERLY SELECTED AND SIZED FOR THE APPLICATION IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND SPECIFICATIONS.
- K. BEFORE ANY INSULATION IS INSTALLED OR BEFORE PIPING IS COVERED OR ENCLOSED, ALL PIPING SYSTEM SHALL BE TESTED AND PROVEN TIGHT 150% OF THE MAXIMUM SERVICE PRESSURE WHICH THE PIPING SYSTEM WILL BE REQUIRED TO HANDLE. PIPING SYSTEM TESTS SHALL BE AS SPECIFIED IN THE APPLICABLE SECTIO THIS SPECIFICATION, ALL TESTS SHALL BE WITNESSED AND APPROVED BY THE ARCHITECT AND THE AHJ AS REQUIRED,
- L. GATE VALVES 2' AND SMALLER, CLASS 125 VALVES 2° AND SMALLER SHALL BE CAST OF ASTM B-62 BRONZE 125 CONSTRUCTION, SOLID DISC, RISING STEM, GLAND PACKED, NON-ASBESTOS PACKING, MILWAUKEE 148 (THREADED), OR EQUIVALENT MILWAUKEE 149 (SOLDER), OR EQUIVALENT
- M. BALL VALVES 2° AND SMALLER SHALL BE CAST OF ASTM B-62 BRONZE, CLASS 150 CONSTRUCTION, 600 PSI Y TWO-PIECE BODY, CHROME PLATED BALL, BLOWOUT PROOF STEM, REINFORCED TFE SEATS, NON-ASBEST PACKING. MILWAUKEE BA-100 (THREADED) OR EQUIVALENT. MILWAUKEE BA-150 (SOLDER) OR EQUIVALENT.
- N. VALVES INSTALLED ON INSULATED SERVICES SHALL BE PROVIDED WITH EXTENSIONS, AS REQUIRED, SUCH OPERATOR DOES NOT INTERFERE WITH INSULATION OR INSULATION JACKETING, CUTTING OR NOTCHING OF INSULATION OR BENDING OF HANDLES SHALL NOT BE PERMITTED,
- O. NATURAL GAS VALVES 1' AND SMALLER' BRONZE NATURAL GAS COCK, WALWORTH NO. 590 (SQUARE HEAD) WALWORTH 591 (FLAT HEAD), OR EQUIVALENT.
- P. NATURAL GAS VALVES 1-1/4' AND LARGER' LUBRICATED PLUG VALVE, CAST IRON CONSTRUCTION, 175 PSIG THREADED CONNECTION FOR VALVES 2' AND SMALLER, CLASS 125 FLANGE CONNECTIONS FOR VALVES 2-1, LARGER, LEVEL HANDLE OPERATOR. WALWORTH NO. 1796 (THREADED), OR EQUIVALENT WALWORTH NO. 17 (FLANGED), OR EQUIVALENT
- Q. PLUMBING FIXTURES BY ELJER, AMERICAN STANDARD, CRANE, ELKAY, KOHLER, OR EQUIVALENT WILL BE ACCEPTABLE IF, IN THE OPINION OF THE OWNER, THEY ARE EQUAL TO THOSE SPECIFIED ON THE DRAWING VITREOUS CHINA AND ENAMELED CAST IRON FIXTURES SHALL BE WHITE, UNLESS OTHERWISE INDICATED O DRAWINGS. THE MATERIAL USED FOR PLUMBING FIXTURES SHALL BE OF NON-ABSORPTIVE ACID-RESISTAN MATERIAL OF VITREOUS CHINA, ENAMELED CAST IRON OR STAINLESS STEEL, EACH WATER SERVICE MAIN, MAIN, RISER AND BRANCH TO A GROUP OF FIXTURES SHALL BE VALVED OR AS OTHERWISE SHOWN ON THE DRAWINGS TO PROVIDE MORE STRINGENT REQUIREMENTS. STOP VALVES SHALL BE PROVIDED AT EACH FIX ONE PIECE CHROME PLATED ESCUTCHEONS SHALL BE INSTALLED ON ALL WATER PIPING AND TRAP CONNE AT WALLS OR BASE CABINETS, ALL EXPOSED CONNECTING PIPING AND MATERIAL SHALL BE CHROME PLATE
- R. WATER HEATER TEMPERATURE CONTROLS SET POINT' WATER HEATING EQUIPMENT SHALL BE PROVIDED V CONTROLS TO ALLOW A SET POINT OF 110°F FOR EQUIPMENT SERVING DWELLING UNITS AND 90°F FOR EQU SERVING OTHER OCCUPANCIES. THE OUTLET TEMPERATURE OF LAVATORIES IN PUBLIC FACILITY RESTROCT SHALL BE LIMITED TO 110°F,
- S. WATER HEATER PERFORMANCE EFFICIENCY RATING' WATER HEATING EQUIPMENT AND HOT WATER STORA TANKS SHALL MEET THE REQUIREMENTS OF 2012 IECC TABLE 504.2. ELECTRIC WATER HEATERS SHALL HAV (0,97-000132X GALLONS) = (EF)EFFICIENCY FOR <12KW, GAS FIRED WATER HEATERS SHALL HAVE AN 80% EFFICIENCY FOR 75,000 BTU/H AND GREATER,
- T. WATER HEATER HEAT TRAPS' WATER HEATING EQUIPMENT NOT SUPPLIED WITH INTEGRAL HEAT TRAPS AN SERVING NONCIRCULATING SYSTEMS SHALL BE PROVIDED WITH HEAT TRAPS ON THE SUPPLY AND DISCHA PIPING ASSOCIATED WITH THE EQUIPMENT,
- U. WATER HEATER SHALL BE ANCHORED OR STAPPED TO RESIST HORIZONTAL DISPLACEMENT DUE TO EARTH MOTION, STRAPPING SHALL BE AT POINTS WITHIN THE UPPER ONE-THIRD (1/3) AND LOWER ONE-THIRD (1/3) VERTICAL DIMENSIONS, AT THE LOWER POINT, A DISTANCE OF NOT LESS THAN 4' SHALL BE MAINTAINED AB CONTROLS WITH THE STRAPPING.

	PLUMBING LEGE	ND	PLUMBING GEN
OF THE OPTED ECTION AND AND INIMUM AND AND AND AND AND AND AND AND AND AND	CW HW HWR SS CW HWR SS CW CW CW CW CW CW CW CW CW CW	DOMESTIC COLD WATER (CW) DOMESTIC HOT WATER (HW) HOT WATER RECIRCULATING (HWR) WASTE (W) PIPE IN SLEEVE VENT (V) EXISTING COLD WATER (CW) EXISTING HOT WATER (CW) EXISTING HOT WATER RECIRCULATING (HWR) EXISTING HOT WATER RECIRCULATING (HWR) EXISTING SANITARY SEWER EXISTING VENT DROP RISE BRANCH CHECK VALVE GATE VALVE VTR (VENT THROUGH ROOF) WALL CLEAN OUT (WCD) BALL VALVE VALVE IN RISER BALANCING VALVE HOT WATER CIRCULATOR (HWC) EXISTING CONNECT TO EXISTING EXISTING TO REMAIN FINISHED FLOOR CLEAN OUT (FCD)	<ul> <li>A. ALL PIPING SHALL BE SHALL BE INSTALLED</li> <li>B. ALL BRANCHES SHALL SHALL BE FURNISHE LOCATE ADDITIONAL</li> <li>C. ALL PIPING SHALL PI CENTRACTOR SHALL DRAWINGS.</li> <li>D. CARE SHALL BE TAKI ABEVE CEILING, THIS CENTRACTER AND S THIS CONTRACTOR SE</li> <li>E. NO WATER PIPING SH AND LOCATED AS CL AND EXTERIOR OF W</li> <li>F. ALL TRENCHING AND</li> <li>G. SECURE ALL PIPING</li> <li>H. PIPING SHOWN SCHE TRADES.</li> <li>I. ALL LOCATIONS WHE PIPE SLEEVE ONE PIN EXTENSION REQUIRE</li> <li>J. THE CONTRACTOR S ADEQUATE CLEARAN CEILING EQUIPMENT CEILING SPACE.</li> <li>K. PIPES ON ROOF 1-1/2</li> <li>L. PLUMBING FIXTURES REFER TO THE ARCH ANY DISCREPANCIES</li> <li>M. COORDINATE ALL PIPING</li> <li>P1.00 SPECIFICATI P1.01 PLUMBING S</li> <li>P2.01 PLMBING MA P3.01 PLUMBING S</li> </ul>
W,O,G,, /2' AND 797F S. ALL DN THE T BRANCH E STURE, ECTIONS ED, VITH JIPMENT DM AGE /E A	AB.C ABOVE CEILING AFF ABOVE FINISHED FLOOR AV ACID VENT AW ACID WASTE BFF BELOW FINISHED FLOOR BG BELOW GRADE CA COMPRESSED AIR CD CONDENSATE DRAIN C.I.N.H CAST IRON NO HUB CO CLEANOUT CFF CAP FOR FUTURE CKV CHECKVALVE CW COLD WATER CX CONNECT TO EXISTING (D) PIPE DROP DN PIPE DROP DN PIPE DROP TO NEXT LEVEL DTL. DETAIL (E) EXISTING F FIRE SERVICE FCO FLOOR CLEANOUT FND FOUNDATION DRAIN GCO GRADE CLEANOUT HW HOT WATER HWC HOT WATER HWC HOT WATER HWC HOT WATER CIRCULATION IDW INDIRECT WASTE I.E INVERT ELEVATION IRR IRRIGATION	KES KITCHEN EQUIPMENT SUPPLIER LPG LIQUEFIED PETROLEUM GAS LWCO LOW WATER CUTOFF MAX. MAXIMUM MIN. MINIMUM NG NATURAL GAS (N) NEW N.O NORMALLY OPEN (VALVE) N.C NORMALLY CLOSED (VALVE) OH OVERHEAD POC POINT OF CONNECTION (R) PIPE RISE RIO ROUGH-IN ONLY SHT. SHEET SCW SOFT COLD WATER SOC SHUT-OFF COCK (GAS) SOV SHUT-OFF VALVE TPL TRAP PRIMER LINE UG UNDERGROUND UP PIPE RISE TO NEXT LEVEL US UNDER SLAB UTR UP THROUGH ROOF V VENT VA VALVE VTR VALVE WENT THROUGH ROOF W WASTE WCO WALL CLEAN-OUT	

## NARAL SHEET NOTES

E CONCEALED WHERE POSSIBLE, ALL EXPOSED PIPING WHERE CENCEALMENT IS NOT POSSIBLE D AND PAINTED AS DIRECTED BY THE ARCHITECT.

LL BE VALVED AND ALL VALVES SHALL HAVE UNIENS ADJACENT, ACCESS PANELS AND DOORS ED TO GENERAL CONTRACTER FOR INSTALLATION AND ACCESS TEI VALVES WHERE REQUIRED, L VALVES AS SHOWN ON DRAWINGS, SEE SPECIFICATIONS.

ITCH TO DRAIN AND CONTRACTOR SHALL PROVIDE VALVING FOR SYSTEM DRAINAGE,

DELIVER A MARKED-UP SET OF PLANS TO THE ARCHITECT FOR INCLUSION IN AS-BUILT

EN TO AVOID MECHANICAL DUCTWORK, ELECTRICAL EQUIPMENT AND AIR HANDLING EQUIPMENT S CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ROUTING OF PIPING WITH CEILING SHEET METAL CONTRACTER, RELOCATION OF PIPING AS A RESULT OF POOR COORDINATION BY SHALL BE AT HIS OWN EXPENSE.

HALL BE LOCATED IN OUTSIDE WALLS UNLESS SHOWN TO BE AND THEN PIPING TO BE INSULATED LOSE AS POSSIBLE TO INSIDE OF WALL CAVITY WITH ADDITIONAL INSULATION BETWEEN PIPING VALL.

D BACKFILL FOR PIPING SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR.

TO WALLS FOR A RIGID INSTALLATION WITH UNISTRUT BRACKETS AND GASKETED PIPE CLAMPS. EMATICALLY FOR CLARITY, ACTUAL PIPE REUTING TO BE COORDINATED IN THE FIELD WITH ALL

ERE PIPES ARE INSTALLED THRU A STEM WALL OR FOOTING SHALL HAVE A SCHEDULE 40 STEEL IPE SIZE LARGER IN DIAMETER EXTENDING 12" BEYOND BOTH SIDES OF FOOTER/WALL. (NO ED FOR WATER ON INTERIOR SIDE WHERE PIPE RISES NEXT TO WALL).

SHALL BE RESPONSIBLE FOR COORDINATING THE INSTALLATION OF THE PIPING TO ALLOW NCE OF LIGHTING FIXTURES AND DUCTWORK AND TO AVOID STRUCTURAL MEMBERS AND OTHER I. THE CONTRACTOR SHALL COORDINATE WITH ALL OTHER TRADES TO AVOID CONFLICTS IN THE

2" AND SMALLER SHALL BE SUPPORTED 8'-0" OC.

S SHALL BE INSTALLED AT HEIGHTS SHOWN ON ARCHITECTURAL PLANS. THE CONTRACTOR SHALL H DRAWINGS FOR ROUGH-IN LOCATIONS OF PLUMBING FIXTURES. THE CONTRACTOR SHALL BRING S TO THE ATTENTION OF THE A/E.

PE ROUTING WITH STRUCTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS.

# SHEET INDEX

IONS, ABBREVIATIONS, LEGENDS, NOTES & INDEX SITE PLAN AIN FLOOR SCHEDULES & RISER DIAGRAMS







KEY PLAN

### 1 KEY NOTES

- 1. CLEANOUTS AS REQUIRED BY CODE
- SEWER LINE TO DROP 1/4" PER FOOT AS REQUIRED BY CODE. CONTRACTOR TO VERIFY INVERTS.
   CONNECT TO NEW WATER DISTRIBUTION SYSTEM. SEE
- DOMESTIC WATER RISER DIAGRAM FOR DETAIL 2/P3.01.

### GENERAL NOTES

1. CONTRACTOR TO FIELD ROUTE SEPTIC AROUND BUILDING. VERIFY EXACT ROUTE WITH OWNER'S REPRESENATIVE PRIOR TO BEGINNING WORK.





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![](_page_8_Figure_2.jpeg)

### 1 KEY NOTES 1ST FLOOR

1. ROUTE DOMESTIC COLD WATER THROUGH CORRIDOR OF EXISTING BUILDING. SEE RISER DIAGRAM FOR MORE INFORMATION.

2. MOUNT WATER HEATER ABOVE CEILING. SEE DETAIL 3/3.01.

### GENERAL NOTES 1ST FLOOR

1. VANITY F4 SUPPLIED AND INSTALLED BY GENERAL CONTRACTOR. THIS CONTRACTOR TO INSTALL FITTINGS.

![](_page_8_Figure_8.jpeg)

### PLUMBING FIXTURE SCHEDULE

FIXTURE NO.	TYPE	DESCRIPTION	COLD WATER	HOT WATER	WASTE –	VENT —
 F—1	 TYPF	WATER CLOSET, FLONGATED, FL MT, FLUSH VALVE, PUBLIC W/WATER HAMMER	 1"			2"
· · · · · · · · · · · · ·	CLOSET	AMERICAN STANDARD, MADERA MODEL 2234.001.020- VITREOUS CHINA				· · · · · <del>· ·</del> · · · · ·
	SUPPLY	SLOAN 8100 SERIES, FLUSH VALVE, BATTERY OPERATED, TOP SPUD, 1.6 GAL/F	LUSH			
F-2	TYPE CLOSET	WATER CLOSET, ELONGATED, FL MT, FLUSH VALVE, HDCP, PUBLIC W/HAMMER AMERICAN STANDARD, MADERA MODEL 3043.001– VITREOUS CHINA	1	· · · · · · · · · · · · · · · · · · ·		2"
	SEAT SUPPLY	BEMIS NO. 1955CT OPEN FRONT WITH COVER, SOLID PLASTIC,W/SELF SUST. SI SLOAN 8100 SERIES, FLUSH VALVE, BATTERY OPERATED, TOP SPUD 1.6 GAL/F	eat LUSH			
 F-3	TYPE	URINAL, WALL MT, 1.0 GAL FLUSH, PUBLIC,	3/4"		2"	1-1/2"
	CLOSET SUPPLY	AMERICAN STANDARD 6590.001, WASHBROOK, 1.0 GPF SLOAN 8100 SERIES, FLUSH VALVE, BATTERY OPERATED, TOP SPUD 1.6 GAL/F	LUSH			
F-4	TYPE ROWI	LAVATORY, HDCP, PRIVATE CULTURED MARBLE TOP BY GENERAL CONTRACTOR	1/2"		 1–1/4"	
	FAUCET	AMERICAN STD. RELIANT 7385.000, SINGLE LEVER HANDLE WITH POP-UP M922901-0020A5 GPM AERATOR				
	SUPPLY DRAIN	DEARBORN BRASS 2712SCW (3/8") ANGLE STOPS WITH SUPPLIES (CHROME) PVC OR ABS 1-1/4" P-TRAP		· · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·
F-5	TYPE BOWL	SINGLE COMPARTMENT, SINK, POLISHED STAINLESS STEEL, PRIVATE ELKAY LUSTERTONE LRAD-1919, 19.5"x19"x6-1/2", 18 GA., 3 HOLES,	1/2"	1/2"		1-1/2'
	FAUCET	MOEN 8278SM, GOOSE NECK SPOUT. GRID DRAIN, CERAMIC DISK CARTRIDGE, METAL LEVER HANDLES, POL. CHROME				
	SUPPLY DRAIN	DEARBORN BRASS 2712SCW (1/2") ANGLE STOPS WITH SUPPLIES (CHROME) DEARBORN BRASS #15 STRAINER & 701–1 17 GA. TRAP W/ C.O.				
F-6	.TYPE BOWL	SINGLE COMPARTMENT, SINK, POLISHED STAINLESS STEEL, PRIVATE ELKAY LUSTERTONE LRAD-1919, 19.5"x19"x6-1/2", 18 GA., 3 HOLES, SELE RIMMING UNDERCOATED 302 SERIES	1/2"			
	FAUCET	MOEN 8278SM, GOOSE NECK SPOUT. GRID DRAIN, CERAMIC DISK CARTRIDGE, METAL LEVER HANDLES. POL. CHROME	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · ·		••••••
	SUPPLY DRAIN	DEARBORN BRASS 2712SCW (1/2") ANGLE STOPS WITH SUPPLIES (CHROME) DEARBORN BRASS #15 STRAINER & 701–1 17 GA. TRAP W/ C.O.		••••••••••••		
		· · · · · · · · · · · · · · · · · · ·		••••••		

HEATER SHALL BE ENERGY STAR RATED.
DOMESTIC HOT WATER SUPPLY. <u>115</u> DEGREES. <u>3/4</u> "
TEMPERATURE/PRESSURE RELIEF VALVE PIPED TO DRAIN PAN. MAINTAIN REQUIRED AIR GAP.
DRAIN VALVE W/ HOSE CONNECTION MAINTAIN REQUIRED AIR GAP.
WATER HEATERS-WH-1
WATER HEATER:A.O.SMITH MODEL NO.: <u>DEL-6</u> _10GAL. STORAGE CAPACITY EA. _16GPH RECOVERY PER 100 DEG. RISE. _1.5_KW ELECTRIC ELEMENT WIRED FOR NON-SIMULATANEOUS OPERATION 120 VOLTS-SINGLE PHASE
3 WATER HEATER DETAIL P3.01 SCALE: N.T.S.

![](_page_9_Figure_4.jpeg)

![](_page_9_Picture_5.jpeg)

TYP. —UNION.TYP.

GALVANIZED STEEL DRAIN PAN BY MECHANICAL CONTRACTOR

- ROUTE DRAIN FROM DRAIN PAN CONCEALED IN WALL, DISCHARGE INTO FLOOR DRAIN, MAINTAIN REQUIRED AIR GAP.

<u>Note:</u> coordinate mounting height W/ all trades TO SEPTIC

![](_page_9_Figure_12.jpeg)

ELECTRICAL ABBREVIATIONS LIST	ELECTRICAL SYMBOLS	GENERAL NOTES:
P         IPOLE (P. 3F. 4P, ETC.)         DCP         ODIVESTIC WATER         HT         HEICHTIN         NEIAN         NATIONAL ELECTRICAL         SW         SWTCH           C         ADOFEE         DEP         DEPLATINE PURP         HTS         HEATING         NEIAN         SKIDLATONE PURP         SWEE         SWE	A       TYPE 'A' WALL MUNITED FIXTURE       UPLEX RECEPTACLE         A       TYPE 'A' CELLING MULTER FIXTURE       CELLING         A       TYPE 'A' CELING MULTER FIXTURE       CELLING         A       TYPE 'A' FILLINGROUT FIXTURE       CELING         A       TYPE 'A' FILLINGROUT FIXTURE       CELING CELING         A       TYPE 'A' FILLINGROUT FIXTURE       CENTROL RECEPTACLE         A       TYPE 'A' FILLINGROUT LIGHT IJ FRAM       CENTROL RECEPTACLE         A       TYPE 'A' FILLINGROUT LIGHT       CENTROL RECEPTACLE         B       TYPE 'A' MUCH RE VITADUL LIGHT       CENTROL RECEPTACLE         COMPTOTERTIELEPHONE DUTLET       CENTROL RECEPTACLE       SUTON         FILLER MICE TELEPHONE DUTLET       CENTROL RECEPTACLE       DISCOMACT SWITCH         FILLER MICE TELEPHONE DUTLET       CENTROL RECEPTACLE       DISCOMACT SWITCH         MUCH BUZZER       FILLE AARN NUNCLATER       DISCOMACT SWITCH         MUCH BUZZER       FILLE AARN SWITCH       FILLE AARN NUNCLATER         MUCH BUZZER       FILLE SWAP SWITCH       FILLE AARN NUNCLATER         MUCH BUZZER       FILLE SWAP SWITCH       CENTROL RECEPTACLE         MUCH BUZZER       FILLE SWAP SWITCH       CENTROL RECEPTACLE         MUCH BUZZER       SWINCH BUTLET       CENTROL RECEPTACLE	<ul> <li>ALL ELECTRICAL WORKS HEREIN SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL BUILDING CODE PROVISIONS OF THE LATEST APPROVED ELECTRICAL CODE. THE LAWS AND ORDINANCES OF THE LOCAL CODE ENFORCING AUTHORITY AND REQUIREMENTS OF THE LOCAL ELECTRICAL TELEPHONE COMPANY AND BUILDILING ADMINISTRATION REQUIREMENTS.</li> <li>THE ELECTRICAL CONTRACTOR SHALL SECURE ALL WIRING PERMIT AND ALL FEES REQUIRED FOR THE WORKS AND FURNISH THE OWNER THE CERTIFICAT OF FINAL ELECTRICAL INSPECTION.</li> <li>THE ELECTRICAL CONTRACTOR SHALL SCURE ALL WIRING PERMIT AND ALL FEES REQUIRED FOR THE WORKS AND FURNISH THE OWNER THE CERTIFICAT OF FINAL ELECTRICAL CONTRACTOR SHALL LEST ANY EXISTING GAIN SERVICE GROUNDING SYSTEMS FOR COMPLIANCE WITH EXISTING CODE. NEW SERVICES SHALL BE GROUNDED IN FULL ACCORDANCE WITH EXISTING CODES AND THESE PLANS AND SPECIFICATIONS.</li> <li>IN CASE OF DISCREPANCY BETWEEN PLANS AND SITE CONDITIONS. SPECIFICATIONS AND REVISIONS CHANGES, THE ELECTRICAL CONTRACTOR SHOULD IMMEDIATELY VERIFY &amp; CONSULT WITH THE ELECTRICAL ENGINEER.</li> <li>ALL LOCATION AND MOUNTING HEIGHTS ARE SUBJECT TO APPROVAL OF ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE IN THE PREPARATION OF ASBUILT PLANS.</li> <li>THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARATION OF SHOP OR CONSTRUCTION DRAWINGS AS REQUIRED BY OWNERS REPRESENTATIVE.</li> <li>THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARATION OF SHOP OR CONSTRUCTION DRAWINGS AS REQUIRED BY OWNERS REPRESENTATIVE. THIS INCLUDES DEVICES AND FIXTURE ELEVATIONS.</li> <li>THE ELECTRICAL CONTRACTOR SHALL LOCATE ALL SPLICING BOXES TO ACCESSIBLE FLACE OR WITH ACCESS PANELS.</li> <li>THE ELECTRICAL CONTRACTOR SHALL LOCATE ALL SPLICING BOXES TO ACCESSIBLE PLACE OR WITH ACCESS PANELS.</li> <li>THE ELECTRICAL CONTRACTOR SHALL LOCATE ALL SPLIC</li></ul>
ELECTRICAL SYMBOL NOTES	SPECIFIC CODE NOTES	<ul> <li>INCREASED BY ONE SIZE.</li> <li>18. THE ELECTRICAL CONTRACTOR SHALL SEAL ALL PENETRATIONS THROUGH WALL CEILINGS AND FLOORS AND RESTORE THE FIRE RATINGS AS REQUIRED.</li> <li>19. THE ELECTRICAL CONTRACTOR SHALL PROVIDE A SET OF RED-LINED AS-BUILT DRAWINGS TO THE OWNER AT THE COMPLETION OF CONSTRUCTION.</li> </ul>
The LIGHTING FIXTURE TYPE IS INDICATED BY AN UPPER CASE LETTER.       Image: Constraint of the Control of the Contro	<ul> <li>FIRE PROTECTION REQUIREMENTS</li> <li>A. PENETRATIONS IN WALLS REQUIRING PROTECTED OPENINGS MUST BE FIRESTOPPED WITH AN APPROVED MATERIAL.</li> <li>1. CONDUITS MAY PENETRATE WALLS OR PARTITIONS, PROVIDED THEY ARE FIRE-STOPPED.</li> <li>2. OPENINGS FOR STEEL ELECTRICAL BOXES NOT EXCEEDING 16 SQUARE INCHES ARE PERMITTED PROVIDED OPENINGS DO NOT AGGREGATE MORE THAN 100 SQUARE INCHES FOR ANY 100 SQUARE FEET OF WALL OR PARTITION.</li> <li>3. OUTLET BOXES ON OPPOSITE SIDES OF WALLS OR PARTITIONS MUST BE SEPARATED BY A HORIZONTAL DISTANCE OF 24 INCHES.</li> <li>B. LIGHT FIXTURES AND OTHER APPARATUS SUPPORTED BY THE ACOUSTICAL CEILING GRID MUST MEET THE REQUIREMENTS OF NEC SECTION 410.16, MEANS OF SUPPORT.</li> <li>C. RECESSED LIGHTING FIXTURES INSTALLED IN FIRE RATED CEILING ASSEMBLIES SHALL BE FIRE RATED FIXTURES BEARING THE UL FIRE RATED LABEL. FIXTURES SHALL BE INSTALLED IN ACCORDANCE WITH THE UL FIRE RESISTANCE DIRECTORY, AND SHALL INCLUDE A FIRE RATED ENCLOSURE INSTALLED OVER THE FIXTURE THAT MEETS THE REQUIREMENTS OF THE UL FIRE RESISTANCE DIRECTORY.</li> </ul>	ELECTRICAL SHEET INDEX ELECTRICAL ABBREVIATIONS, SYMBOLS, NOTES AND INDEX E1.00 ELECTRICAL OVERALL POWER DISTRIBUTION PLAN E2.01 ELECTRICAL UIGHTING PLAN E3.01 ELECTRICAL MAIN LEVEL POWER PLAN E3.02 ELECTRICAL ROOF POWER PLAN E4.01 ELECTRICAL SCHEDULES, 1-LINE DIAGRAM & DETAILS E5.01 EXISTING ELECTRICAL SERVICE (REFERENCE) E6.01 ELECTRICAL SPECIFICATIONS February, 2018 McEtheney Architects, P.C. EI STRIAL RING, INC.
CIRCUIT DESIGNATION IS INDICATED BY A NUMBER(S) ADJACENT TO THE SYMBOL. EXAMPLE: MOTOR SF-1; 3 PHASE CONNECTION TO CIRCUITS 2, 4, 6.	3210 23 Rio Rancho Phone (50 Cell (505) EMAIL: enginee	AddItion AddItion Mountain Side Church of Christ 12300 Indian School NE Albuquerque, New Mexico 87112

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					LIGHT F	IXTUR	E SCHE	EDULE			
			DESCRIPTION	ELECTRIC	CAL DATA	LAMP	DATA	[	BASIS OF DESIGN		NOTES
QII	n e i	ID	DESCRIPTION	VOLTAMP	VOLTAGE	QTY	WATT	MANUFACTURER	CATALOG #	REMARKS	NULES
19	$\square$	А	INDIRECT LED LAY-IN	30	120	1	30	COLUMBIA	LCAT24-35XX-X-EDU		
7		Α1	INDIRECT LED LAY-IN EMERGENCY	30	120	1	30	COLUMBIA	LCAT24-35XX-X-EDU-ELL14		
6	0	В	RECESSED 6" LED	24	120	1	24	PRESCOLITE	LF6SL-6LFSLXX-35K-B24		
2		Β1	RECESSED 6" LED EMERG	24	120	1	24	PRESCOLITE	LF6SL-6LFSLXX-35K-B24-EMR		
2		С	WALL MOUNTED LED VANITY LI	24	120	1	24	COLUMBIA	CWM4-35W-SM-FR		
4	$\bigotimes$	ΕX	LED EXIT	5	120	1	5	DUALLITE	EVEURWEI		
1	Ş	EX1	EMERGENCY LIGHT	42	120	1	42	DUALLITE	PG		

![](_page_12_Figure_1.jpeg)

1 ELECTRICAL LIGHTING 1ST FLOOR <sup>(1)</sup> <sup>(1</sup>

NDRTH

![](_page_12_Figure_5.jpeg)

## GENERAL NOTES (LTG 1ST FLOOR)

1. COORDINATE LIGHTS WITH CEILING GRID AND MECHANICAL.

![](_page_12_Picture_8.jpeg)

						ELECTR	ICAL MECHANICAL EQUIPME	NT SCHEDULE						
ID	KEY	ELECT MOCP	RICAL DATA	LOCATION			BASIS OF DESIGN		FED FROM	CKT #	LOAD	DISC C	ONTROL	REMARKS NOTES
		AMPS	VULTAGE		MANUFACTURER	MODEL #	DESCRIPTION	CONDUIT & WIRE SIZE						
EF-1	N	20	208/1/60	MEN'S BATHROOM CEILINGE	FANTECH	FG-8	BATHROOM EXHAUST FAN		E1	15	400	YES (	OTHERS	
RTU-1	() ()	60	208/3/60	ROOF	BRYANT	582JP06A125	ROOFTOP UNIT	3/4"C, 1"C, (4) #6 THHN + GND	E1	21,23,25	11100	YES (	DTHERS	
RTU-2	() ()	50	208/3/60	ROOF	BRYANT	582JP06A125	ROOFTOP UNIT	3/4"C, 1"C, (4) #6 THHN + GND	E1	22,24,26	11100	YES (	DTHERS	
WH-1	N/	20	208/1/60	WOMEN'S BATHROOM CEILING	A O SMITH	DEL-6	WATER HEATER	3/4"C,(2)#12 THHN + GND	E1	7	1600	YES (	DTHERS	

![](_page_13_Figure_1.jpeg)

![](_page_13_Figure_3.jpeg)

A

![](_page_13_Figure_5.jpeg)

## 1 KEY NOTES (1ST FLOOR POWER)

### 1. ABOVE COUNTER

 PROVIDE 4"X4" BOX WITH SINGLE GANG BLANK COVER. PROVIDE 3/4" CONDUIT UP TO EXPOSED CEILING. TYPICAL ALL SUCH.

![](_page_13_Picture_9.jpeg)

![](_page_14_Figure_0.jpeg)

10/22/2019 2:08:33 PM

1 ELECTRICAL POWER ROOF PLAN E4.02 SCALE: 4' 0'

NORTH

![](_page_14_Figure_5.jpeg)

## 1 KEY NOTES (ROOF)

1. VERIFY LOCATION ON ROOF WITH OWNER'S REPRESENTATIVE PRIOR TO ROUGH-IN.

## GENERAL NOTES (ROOF)

1. PROVIDE MAINTENANCE WEATHERPROOF DUPLEX OUTLET(S) FOR ROOF MOUNTED EQUIPMENT ACCORDING TO CODE.

![](_page_14_Figure_10.jpeg)

![](_page_15_Picture_0.jpeg)

![](_page_15_Figure_1.jpeg)

- 2 4/0 AWG COPPER GROUND CONDUCTOR ENCASED IN CONCRETE.
- (3) 4/0 AWG BARE COPPER GROUND CONDUCTOR.
- (4) 19mm x 3050mm (3/4" x 10'-0") LONG COPPER-CLAD GROUND ROD DRIVEN WITH TOP 300mm (12") BELOW GRADE.
- (5) 2/0 AWG INSULATED COPPER GROUND CONDUCTOR IN 30mm CONDUIT.

![](_page_15_Picture_6.jpeg)

![](_page_15_Figure_8.jpeg)

![](_page_15_Figure_9.jpeg)

CONDUIT PENETRATION THRU EXISTING ROOF

![](_page_15_Figure_10.jpeg)

![](_page_15_Figure_11.jpeg)

3 COND E5.01 SCALE:

![](_page_15_Figure_12.jpeg)

2 CONDUIT PENETRATION THRU NEW ROOF e5.01 scale;

### ) 1-LINE DIAGRAM KEY NOTES

1. 3"C, (4) 350 KCMIL AL + 4 AL GND

![](_page_15_Figure_16.jpeg)

![](_page_15_Figure_17.jpeg)

10 1 Ð #1 ÷., Ò -0 Ð E PANEL PANEL PANEL MDB D° C S 6 (4) $\mathcal{D}$ DIn UPPER LEVEL Ð  $\leq 1$ T PANEL A  $\bigcirc$ LOWER LEVEL POWER RISER DIAGRAM E NO SCALE 사람이 가지는 것은 것을 수 없습니다. 1 E O STUB FOUR I' CONDULTS INTO CALING PANEL LESCRIPTION CCT. NO. MINING TURE LOAD DESCRIPTIC DEXTEND AI RE CONDUIT UP FOLE NY FAHEL "MOP" SPARE ALL STAND-OFF DEACKETS, KIEATTER-HEAD, ETC., FER FAM REQUIREMENTS 30A/3F 12 120/2081,30 4W 1200 A N.L.O. SURFACE HOUHTED, BOTTOM FEED, GRAVING 3,4 60A/3P 3 4" COFCRETE ENCASED DUCT PER PRIM REQUIREMENTS SPARE EAR, 42 TOAL PLES FUSIBLE SHITHBOATO 5 150A RAHEL "C" 2004/2P (A) CONCRETE POO PER' PIM DRW'G#D5-7-165 000 A/3P 200 A FAHEL 'D" 6 TROHOTOMER BY PHN. POMOE 6' 7,8,9,10 200A/3P 125A MECH. SPACES OF CT. EHCLOSLIPE AND NETERING EDUP-NENT PER PAN DEN'S #05-19-24.0 PAHEL "A", SPARE 400A/30 805A 11, 12 0 DEALEL RUH OF 3-35" WHOLE TO EAGT CONDITION FOLK: #500 NON AND ONE # 36 THY CONDUCTORS PANEL DESCRIPTION CCT. NO. C/B WIRE LOAD DESCRIPTIO ISON, 1000 ANP. 3P & SH FIGURE BOLTSD ROOCHEE SHITCH IN NEWA SC ENCLOSEDER. ALLE W 1000 AND BUSS KOP-C CLOSENT LINITHS FUCES. PAHEL "A" 150/2087, 30,4-W 2955 A. V. LO. SLEGACE VOLHED BOTTON FRED, GROUNT SAR, TWO SECTION, 60 TOTAL POLES HIGHTING, PECEPTIC 24.240 20A/1P #12-AND SALARS! 25,28,29 50A/20 \$6 avel, stoves (9) OHE # 3/0 BED CU 14 1" CONDUT DE FOUL MOANG AND OFFIC 32,34,360 20A/1P #12 FIMPS 28" CONTRACT. 30, 23 19 space-THAT CUL COHOLCTORS IN 26 CONDUCT 34,40,45 PAMPS, MECHAHIKA 20A/37" #12-44,40,48 THEL 60 10 SPACE . (3) FRITEHD FMPTY 2'4" CONDUIT AG INDICATED ON THE SITE FLAT (STRETEN) FOR FLATHEE CONSPLICTION. 1-20,22,24, 20A/18 #12-16HTHG, RECEA AND SPRES 20A/3P #12 HEATER. SPACE IP 29 304/3P #10 EVAP COOLER PANEL "0" 130/10084, 54, 4W 235 A. M.L.O. SHERKE MOLINED, 5000M PEED, OROUND-BAF, 42 DONL PRES 1TH2412,14 HUHTHG. CELEPTAC 20A/1P #12 20,24-34 15 20A/3P #17 HEATER 9 MECHANICAL TOAY2P #4 IP SACE 24 THRU 42 D POWER RISER NOTES 60A/30 #6 23 DIVINER BOILING LOAD SUMMARY - 120/208V - 30 -4W. CONNECTED 2915 KVA 1 1 22 KVA EST. DEMAND 281 KVA 114 KVA RHEL 'MDP' FUNKE 395 KVA 417 KYA ENERGY CONSERVATION W. DEAN POWELL P.E. #1883 THE PLANS AND SPECIFICATIONS AS DESIGNED ARE IN CON-47, 170 KATTS FORMANCE WITH THE STATE OF NEW MEXICO ELECTRICAL CODE 25,050 SQ.FT. ARTICLE 290 ENERGY CONSERVATION. LIGHTING BUDGET: SHORT CIRCUIT AVAILABILITY BASED ON MAXIMUM BUILDING TRANSF. S.C. LET THRU WITH UNLIMITED PRIMARY S.C. CURRENT. ASSUME BUILDING TRAFFORMER = 500 KVA TRANSFORMER INFERINCE (%2) = 7% S.C.A. = 56,708 A.C. MAH DISCONNEST (HHE SDE) S.C.A. = 23,500 A.C. MAH DISCONNEST (HOAD SDE) S.C.A. = 22,700 A.C. PAHEL NOP S.C.A. = 6400 AAC LOAD SDE OF LACCEST SHITCH IN MOP PROVIDE BLASS LIMITROADS 95 FOR SWITCHES 5,6,11,12 PROMOE BLESLOW PEAK RK-1 FUSES FOR SHUTCHES 1,3,4,7,8 PROVIDE MOP MIHIMIAN 200,000 AIG BRACIAGO PROVIDE MINI, 10,000 AND BRACIAG ATO AIG FOR ALL OTHER PAHELSS C PANEL SCHEDULE (199**%**)))

PΖ  $\sim$ 

	<b> </b>			
	SYMBOL	DESCRIPTION	Туре	DESCRIPTION
	Ø	CEILING OUTLET AND FIXTURE.	A	2'24' RECE
	<b>®</b> ⊣	BRACKET OUTLET AND FIXTURE.		TO HILLPH
	181	CEILING NOUNTED EXIT FIXTURE AND OUTLET WITH DIRECTIONAL ARROWS AS INDICATED.		al al survey
	Š	WALL BRACKET OR RECESSED EXIT FIXTURE AND OUTLET WITH DIRECTIONAL ARROWS AS INDICATED.		D HILLANE
	ē C	FLUORESCENT OUTLET AND. FIXTURE.		المعتدر مستاد المشار
		POLE HOUNTED FIXTURE.		UNHIT BIR
	→ <del>A</del>	EVAPORATIVE COOLER SWITCHES, OHE ON-OFF For Fan And One "On-OFF" For Punp.		
	<del>B</del>	SINGLE POLE WALL SWITCH. FLUSH HOURTED UP 48" UNLES OTHERWISE INDICATED.	b	FLIDRESCEL
	- <del>11</del> -	FILOT SWITCH.		
	- <del>10</del> 1-	THERNAL SWITCH, WEATHERPROOF IF ENSTALLED OUTSIDE.		TO WILLIAM
	E_1	JUNCTION BOX FLUIN IN FLOOR, MUBBELL FB-2527.		EREGED
	$\bullet$	FLUSH FLOOR OUTLET, HUBBELL FB-2503 BOX WITH #8-6290 RECEPTACLE AND ALL ACCESSORIES REGULARD FOR A COMPLETE INSTALLATION.		SATURY HY SIMILAR TO
	0-	JUNCTION BOX FLUSH IN WALL, HEIGHT AS INDICATED WITH CONNECTION TO EQUIPMENT.		High Ports
		OUPLEX GROUNDING TYPE CONVENIENCE OUTLET INSTALLED WITHIN CASE OF ELECTRIC WATER	6	POLYCAPSON
	8	OUPLEX CONVENIENCE OUTLET, UP 15" OR AS INDICATED.		# 4 PGO-
		250 YOLT, 3 WIRE RANGE TYPE OUTLET, FLUSH MOUNTED AT HEIGHT INDICATED AND FURNISHED FOR RATED AMPERAGE.	H	SMILAR DI
		and a second second A second secon A second secon		
			4	TO HILLIAM
				at at reason
				KILLIDMS +
		THERMOSTAT, UP 48- UNLESS OTHERWISE INDICATED. Photocell lighting controller, precision #T-15 mounted on \$" Rigid Conduct Ryusbed		IVAL PECE
		UP 12" ABOVE ROOF, WITH WINDOW FACING NOATH.	M	SIMILAR TO
		TELEPHONE OUTLET, UP IS' ON AS INDICATED.		
42-5		FIRE ALARN MANUAL PULL STATION, UP NO", SEE DRAWINGS		HHITE OPAL
		FIRE ALARN (AUDO VIELOL DEACE) UP 7'-8" TO CENTER-		
		BPECIAL CABINET, TELEPHONE TYPE OR AS NOTED.	P	PORCEIAIH L
		POWER DISTRIBUTION PANEL.		
	6	NOTOR CORRECTION WITH NP INDICATED.		616HLIGHTE
		NOTOR CONTROLLER, SIZE AND POLES FOR NOTOR FUENISHED.		HUBEELL #
		OUTDOORS.		REGELLE
	Ģ	MOTOR CONNECTION FOR FRACTIONAL HP NOTOR (LESS THAN 1/2 MP). PROVIDE THERNAL O.L. Switch Adjacent to all notors unless switch is shown elsewhere on plan.		TO MCGRAN-1 N # PS BIIS
		JUNCTION BOX INSTALLED ABOVE THE CEILING WITH FLEXIBLE CONDUIT CONNECTION TO LAY-IN	6	PECESSED OPAL LEHS
		WIRE GROUND.		# 1015 HS-3
		AUDIBLE ALARM. WIRING AND CONDUIT AT INDICATED WITH SIN MINIMUM FOR SIGNAL AND SIZ FOR	+	GEMI-RECE
		BRANCH CIRCUIT IN WALLS OR CEILING WITH CONDUCTORS INDICATED.		TO ELIPTIPA
	- 1-1-3	HOME RUN TO PANEL WITH BRANCH CIRCUIT HUMBERS INDICATED.	Y	ALZAK REF
Kales,		TELEPHONE CONDUIT, MINIMUM S/4" WITH PULL WIRE.		PRESCOLITE
	<b>1</b>	IT CONDUIT WITH PULL WIRE TO TELEPHONE TERMINAL CABINET.		OHIT
		TIC MARKS REFERENT HELITEAL, HOT, SHITCHLES AND GRAINS RESPECTIVELY		
ES,AD		OF HALLYDGH	Ý	6" APERTUR ALZAK REFL
	<u> </u>	I" SOUND CONDUIT NY FULL HIPE		PRESCALTE
			-	EFEALL *
				PREDCOLITE
	BSYN	IBOL LEGEND	AB	AHO OPEN
				(a) A second se second second sec
= 1.9 4/50,FT.				
				THILL HEAD
			<b>X</b>	ENT FROM LON
			<b>V</b>	STEACIL, KI
			en e	
				TATURE S
				· · · ·

	LAMPS	MOUNTING	
#5227-RKA	4/F40/CK		
50 TROFER GIMILAR # 5292-RKA	3/=40/CK1	LAY-IN	
	2/F40/CH	SURPCE	CONSULTANTS
HTERCECTION 1/241 W HEDPAROUND LENS KEELE # CUB 240	affro/cr1	SUPTICE	
>FO TROFFER SMILAR > #522-23-REA	2/F40/Cr+	LATIN	14 16 15 15 15 15 15 15 15 15 15 15 15 15 15
	1/100H/HPS	PECESEO	
2E GODILIM, WALL FACK W E LEHS, H/ WIDE LIGHT SMILLAR TO DEVINE	Noo/HPS	SURFACE	
0 HPS AT LIGHT FIXTURE X-0.#FH39-601	2/250 N INFRARED HEATLAND	PERFED	
=0 TROPHER_ SMILAR # 5260- PKA	afaou/crl	1-27-1N	
HE FIXILLE SIMILAR TO	2/=40/cki	SLEFACE-	
-SED TROFFER JENJAMIN AGA-2224-4	21F40/CW	LAY-IN	
INCATOESCENT N/ DROP LEAS SIMILAR 10 #90HF-3	Vicoul/if	E-ECE5SEP	
NP HADER	1/100KV/1F	SHRFACE.	
WHDAL PROOF LEHSED MP SMILAR TO	1/120H/ 1342 56/KHE	GLIEFFICE	
BLE NOLHITED HIGH DOLLM FOTHER SIMILAR	1/400Kl/HPS	PAE-MOUHTED	
HERE POLE	1/150/1F	RELECTED	
ED TUHGATEH HALOCEH UHIT NY HOO SIMILAR HE DOI-T	NISON/ ALARTZ	reseo	
OI APERTURE H/ OFFAR ECTOR SMILLAR TO #1059-746	2004/1F	PECEPCEO	
		CEILING SFC.	HIST HED
COVENIESHT W/ CLEAR CODE SMILLOR TO	1504/14	PEPSED	P CH SC
5" APERTLIKE AHP	504/R-20	RECESSED	E I CHO
498:HF COR H/ 4" OPERTURE L'SH TRUM SIMILOR TO #20HF	Rø	SURFACE	PHAS CHUF
			DATE 4/29/85
			REVISIONS
MERCENCY LIGHTHGUHT	72 W	SLIFFACE	
SIMILAR TO PLAL-LITE H/ RED LETTERS, KHITE TE HOLGING, RAER PACK	REQUIRED	PER DARHHOS February 2018	SHEET
		© 2018 McElheney Architects, P.C.	<b>IV DE DENEY</b>
	IEI LICTITAT	SB SEN ME ZICO TA	9232 HILTON AVE NE ALBUQUERQUE, NM 87111 V: 50 <u>5.262.0193</u> F: 505.881.9114 E: bobmacarch@
ENGINI 3210	EERING, II 23rd Ave SF	VC.	Addition
Rio Ran Phone	cho, NM 8712 (505) 246-433	4 David VELE	12300 Indian School NE

E5.02

### **DIVISION 16 ELECTRICAL SPECIFICATIONS**

PART 1 - GENERAL

#### 1.01 GENERAL CONDITIONS

A. The general conditions and the special conditions of the architectural specifications shall be considered as an integral part of these electrical specifications.

1.02 DRAWINGS AND DOCUMENTS

A. These specifications and the corresponding drawings form a complete set of plans for the electrical work for this project. What is required by either shall be as binding as if required by both.

1.03 SCOPE OF WORK

- A. The contractor shall furnish all labor, materials, tools, skills, and equipment for the installation of, and install the electrical equipment and the electrical wiring in and about the project; all as shown on the drawings and/or as described in these specifications
- B. Where connections are to be made to equipment furnished by others, the contractor shall obtain exact location of connection from the equipment supplier.
- C. All circuits specified herein are designed on the basis of load requirements and control procedures as indicated. The contractor shall make the necessary changes to the circuits and control equipment where motors, appliances, and devices furnished by the contractor have other ratings than those indicated. D. The omission of express reference to any parts necessary for, or reasonably incidental to, the complete
- installation shall not be construed as releasing the contractor from furnishing such parts.

#### 1.04 CODES, INSPECTIONS, AND FEES

- A. The completed electrical installation shall comply with the latest edition of the national electrical code as well as all applicable federal, state, and local codes, regulations, and standards, including interpretations of these by appropriate authorities having jurisdiction. This shall not be construed to permit a lower grade of construction where the drawings and specifications call for workmanship or materials in excess of code or regulatory requirements.
- The work specified herein shall be subject to inspection and approval by authorized representatives of the national board of fire underwriters, state and local authorities having jurisdiction, and the engineer. The contractor shall make the necessary arrangements to have the electrical work inspected by the appropriate inspector(s) and shall provide two (2) copies of every final signed "certificate of inspection" to the owner. C. The contractor shall obtain and pay for all licenses and permits, and allfees and charges for all work
- installed by the contractor. The contractor shall also pay all fees and charges for connection to electric services.

#### 1.05 INSPECTION OF SITE

A. Before submitting a proposal for the work contemplated, each bidder shall examine the site and become familiar with all existing conditions and limitations. No extra compensation will be allowed because the contractor misunderstood the amount of work involved or lacked knowledge of any existing condition at any location.

#### **1.06 EXISTING WIRING AND EQUIPMENT**

- A. All existing wiring, fixtures, and equipment shall remain as installed except where removal is called for in the drawings and specifications or is made necessary by the alterations to the building structure in the remodeled areas. All conduits and wiring uncovered by other contractors within the existing building walls or structure and/or requiring relocation to complete the remodeling shall be relocated or rerouted as part of this contract. For example, where the general contractor removes a wall, or cuts a door or window opening into an existing wall, any conduits uncovered shall be rerouted by electrical contractor at no additional cost to the owner.
- B. All existing work altered during the course of remodeling shall be placed in safe operating condition and shall remain in service unless otherwise noted, and shall be restored to satisfactory operating condition Connections to and extensions from existing wiring shall be installed in the same manner as called for in new wiring. Where conduit or outlets are removed, the remaining runs of raceway shall be reconnected to form continuous raceways with new conductors installed from last remaining outlet box. Wherever it is necessary to withdraw less than all existing conductors from existing raceways, remaining existing conductors shall be replaced with new.
- C. The contractor shall remove only existing work so noted, specified, or necessary for completion of his work. Owner shall have the option of retaining any item of material removed under this contract. Items or materials not retained by owner shall become the property of the contractor and shall be removed from the premises
- D. Throughout the construction period, the contractor shall be responsible for maintaining electric service to the existing building for construction.

#### **1.07 ENERGY CONSERVATION REBATES**

A. The electrical contractor shall perform all work required to provide the owner with all electric utility company energy conservation rebates that apply to this project, such as energy efficient fluorescent lamp rebate, energy efficient ballast rebate, etc. The contractor shall provide all forms required to obtain the rebates and provide all information, invoices, etc. As required by the utility company. The contractor shall provide a letter to the engineer certifying that the rebate requirements have been met. Β.

### **1.08 MATERIALS AND EQUIPMENT**

- A. Unless otherwise specified, all material and equipment shall be new and manufactured by recognized
- manufacturers. All materials and equipment shall meet the requirements of governing codes. All material and equipment shall be listed and labeled by underwriters laboratories, inc. (UL) as conforming to its standards in every case where such a standard has been established for that particular type of material or equipment.
- C. Where the term "equal" is used, the manufacturer's name and product identification are used to establish the quality, design features, and performance of the equipment and materials specified. Products manufactured by others will be accepted provided they are equal in quality, features, and performance and are approved by the engineer
- D. The contractor shall obtain written approval from the engineer to use any proposed substitute material or equipment before contracting to purchase such substitutes. The engineer reserves the right to require the removal of any material or equipment which does not have this written approval and which does not comply with the specifications, regardless of the state of installation of such equipment.
- Where equipment supplied by the contractor has characteristics other than as specified herein, the contractor shall, at no additional cost to the owner, make all changes in the electrical work necessitated by the substitution.

#### 1.09 WORKMANSHIP

A. The installation specified herein shall be performed in a neat and workmanlike manner by persons experienced and skilled in the trade. Only the best quality workmanship will be accepted. All exposed components of the electrical systems shall be square and true with building lines and surfaces.

#### **1.10 CORRELATION OF WORK**

#### A. The contractor shall:

- 1. Give careful consideration to the work of the general, mechanical, and all other contractors and subcontractors on the project and shall organize the electrical work so that it will not interfere with the work of other trades.
- 2. Consult the drawings and specifications for work of other trades for correlation information and the

1.11 SHOP DRAWINGS

#### **1.12 MAINTENANCE MANUAL**

- manual shall contain the following:
- 2. Inspection certificates: inspection certificates, signed by the appropriate inspector, shall be furnished in the maintenance manual.
- maintenance manuals.

#### 1.13 GUARANTEE

#### 1.14 CUTTING AND PATCHING

- surface equal in strength, durability, and appearance to the original surface.
- specific cuts is approved by the engineer.
- areas.
- the ratings of the separations.
- trades

### 1.15 GENERAL RACEWAY REQUIREMENTS

- general requirements.
- B the raceway and conductor manufacturers.
- floors in general.

#### 1.16 METAL CONDUIT RACEWAY

- die cut threads.

#### 1.17 PULLBOXES

### **1.18 OPERATING INSTRUCTIONS & TESTING**

- acceptance of the equipment by the owner.
- inspection and acceptance.

 $\infty$ 

#### general construction drawings for details, dimensions, etc.

3. Verify the location of all outlets, wiring, and equipment. No additional compensation will be allowed for moving misplaced electrical system components.

A. The contractor shall submit shop drawings to the engineer for all major items of electrical equipment. The drawings shall be reviewed and approved, conditionally approved, or disapproved by the engineer. Two (2) sets of the reviewed drawings will be retained by the engineer. The remainder will be returned to the contractor. In the case of disapproval, the contractor shall submit new drawings, corrected as required by the engineer. All shop drawing submittals shall allow for a minimum of 7 working days for engineer review. The contractor shall refer to the general conditions of these specifications for any other requirements pertinent to shop drawings. C. Shop drawings shall be detailed dimensioned manufacturers' drawings, including schematics where applicable. Drawings and schematics shall be legible, use standard electrical notations, and be prepared in a professional manner. Handwritten schedules are not suitable. Each set of documents shall be bound in a permanent manner with a title page giving the project name, project address, and contractor's name, address, and telephone number. A 3"x3" clear space shall be provided for the engineer's stamp. An index page shall also be included in each set.

A. The contractor shall furnish the owner with two (2) manuals covering the operation and maintenance of all equipment provided under this contract. The manuals shall be 3-ring, loose leaf, heavy duty, steel piano hinged notebooks, hytone #8711 or equal and submitted to the architect/engineer for approval. Each

1. Manufacturer data: complete catalog data, manufacturer's literature, wiring diagrams, detailed operating instructions, and a complete listing of suppliers and distributors where replacement parts or maintenance services are available for all equipment.

3. Fire alarm system: where a fire alarm system installation or modification is included as a part of the contract, a letter from the fire alarm system equipment supplier or installer shall be furnished stating that the system has been installed correctly, is working correctly, and has been thoroughly checked out. A copy of this letter shall be included in each copy of the maintenance manual.

4. As-built drawings: as work progresses, the contractor shall mark a set of construction documents to show actual circuit routing and makeup, equipment location changes, and any other changes or deviations between project work, as built, and the contract documents. Markings shall be neat, legible, and permanent (ink or indelible pencil). Upon completion of the work, the contractor shall similarly mark a second set of documents and provide both sets of documents to the owner with the

#### A. The contractor shall furnish the owner with a written guarantee for the period of one (1) year against the failure of any part of the electrical systems installed under the specifications due to faulty material or workmanship. Guarantee period shall start upon substantial completion or as specified under general and special conditions. Lamp bulbs shall be operable on the start date of, but excluded from, the guarantee.

A. The contractor shall be responsible for all cutting and patching necessary for the completion of this project. No structural members shall be disturbed without obtaining written permission of the engineer. B. Any surface which is disturbed in any way by the contractor shall be repaired and refinished to provide a

C. Where it is necessary to drill or cut concrete surfaces, the edges shall be sharply defined. Holes shall be made with a rotary drill. Cuts shall be made with a concrete saw unless some other method of making

D. All disturbed areas shall be returned to their original conditions and shall be refinished to match surrounding

Penetrations through smoke, fire, hazardous area, or other rated separations shall be sealed to preserve

F. All cutting, drilling, patching, repairing, and refinishing shall be done by persons skilled in appropriate

G. The contractor shall clean away all rubbish and litter caused by this installation.

A. All electrical conductors installed under these specifications shall be in electrical raceway, unless some other method of installation is specifically indicated. All raceways shall be installed in accordance with these

Raceway shall be complete with necessary couplings, connectors, boxes, supports, fittings and all other components needed for an integral raceway system. The system's components shall be designed for inter-connection and shall be installed to provide a neat appearing, mechanically firm assembly adhering in every respect to principles of good electrical practice, and conforming with pertinent recommendations of

C raceway runs shall originate and terminate at locations approximately as shown on the drawings. Runs shall be straight and true with elbows, offsets and bends, uniform and symmetrical. In general, exposed runs of raceway shall be parallel or perpendicular to surrounding building lines and surfaces. Runs shall be installed so that they do not interfere with the use of aisles, passageways, doorways, hatchways, working areas, and

D. Sufficient pullboxes and junction boxes of adequate size shall be located as necessary to ensure easy installation and splicing of conductors. Boxes shall be sized to provide adequate free space for all conductors enclosed. Box sizes shall not be determined by scaling the drawings.

A. Metal conduit shall be installed wherever a raceway is required, except where some other type of raceway is specifically indicated. Rigid metal conduit shall be zinc-coated steel conduit coupled with code standard

B. All components of conduit raceway systems; such as conduit, seal tight conduit, boxes, supports and fittings shall meet in every respect the latest applicable standard of underwriters laboratories, inc. All steel components of conduit raceway systems shall be hot-dipped galvanized, metallized, sheradized, or zinc-coated by some other approved means. Seal tight conduit shall have separate ground conductor.

A pullboxes shall be installed as required in long runs or when more than four quarter bends occur in any conduit run. All pullboxes shall be sized to conform to the requirements of article 370 of the national electric code. Pullboxes shall be recessed in all finished portions of the building.

A. Operating instructions: the contractor shall furnish instruction in the care, adjustment, operation, and maintenance of all parts of the electrical equipment. Instruction shall be given to employees designated by the owner, at no additional cost to the owner, and at a time acceptable to the owner, just prior to

Tests: the contractor shall test the equipment installed under this specification and shall demonstrate its proper operation to the engineer. No equipment shall be tested or operated for any purpose until it has been fully prepared, connected, and readied for normal operation. Any equipment damaged by improper or ill-timed operation or testing shall be repaired or replaced, at the contractor's expense, before final

#### 1.19 EXCAVATION AND BACKFILLING

- A. The contractor shall perform all excavation and backfilling for the installation of all electrical work installed in earth, including all conduits, direct burial cables, ducts, and manholes shown on the drawings. All conduit or cables below grade exterior to the buildings shall be 24 inches minimum below finish grade or as noted on the drawings.
- B. The contractor shall determine the location of existing underground utilities in the area of any contemplated excavation. If these utilities are to remain in place, adequate means of protection shall be provided during excavation operations. If incorrectly charted utilities are encountered during excavation, the architect shall be consulted for direction.
- 1.20 UNDERGROUND MARKING
- A. All underground electrical lines exterior to the building shall be marked by the installation of a continuous identifying tape buried in the trench above the line. The tape shall be buried 6 inches below finished grade. The tape shall be made of yellow or orange colored inert plastic, 6 inches wide, with the words "caution buried electric line below" repeatedly printed along the length of the tape. The tape shall be griffolyn company "terratape" or equal.

#### PART 2 - PRODUCTS

2.01 DISCONNECT SWITCHES

- A. The contractor shall furnish and install disconnect switches having the number of poles and ampere ratings as shown on the drawings and as specified in the equipment schedule.
- B. Disconnect switches rated at 30 amperes or more shall be heavy duty, ac, single throw safety switches, built in accordance with nema requirements with a voidable full cover interlock and quick-make, quick-break mechanism. Each switch shall be fusible unless nonfusible (nf) switch is specifically indicated. Switches shall be in nema 1 enclosures, except that switches exposed to the weather shall be in nema 3 enclosures. Disconnect switches shall be equal to "heavy-duty" as manufactured by westinghouse, square-d, or equal.
- C. Disconnect switches rated at 20a shall be general use, 20a, ac, snap switch wiring device. 2.02 fuses a. The contractor shall furnish and install fuses of the types and ratings designated in the drawings and specifications in each fusible device installed by the contractor. In addition, the contractor shall furnish and store, at a location directed by the owner, three (3) spare fuses of each size and type installed during this project. The contractor shall present, typed on his own letterhead, two (2) copies of the spare fuse list to the owner for his records. B. Fuses shall be one-time cartridge fuses of the following types as manufactured by the economy division of fpe co., the bussman division of the mcgraw-edison company, or equal: type designation heavy-duty current limiting, time lag hi cap (hc) two element, current limiting, time lag low peak (lp) single element, current limiting limitron (cl) two element, time lag fusetron (f)

#### 2.03 WIRE AND CABLE

- A. Electrical conductors installed under theses specifications shall be building wire, except where some other type of wire or cable is specifically indicated.
- B. Building wire conductors shall be soft drawn annealed copper, having a conductivity of not less than 98% pure copper. Conductor sizes are american wire gauge (awg), except where conductors mcm is indicated. No conductors smaller than #12 shall be used unless specifically permitted by the plans or specifications. Conductors larger than #10 shall be stranded.
- C. Building wire insulation shall be code grade 600. In general, all conductors shall have thhn insulation unless specifically noted otherwise.

#### 2.04 WIRING DEVICES

- A. Wiring devices shall be installed in metal conduit device boxes.
- B. Switches and receptacles shall be arrow-hart, general electric, hubbell, pass & seymour, leviton or approved equal. Unless otherwise specified below, color shall be as specified by the architect. C. All switches, except as noted herein, shall be specification grade, ac quiet type, 20a, 120/277v, with silver
- alloy contacts, equal to hubbell #1221. D. General purpose duplex receptacles shall be specification grade nema 5-20r, 20a, 125v, 3-wire grounding
- type devices, equal to hubbell #5362, with the third pole grounded to the outlet box. Each receptacle shall be rigidly positioned within the box so that the exposed face of the receptacle protrudes beyond the face of the cover plate.
- E. Isolated ground duplex receptacles shall be specification grade, 20a, 125v devices, equal to hubbell #ig5362, orange color.
- F. GFI receptacles: ground fault circuit interrupter duplex receptacles shall be specification grade, 20a devices, equal to hubbell #gf5362, installed so that each unit is self contained. Gfi receptacles shall not be connected to feed-thru unless specifically so noted on the drawings.
- G. Weatherproof duplex receptacles shall be gfi receptacles with stainless steel or cast aluminum weatherproof cover plates equal to sierra #wp-8 or #wpd-8 or hubbell #wp26. Device height shall be as follows, unless otherwise noted on the plans (height is to center of outlet above
- finished floor or grade): Switches -------4'-0"
- Convenience outlets ---------2'-0"
- Telephone outlets ---------2'-0"
- 4. Weatherproof receptacles (above grade) ----2'-0"
- Thermostats ---------5'-0" 6. MB8 ---3-8"

2.05 WALL AND COVER PLATES

A. The contractor shall furnish and install new wall plates for all new flush mounted wiring devices and all flush mounted special system outlets. Sectional wall plates shall not be used. Blank plates shall be installed over all outlets provided for future use or outlets abandoned but not removed. Wall plates shall be decors series Leviton. Wall plates shall be secured with matching screws. Engraved wall plates shall have black fill. B. Cover plates for telephone, computer, television, and other special outlets shall be as specified by owner.

#### 2.06 MAGNETIC STARTERS

- A. Starters shall be built in accordance with nema requirements. They shall contain motor over-current protective devices as well as the necessary number of contacts to open each ungrounded motor branch circuit conductor. Over-current devices shall be externally operated manually reset thermal overload relays sized in accordance with motor nameplate data to provide motor running current overload protection. Each starter controlling a 3-phase motor shall be equipped with three (3) over-load protective devices.
- B. Starters shall be installed in surface mounting nema 1 enclosures unless some other type of enclosure is indicated. Starters exposed to the weather shall be in nema 3 enclosures. Starters mounted in finished areas shall be in flush mounting enclosures, equipped with suitable cover plates.
- C. Magnetic starters shall be across-the-line, full voltage type unless reduced voltage, multi-speed or reversing starters are specifically indicated. Magnetic starters shall provide under voltage protection and shall have auxiliary contacts as necessary for the operation of control and indicating circuits. Where a control transformer is specified, the operating coil and the entire control circuit shall be designed for 120 volt operation.
- D. Ac magnetic starters: motor starters shall be rated in accordance with Nema sizes and horsepower ratings.

#### 2.07 MANUAL STARTERS

A. Manual starters shall be toggle switch type starters. Where a red pilot light is indicated, the light shall be a neon bulb integral with the starter. Flush mounting units shall have engraved wall plates. Surface mounting units shall be in nema 1 enclosures, unless some other type of enclosure is indicated. Manual starters shall be cutler hammer bulletin 9101, square-d class 2510, or equal.

#### 2.08 PANELBOARDS

A. Panelboards shall be square d #ngod or equal by challenger, cutler-hammer, general electric, i.t.e., or

Westinghouse.

- B. Panelboards shall be dead front safety type with enclosures of code grade steel. Oversize gutters shall be provided for feed through where indicated or required. Where double lugs are not permitted by local code, a suitable pull box or gutter adjacent to panels shall be provided for connections. Top of panelboard tubs shall be 6'-6" above finished floor.
- C. Panelboards shall have trim and flat locking doors with both hinges and trim clamps completely concealed. Door locks shall be flush with the cover. All door locks shall be common keyed. Two (2) keys shall be provided for each panelboard. A clear plastic-covered typewritten circuit directory shall be mounted in a card holder attached to the inner side of the door. Panelboards shall have black micarta plates with 1/2-inch high white cut letters stating panelboard number and voltage. Where panelboards are in public areas, identification plates shall be inside door.
- D. Buses shall be made from 98 percent electrolytic copper or 55 percent conductivity aluminum and shall be independently supported (without dependence upon the circuit breakers). Solderless lugs only shall be provided in all mains unless noted otherwise in the panelboard schedule. All main lugs shall be crimp compression type. Where breakers and/or switches are listed in the schedules as "space only", this shall include extended bus and mounting provisions.
- E. Circuit breakers shall be bolt-on and shall have bolted line and load terminals. All branch circuit breakers shall be quick-make, quick-break, thermal magnetic, common trip on all multipole breakers and have a UL short circuit rating of 10,000 symmetrical r.m.s. amperes. Each breaker shall have it's current rating engraved, in easy to read numbers, on the toggle handle. All breakers used for fluorescent lighting switching control shall be ul listed swd switching duty.
- F. Panels noted "isolated ground bus" shall contain a factory installed isolated ground bus which is electrically insulated from the panel enclosure and normal conduit grounding system. The contractor shall provide a grounding electrode and an insulated ground wire connection from the isolated ground bus to the grounding electrode for branch circuit requirements.
- G. Circuit numbers appearing on drawings shall be used for reference only. Actual connections shall be in accordance with phasing of the cabinet, load balance and common neutral requirements. Room numbers or names used for circuit identification shall correspond to name plates installed on room doors by the general contractor or as selected by the owner and shall be verified as these may not be the same as room titles on the drawings.

2.09 LIGHTING FIXTURES

- A. Lighting fixtures, complete with lamps, shall be furnished and installed where shown on the drawings. All fixtures shall be ul listed for the intended use.
- B. Lamps shall be as manufactured by general electric, sylvania, westinghouse, or equal. General service lamps shall be rated at 120 volts and shall be inside frosted.
- C. All fluorescent ballasts shall have thermosetting ballast compound which will not soften or flow at elevated temperatures, shall be rated for voltage as indicated, shall be high power factor, cbm-etl certified, shall have individual automatic-resetting thermal protection (ul class p) and shall have a sound rating of "a" for rapid start lamps and highest sound rating available for other lamps.
- D. All high intensity discharge lamp ballasts shall be high power factor, 90 or higher with a crest factor of 1.75 or lower.
- E. Finish of all fixtures shall be in first class condition and shall be guaranteed for a period of one (1) year from date of acceptance when lamped not larger than manufacturer's recommendations F. Capital letters adjacent to the outlets indicate fixture type; lower case letters indicate manner of switching.

### 2.10 GROUNDING SYSTEMS

- A. Circuits, metal raceway systems, and all other permanently installed electrical equipment shall be solidly grounded in accordance with the national electrical code to form a continuous, permanent and effective grounding system.
- B. Grounding conductor connections shall be made with solderless pressure type fittings. Where welded connections are practical, connections may be made by the use of a suitable welding process. All connections shall be made in strict conformance with the manufacturer's recommendations.
- C. To maintain uninterrupted electrical continuity, flexible raceway sections must have conductance equal to that of the system's inflexible raceway. Raceway fittings used must be such as to ensure existence of a permanent bond. Grounding bushings shall be provided to ground conduits to control center ground. All new equipment shall be grounded to the existing grounding system.

#### 2.11 IDENTIFICATION AND LABELING OF ELECTRICAL EQUIPMENT

- A. All control devices and device enclosures shall be labeled with individual name plates or legend plates. B. Individual name plates or legend plates shall be one of the following types:
- 1. Black laminated plastic or micarta with white cut letters.
- 2. Corrosion-resistant metal plates with engraved or raised letters and black fill. E. Paper, foil, or tape markers attached with adhesives shall not be used.
- 2.12 SERVICE TO ELECTRICALLY-POWERED EQUIPMENT
- A. The contractor shall furnish and install outlets for and make connections to all motors and power-operated equipment indicated on the equipment schedule.
- B. All items of electrically powered equipment, together with their circuit requirements, are listed in the equipment schedule. In general, equipment listed under "description" in the schedule will be furnished under other divisions of the specifications. All other components listed in the schedule shall be furnished and installed under this section of the specifications.
- C. The "conduit and wire" listed in the schedule is the branch circuit wiring. The branch circuit shall terminate in an outlet box, a disconnect switch, a starter, or a receptacle, as indicated in the equipment schedule. The contractor shall furnish and install all necessary power and control wiring and make connections to the item of equipment, unless otherwise indicated in the schedule.
- a. Each fusible "disconnect switch" (disc.) Listed in the schedule shall be equipped with dual element fuses except where some other type of fuse is indicated in the schedule or on the drawings
- D. The "starter size" listed in the schedule is nema size of the magnetic starter to be installed. The designation "man" indicates the installation of a manual starter. Where a manual starter is located within sight of the motor, it shall be used as the motor disconnect switch as well as overcurrent protection.
- E. The contractor shall obtain exact information pertaining to location, electrical characteristics, and wiring for equipment furnished by others from the contractor furnishing the equipment. This information shall be verified by examining nameplates and manufacturer's wiring diagrams. Any discrepancy between the equipment requirements and the provisions made by these specifications shall be reported. Equipment damaged as a result of the contractor's failure to observe manufacturer's requirements shall be replaced or repaired by the contractor. The thermal protection elements in magnetic and manual starters shall be rechecked with name plate data at the site before operation of the equipment. Where necessary, the thermal protection elements shall be changed to properly protect the equipment.

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