MONTANA STATE UNIVERSITY - BOZEMAN MARSH 40,41,54 HVAC UPGRADE - PPA#25-1248

BID SET 05 DEC, 2025

MECHANICAL AND ELECTRICAL ENGINEERS:
CONSULTING DESIGN SOLUTIONS, INC.
7540 CHURCHILL RD
MANHATTAN, MT 59741
(406)282-7082

STAGING **PROJECT** LABORATOR\ **LOCATION** LIVESTOCK SHELTER CLINIC eterinary Center Hay Shed W. LINCOLN STREET (1500.L) PRIMARY ACCESS **ROUTE** (1900) **SITE PLAN**

CVR / NO SCALE

GENERAL PROJECT NOTES

A. ALL CONSTRUCTION AND CONSTRUCTION METHODS TO BE IN ACCORDANCE WITH APPLICABLE CODES, GOVERNMENTAL AGENCIES, AND LOCAL DESIGN CRITERIA INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:

INTERNATIONAL BUILDING CODE, 2021 EDITION

INTERNATIONAL MECHANICAL CODE, 2021 EDITION

INTERNATIONAL FUEL GAS CODE, 2021 EDITION
INTERNATIONAL ENERGY CODE, 2021 EDITION
UNIFORM PLUMBING CODE, 2021 EDITION

NATIONAL ELECTRIC CODE, 2021 EDITION

NATIONAL FIRE PROTECTION ASSOCIATION CODE, LATEST EDITION

B. ANY AMBIGUITIES OR DISCREPANCIES DISCOVERED BY THE USE OF THESE CONTRACT DOCUMENTS SHALL BE REPORTED TO THE MSU PROJECT MANAGER IMMEDIATELY.

C. CHANGES OR DEVIATIONS FROM THE CONTRACT DOCUMENTS MADE WITHOUT THE WRITTEN CONSENT OF THE OWNER ARE UNAUTHORIZED.

COORDINATE NECESSARY MODIFICATIONS WITH THE MSU PROJECT MANAGER PRIOR TO CONSTRUCTION.

D. THE CONTRACTOR IS RESPONSIBLE FOR THE COORDINATION AND SCHEDULING OF ALL REQUIRED INSPECTIONS DURING THE COURSE OF THE CONSTRUCTION PROJECT. PARTIES REQUIRED TO ATTEND SHOULD BE GIVEN 48 HOURS MINIMUM NOTICE.

E. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR SAFETY AND SHALL TAKE WHATEVER MEASURES ARE NECESSARY TO ENSURE THE HEALTH AND SAFETY OF THE CONTRACTOR'S EMPLOYEES, SUBCONTRACTORS, BUILDING OCCUPANTS, PEDESTRIANS AT OR NEAR THE CONSTRUCTION SITE OR ACCESS ROUTES, AND OF ALL OTHER PERSONS IN AREAS AFFECTED BY THE CONTRACTOR'S CONSTRUCTION ACTIVITIES.

F. THE CONTRACTOR SHALL COORDINATE ALL UTILITY INTERRUPTIONS WITH THE OWNER AND PROVIDE 5 WORKING DAYS NOTIFICATION PRIOR TO AND UTILITY SHUT DOWN

GENERAL SITE / STAGING NOTES

A. THE CONTRACTOR SHALL MINIMIZE INTERFERENCE WITH ADJOINING STREETS, SIDEWALKS, PARKING AREAS, AND OTHER ADJACENT OCCUPIED OUSED FACILITIES DURING CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL NOT BLOCK STREETS, SIDEWALKS, OR ACCESS TO DUMPSTER LOCATIONS AT ANY TIME

CONTRACTOR SHALL PROTECT EXISTING SITE AND LANDSCAPING FROM DAMAGE CAUSED BY CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL RESTORE EXISTING SITE AND LANDSCAPING DAMAGED BY CONSTRUCTION OPERATIONS TO CURRENT MSU STANDARDS OR AS DIRECTED BY THE MSU PROJECT MANAGER PRIOR TO SUBSTANTIAL COMPLETION.

C. THE CONTRACTOR SHALL PROTECT THE EXISTING BUILDINGS FROM DAMAGE, CONTAMINATION, AND SOILING CAUSED BY CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL KEEP BUILDING ENTRANCES AND STAIRWELLS CLEAR OF CONSTRUCTION MATERIALS, TOOLS, AND EQUIPMENT AT ALL TIMES.

D. THE CONTRACTOR SHALL ACCESS THE SITE FROM S. 19TH AVENUE, 11TH AVENUE, COLLEGE STREET OR GRANT STREET. SOME OF THESE ROUTES MAY NOT BE AVAILABLE DURING THE CONSTRUCTION PERIOD

ALL CONTRACTOR VEHICLES PARKED ON CAMPUS, INCLUDING VEHICLES OWNED BY EMPLOYEES OF THE CONTRACTOR, SHALL BE PARKED IN DESIGNATED PARKING AREAS ONLY. VEHICLES MAKING DELIVERIES TO THE PROJECT SITE MUST BE MOVED TO A DESIGNATED PARKING AREA OR REMOVED FROM CAMPUS IMMEDIATELY AFTER UNLOADING. ALL VEHICLES PARKED IN DESIGNATED PARKING AREAS MUST HAVE A VALID MSU PARKING PERMIT. PERMITS CAN BE PURCHASED FROM THE UNIVERSITY POLICE (994—2121). VIOLATORS OF MSU VEHICLE REGULATIONS MAY BE TICKETED AND / OR TOWED. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

F. CONSTRUCTION STAGING AREA: SHOULD THE CONTRACTOR REQUIRE ON—SITE CONSTRUCTION STAGING, AN AREA FOR THIS PURPOSE WILL BE PROVIDED. THE CONTRACTOR MAY BE REQUIRED TO FENCE THE STAGING AREA TO PREVENT ACCESS FROM UNAUTHORIZED PERSONNEL. THE CONTRACTOR SHALL RESTORE AREAS USED FOR CONSTRUCTION STAGING THAT ARE DAMAGED DURING THE COURSE OF CONSTRUCTION OPERATIONS TO CURRENT MSU STANDARDS OR AS DIRECTED BY THE MSU PROJECT MANAGER PRIOR TO SUBSTANTIAL COMPLETION.

LEGEND

THE CONTRACTOR SHALL LIMIT HIS OPERATIONS TO THE AREAS DEFINED BELOW. AREAS BEYOND THESE LIMITS ARE NOT IN CONTRACT (NIC) AND SHALL NOT BE USED BY THE CONTRACTOR FOR ANY PURPOSE DURING THE COURSE OF CONSTRUCTION.

CONSTRUCTION STAGING AREA: CONTRACTOR MAY UTILIZE THE INDIVIDUAL PARKING SPACES WITHIN THE SCOPE OF THIS PROJECT FOR CONSTRUCTION STAGING. STAGING AREA LOCATIONS INDICATED ON SITE PLAN ARE APPROXIMATE.

PRIMARY ACCESS ROUTE: JOB RELATED VEHICULAR TRAFFIC SHALL ACCESS THE CONSTRUCTION SITE BY THIS ROUTE ONLY

CONTRACT LIMITS (CONSTRUCTION SCOPE OF WORK)

INDEX OF DRAWINGS

CVR SITE PLAN, GENERAL PROJECT NOTES, GENERAL SITE / STAGING NOTES, INDEX OF DRAWINGS, PHASING NOTES

M1.0 MAIN BUILDING CRAWL SPACE - HVAC M1.1 MAIN BUILDING FIRST FLOOR PLAN - HVAC

M2.1 MECHANICAL LEGEND, DETAILS AND SCHEDULES
M3.1 MECHANICAL SPECIFICATIONS

1.1 MAIN BUILDING FIRST FLOOR PLAN — ELECTRICAL
2.1 ELECTRICAL LEGEND, DETAILS AND SPECIFICATIONS

PHASING NOTES

A. CORE DRILLING OF EXISTING BUILDING AT FLOOR AND WALL PENETRATIONS. .

B. INSTALL NEW MECHANICAL EQUIPMENT, MAKE FINAL CONNECTIONS, COMPLETE PROJECT CONSTRUCTION, AND BRING SYSTEM UP TO FULL OPERATION.

COVER SHEET



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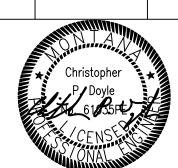
MONTANA STATE UNIVERSITY BOZEMAN, MONTANA PHONE: 406.994.5413 FAX: 406.994.5665

MARSH IVAC UPGRADES

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REV. DESCRIPTION DATE



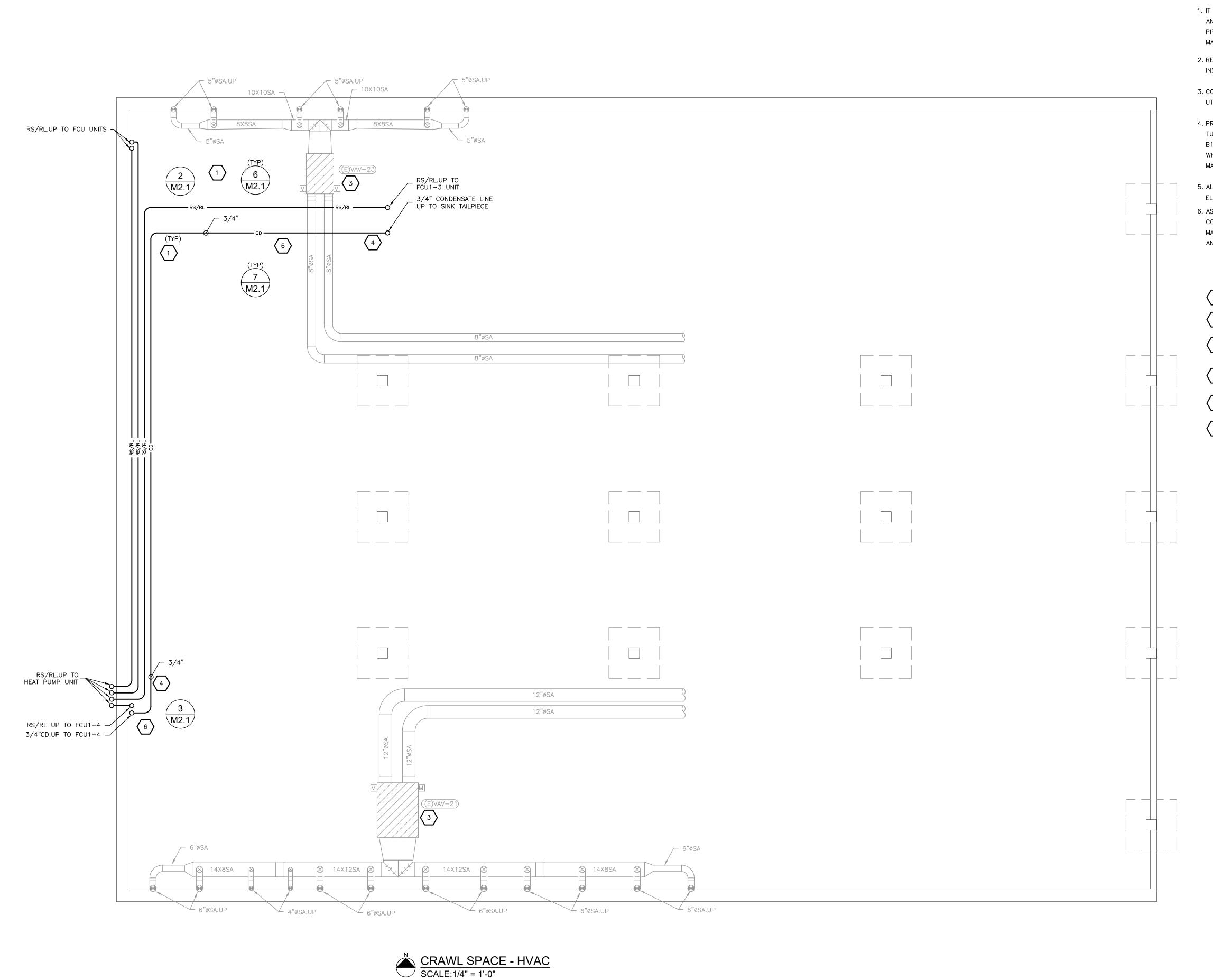
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Consultant #: 2514

SHEET TITLE

SHEET

CVR



GENERAL NOTES

- 1. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INCLUDING EQUIPMENT SUPPLIERS TO COORDINATE WITH EACH OTHER AND TO VERIFY THAT THERE ARE NO CONFLICTS IN LOCATIONS OF DUCTS, CONDUITS, SPRINKLER HEADS, SPRINKLER PIPING, DIFFUSERS, ELECTRICAL BOXES AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
- 2. REFER TO PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION: DETAILED EQUIPMENT REQUIREMENTS, INSTALLATION INSTRUCTIONS, PERFORMANCE REQUIREMENTS, CONTROL SEQUENCES AND ALL OTHER PROJECT DETAILS.
- 3. COORDINATE ALL UTILITY INTERRUPTIONS WITH THE OWNER AND PROVIDE 5 WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.
- 4. PROVIDE LINE SET REFRIGERANT GRADE, COPPER TUBING MEETING ASTM B1103. PROVIDE FULLY ANNEALED COPPER TUBING PRESSURE RATED TO 700 PSI 250F AND UL LISTED. PROVIDE WITH COPPER BRAZING TYPE FITTINGS ANSI B16.22 SUITABLE FOR CONNECTION WITH BRAZING FILLER METAL MEETING AWS A5.8 FOR ALL REFRIGERANT PIPING. WHILE SWEATING FITTINGS TOGETHER, SWEEP DRY NITROGEN THROUGH THE TUBING TO PREVENT OXIDATION. REFER TO MANUFACTURER FOR MAXIMUM LENTH.
- 5. ALL CONTROL WORK FOR THIS PROJECT IS TO BE PERFORMED BY ELECTRO—CONTROLS. ELECTRO—CONTROLS CONTACT (406)—721—3084 OR 1—(800)—827—3084.
- 6. ASBESTOS TESTING HAS CONFIRMED THAT THE FLOOR MASTIC IS AN ASBESTOS—CONTAINING MATERIAL. HVAC CONTRACTOR SHALL GET A LICENSED ASBESTOS ABATEMENT COMPANY FOR THE REMOVAL OF ASBESTOS—CONTAINING MASTIC AT ALL FLOOR PENETRATIONS. ALL REMOVAL AND DISPOSAL SHALL COMPLY WITH APPLICABLE FEDERAL, STATE AND LOCAL ASBESTOS REGULATIONS AND SAFETY REQUIREMENTS.

CONSTRUCTION NOTES

- 1 ROUTE REFRIGERANT PIPING AT THE UNDERSIDE OF FLOOR STRUCTURE.
- $\left\langle 2\right\rangle$ NOT USE
- TEMPERATURE CONTROLS BY ELECTRO—CONTROLS. REFER TO TEMPERATURE CONTROL SPECIFICATION FOR DETAILED SEQUENCING AND OVERRIDES.
- FIELD VERIFY CRAWLSPACE FOR FLOOR SINK. IT IS ACCEPTABLE FOR CONTRACTOR TO ROUTE CONDENSATE LINE TO NEAREST FLOOR SINK IF IT EXISTS.
- 5 NOT USED
- ADD ALT 1: PROVIDE FCU1-4 FAN COIL, THERMOSTAT, AND CONDENSATE PUMP AND LINE AS AN ADD ALTERNATE ITEM TO THE PROJECT.



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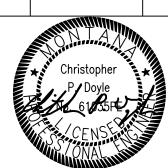
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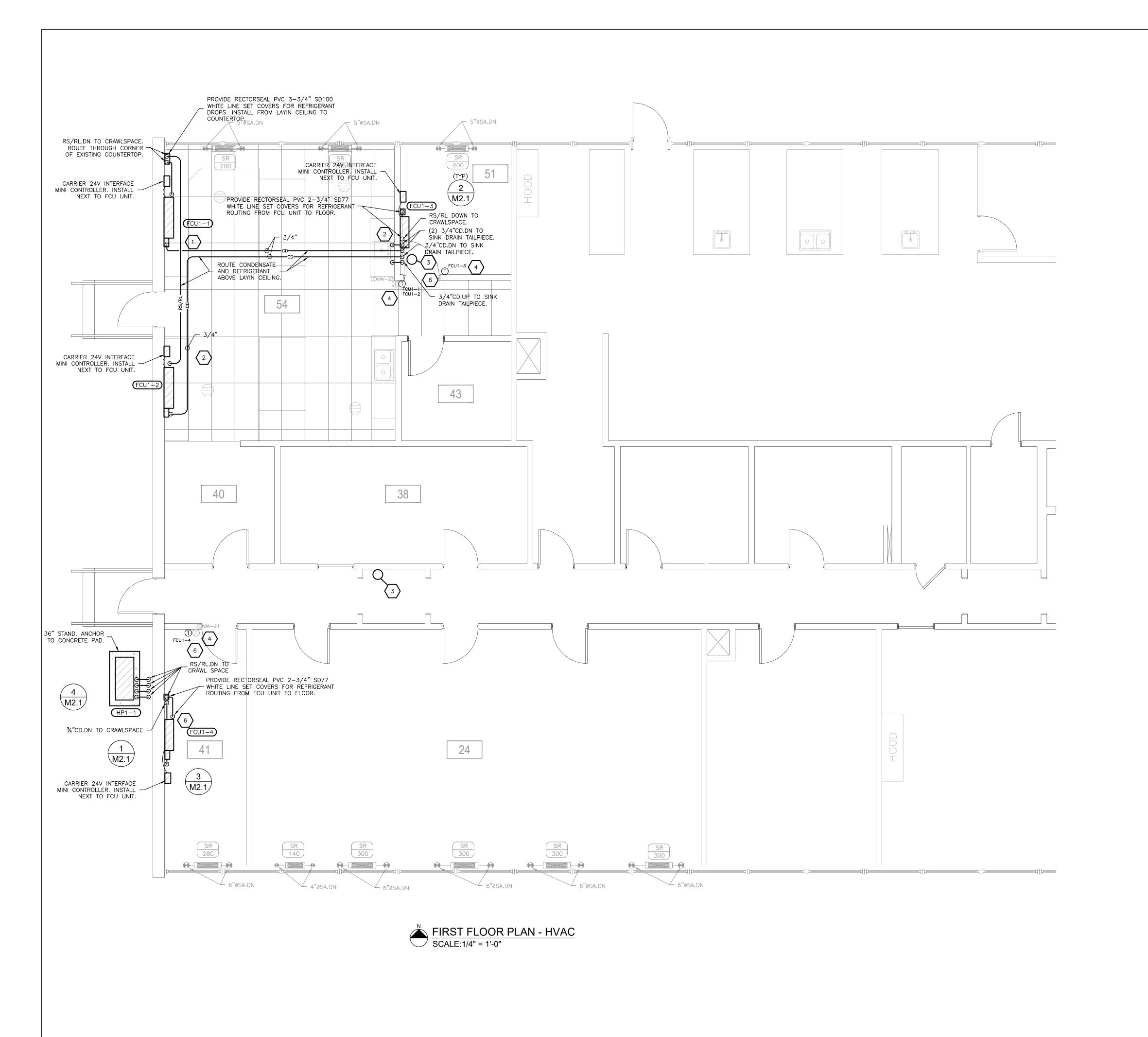
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A/E#00-00-00 Consultant #: 2514

> SHEET TITLE CRAWL SPACE -HVAC

> > SHEET

M1.0



GENERAL NOTES

- 1. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INCLUDING EQUIPMENT SUPPLIERS TO COORDINATE WITH EACH OTHER AND TO VERIFY THAT THERE ARE NO CONFLICTS IN LOCATIONS OF DUCTS, CONDUITS, SPRINKLER HEADS, SPRINKLER PIPING, DIFFUSERS, ELECTRICAL BOXES AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
- 2. REFER TO PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION: DETAILED EQUIPMENT REQUIREMENTS, INSTALLATION INSTRUCTIONS, PERFORMANCE REQUIREMENTS, CONTROL SEQUENCES AND ALL OTHER PROJECT DETAILS.
- 3. COORDINATE ALL UTILITY INTERRUPTIONS WITH THE OWNER AND PROVIDE 5 WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.
- 4. PROVIDE LINE SET REFRIGERANT GRADE, COPPER TUBING MEETING ASTM B1103. PROVIDE FULLY ANNEALED COPPER TUBING PRESSURE RATED TO 700 PSI 250F AND UL LISTED. PROVIDE WITH COPPER BRAZING TYPE FITTINGS ANSI B16.22 SUITABLE FOR CONNECTION WITH BRAZING FILLER METAL MEETING AWS A5.8 FOR ALL REFRIGERANT PIPING. WHILE SWEATING FITTINGS TOGETHER, SWEEP DRY NITROGEN THROUGH THE TUBING TO PREVENT OXIDATION. REFER TO MANUFACTURER FOR MAXIMUM LENTH.
- 5. ALL CONTROL WORK FOR THIS PROJECT IS TO BE PERFORMED BY ELECTRO-CONTROLS.
- ELECTRO-CONTROLS CONTACT (406)-721-3084 OR 1-(800)-827-3084.
- 6. ASBESTOS TESTING HAS CONFIRMED THAT THE FLOOR MASTIC IS AN ASBESTOS—CONTAINING MATERIAL. HVAC CONTRACTOR SHALL GET A LICENSED ASBESTOS ABATEMENT COMPANY FOR THE REMOVAL OF ASBESTOS—CONTAINING MASTIC AT ALL FLOOR PENETRATIONS. ALL REMOVAL AND DISPOSAL SHALL COMPLY WITH APPLICABLE FEDERAL, STATE AND LOCAL ASBESTOS REGULATIONS AND SAFETY REQUIREMENTS.

CONSTRUCTION NOTES

- 1 ROUTE REFRIGERANT PIPING ABOVE LAY-IN CEILING. MOUNT TO ROOF STRUCTURE.
- 2 ROUTE CONDENSATE DRAIN LINES ABOVE LAY-IN CEILING TO TAILPIECE OF SINK.
- 3 REFER TO GENERAL NOTE NUMBER 6 ABOVE.
- TEMPERATURE CONTROLS BY ELECTRO-CONTROLS. REFER TO TEMPERATURE CONTROL SPECIFICATION FOR DETAILED SEQUENCING AND OVERRIDES.
- 5 NOT USED
- ADD ALT 1: PROVIDE FCU1-4 FAN COIL, THERMOSTAT, AND CONDENSATE PUMP/PIPING AS AN ADD ALTERNATE ITEM TO THE PROJECT.

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1SU MARRSH 11,54 HVAC UPGRADES ANA STATE UNIVERSIT

BID

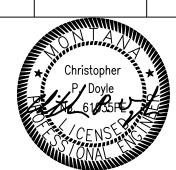
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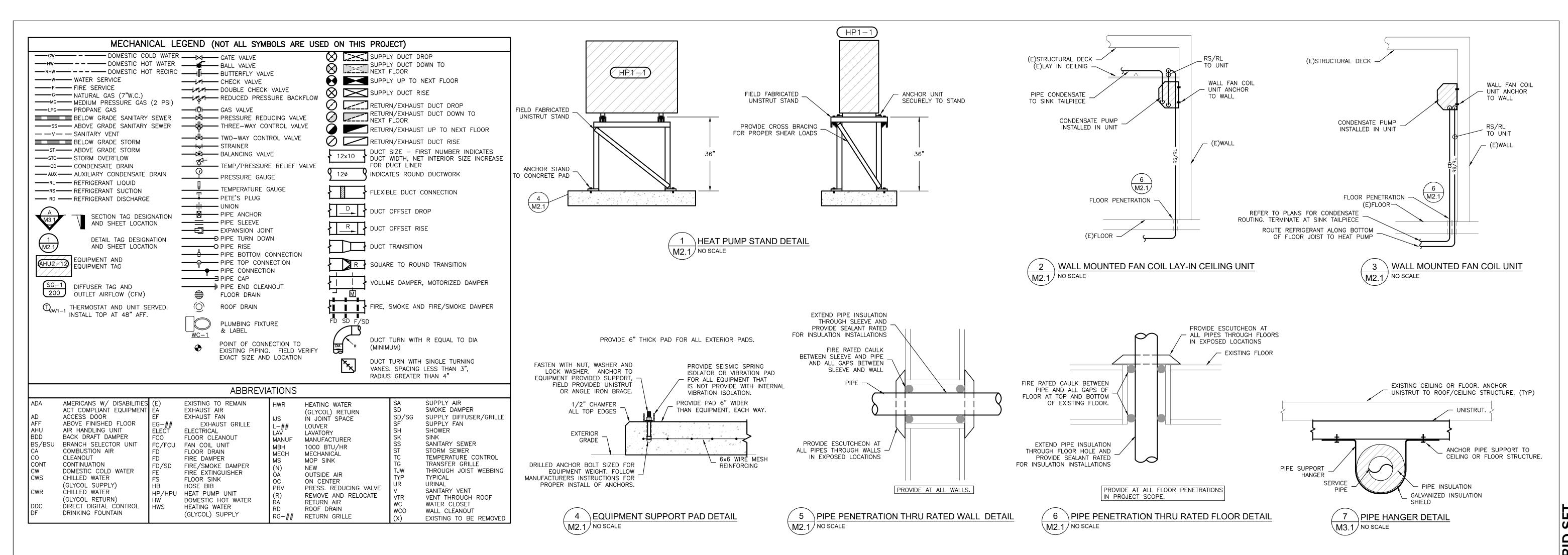
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SHEET TITLE
FIRST FLOOR

SHEET

PLAN - HVAC

M1.1



	HEAT PUMP CONDENSING UNIT SCHEDULE															
					TOTAL COOLING	SENSIBLE	TOTAL HEATING				ELECTRICAL					
TAG	MANUF.	MODEL	SERVES	TONS	BTU/HR	COOLING BTU/HR	BTU/HR	REFRIGERANT	SEER	COP	VOLT.	PHASE	HZ	UNIT MCA	UNIT MOP	REMARKS
			FCU1-1, FCU1-2,													
HP1-1	CARRIER	37MGHAQ48FA3	FCU1-3, FCU1-4	4	53,046	42,437	27,276	R454B	23	3.7	208	1	60	43	45	1,2
REMARKS	S:										·					
1. PROVIE	DE FOR OPERAT	10N DOWN TO -22 DEG	F. PROVIDE HAIL G	SUARDS	. PROVIDE UNIT F	RATED FOR 4500' EL	EVATION, 92/62°F	OUTDOOR CONDI	TIONS. PRO	VIDE REFRIC	GERANT PI	PING BETW	EEN INDO	OOR AND OL	JTDOOR UN	IT SIZED
FOR ACTU	JAL PIPE ROUTII	NG, ELEVATION CHANG	ES AND LENGTHS.	PROVID	E ALL REFRIGERA	ATION COMPONENTS	REQUIRED FOR A	COMPLETE INST	ALLATION IN	ICLUDING MI	ULTIPLE CI	RCUITS, ML	JLTIPLE R	ISERS AND	TRAPS.	
2. PROVIE	DE REFRIGERAN	IT SIZED FOR EQUIPMEN	NT AND SITE. COOF	RDINATE	REFRIGERANT LI	NE SIZES AND FIEL	D VERIFIED LENGT	THS WITH MANUF	ACTURER TO	MEET THEI	R REQUIRE	MENTS. SU	BMIT SHO	OP DRAWING	3S.	

3. PROVIDE FAN COIL UNIT WITH CARRIER 24V INTERFACE MINI KSAIC0601230 FOR CONNECTION WITH EXISTING DDC SYSTEM.

4. PROVIDE ADD ALTERNATE BID FOR FCU1-4.

							F/	AN COIL	UNIT S	SCHED	ULE														
									MAX			HEATING		COOLING						ELE	CTRICAL				
TAG	BIDDING	MANUF.	MODEL	ARRANGEMENT	LOCATION	SERVES	ALTITUDE	REFRIGERANT	AIRFLOW (CFM)	OUTDOOR AIR (CFM)	ESP (IN W.C.)	CAPACITY (BTU/HR)			TOTAL BTUH	SENSIBLE BTUH	EAT DB	E / T / / / D	LAT DB	I AT \A/D	VOLT	DUASE	U7	MCA MOP	DEMARKS
FCU1-1	BASE	CARRIER	45MAHAQ18XA3	WALL MOUNTED	SEED ROOM 54	SEED ROOM 54	4500'	R454B	635	N/A	N/A	9,092	70.0		17,682	14,146	80.0	67	55.2	54.2		1	60	POWERED BY OUTDOOR	1,2,3
FCU1-2	BASE	CARRIER	45MAHAQ18XA3	WALL MOUNTED	SEED ROOM 54	SEED ROOM 54	4500'	R454B	635	N/A	N/A	9,092	70.0	85.6	17,682	14,146	80.0	67	55.2	54.2	208	1		POWERED BY OUTDOOR	1,2,3
FCU1-3	BASE	CARRIER	45MAHAQ09XA3	WALL MOUNTED	OFFICE 51	OFFICE 51	4500'	R454B	441	N/A	N/A	4,546	70.0	81.2	8,841	7,073	80.0	67	62.2	61.2	208	1	1 60 1	POWERED BY OUTDOOR	1,2,3
FCU1-4	ADD ALT	CARRIER	45MAHAQ09XA3	WALL MOUNTED	OFFICE 41	OFFICE 41	4500'	R454B	441	N/A	N/A	4,546	70.0	81.2	8,841	7,073	80.0	67	62.2	61.2	208	1		POWERED BY OUTDOOR	1,2,3,4
CONDEN	SATE IS BI	LOCKED. PIPE	CONDENSATE TO NE	AREST FLOOR SINK OR	SINK TAIL PIECE.	TORS AND ACCESSORIES F														IP WITH C	VERFLO	W SAFET	ry to tui	RN OFF UNIT V	VHEN

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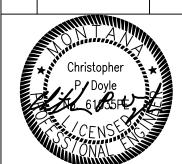
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REV. DESCRIPTION DATE



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SHEET TITLE
MECHANICAL
LEGEND, DETAILS
AND SCHEDULES
SHEET

M2.1

B. Note: in division 220000 and 230000 specifications the term "contractor" refers to mechanical contractor, plumbing contractor, and/or hvac contractor or any mechanical sub—contractor. Unless specifically noted, all work referenced is to be included in the sub contract bid and construction of the project. No exclusions are allowed, except as specifically permitted in writing by the general contractor. Furnish all labor, materials, tools, equipment, and services for all mechanical work as indicated, in accord with provisions of Contract Documents.

Completely coordinate with work of all other trades. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a safe, sound, fully functional, secure and complete installation meeting all local and state codes. 1.2 INTENT OF PLANS AND SPECIFICATIONS

The plans and specifications contemplate the complete installation of the system described so that at the conclusion of the construction, the systems will be turned over to the owner complete and ready for safe, efficient operation. The plans and specifications cannot deal individually with the many minute items which may be required by the nature of the systems. Furnish and install all such items normally included on systems of this type, which while not mentioned directly herein, are obviously essential to the installation and operation of the system and which are normally furnished on quality installations 3. In receiving bids, it will be assumed that each bidder has made a thorough inspection of the conditions and is familiar with all conditions affecting the extent or cost of this work. Claims for extra payments as a result of failure to examine the conditions prior to submitting the bid will not be allowed. C. The drawings are diagrammatic, indicate general arrangement of systems and equipment and do not necessarily show the exact locations of plumbing, piping and ductwork runs unless specifically dimensioned. Install piping to avoid other trades and install in a compact and neat manner to maximize the available space. For exact locations of building elements, refer to dimensioned architectural/structural drawings.

Field measurements take precedence over dimensioned drawings. Because of the small scale of the drawings, offsets and transitions in the piping and sheet metal are not shown, but are to be provided by the contractor during the course of the project. Consult all drawings of each contract for the project to predetermine that work and equipment will fit as planned. Check the location of piping, ducts, equipment, etc., to determine that all work clears openings, structural members, cabinets, lights, outlets, and other work or equipment having fixed locations. If at any time and in any case a change i ocation of piping, ducts, equipment, etc., becomes necessary due to obstacles or the installation of the work of other trades shown on any of the project drawings, make such required changes. Verify mounting heights and dimensions of all wall mounted equipment with the Architect prior to rough in and

Installation of all systems and equipment is subject to clarification as indicated in reviewed shop drawings and field coordination drawings.

J. Dimensions indicated anywhere are limiting dimensions. Do not use equipment exceeding dimensions indicated on detail drawinas or arrangement that reduce required clearances or exceed specified maximum dimensions. Provide equipment and systems sized and rated for high altitude operation. The capacity of all equipment is to be sized and manufactured to perform at the elevation of the job site.

CODES, ORDINANCES AND PERMITS A. Comply with all state and local codes and ordinances applying to the work specified herein. Attention is directed in particular to the UNIFORM PLUMBING CODE, INTERNATIONAL BUILDING CODE, INTERNATIONAL MECHANICAL CODE, INTERNATIONAL FUEL GAS CODE. INTERNATIONAL ENERGY CONSERVATION CODE AND/OR ANY AUTHORITY HAVING JURISDICTION. and local regulations concerning the specified plumbing, heating and cooling equipment. Make application for, obtain and pay for all required permits and certificates of inspection for the work.

In the event of conflict between this specification and a governing code or ordinance, provide work to meet the higher standard. Provide all work to meet any local codes that affect work on the project. Extra payment will not be allowed fo changes required by local regulations. Where compliance with 2 or more standards or requirements is specified or shown on the plans, the contractor is to provide the most costly material or labor intensive method unless approved otherwise by the Architect/Engineer. If no particular material or method of installation is specified, the standard of the trade involved shall be used. 1.4 INSPECTION Request regular inspections of duly authorized inspectors as required by MSU Division 1 specification

1.5 SUBSTITUTING Provide all equipment, fixtures, materials and products exactly as listed in the project plans, schedues and specifications. The Manufacturer listed in the project equipment schedules, drawings and specifications is the basis of design for the project. "Approved Equal" manufacturers listed in the drawings and specifications are allowed to bid only if the manufacturer can provide exactly equal equipment, fixtures, materials and products as listed in the basis of design schedules, drawings and specifications, regardless of any prior approval listing. Any variation in the performance, appearance, color, shape, size, weight, electrical characteristics, etc. is subject to rejection during shop drawing review. Th product supplier and installing contractor are responsible for any and all changes to the project and associated costs for any equipment, fixtures, materials and products provided that do not meet the project design requirements. B. Submit proposals to contractor for substitution of material and equipment listed on the drawings and/or these specifications after the architect/engineer's approval has been obtained. For such proposals, provide materials and equipment that conform in type, function, quality of material and assembly and meet the requirements indicated in drawings and specifications. SUBMIT REQUESTS FOR APPROVAL TO THE ARCHITECT/ENGINEER AT LEAST 10 DAYS PRIOR TO THE BID Include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cuts, performance and test data and any other information needed for an evaluation nclude a statement setting forth any changes in any other equipment or other work that incorporation of the substitute would require. The burden of proof of the merit of the proposed substitute is upon the proposer. If these proposed substitutions are considered as acceptable equals for quotations and use, approval will be issued in an addendu

A. Prior to the placing of orders for any equipment, submit to the engineer for approval a complete schedule of mechanical eauipment and fixtures to be installed. PDF versions are required for review. Include in the schedule catalogs, cuts, diagrams, shop drawings, performance curves or any other descriptive material necessary to fully describe the equipment proposed and its operating characteristics. In the schedules, list the operating conditions of the equipment at B. Mechanical contractor is to submit all shop drawings with company letterhead, stamp, "approved" and signed prior to submittal to the engineer. The engineer will check the shop drawings to aid in interpreting the plans and specifications,

and in so doing will assume that the shop drawings conform to all specified requirements set forth in this specification.

The approval of the shop drawings by the engineer does not relieve the contractor of the responsibility of complying with all elements of the specification. Make the determination of quantities of material and equipment required based on the drawings. Schedules on the drawings and in the specification are completed as an aid to the contractor, but where discrepancies arise, provide the proper number to complete this work.

A. Coordinate all work with the asbestos abatement contractor for this project. Prior to the start of work review all asbestos reports or sample analysis, that the Owner has had completed. Do not cut into or in any other way disturb existing materials which contain asbestos. Asbestos abatement is not within the scope of Division 23 work but is to be conducted under the general contractor scope of work that would fall under the HVAC contractor for this project scope refer to plans and keynote as to where the testing has shown positive for asbestos containing materials. If a material that has not been tested for asbestos must be disturbed, make a request in writing to the Owner that the material be tested Provide materials and equipment which do not contain asbestos. At the completion of the project, certify in writing that the materials and equipment installed do not contain asbestos.

Provide 3M CP25 caulk for fire barrier caulking system. Provide fire barrier caulk that is UL classified and Factory Provide fire stopping for all mechanical work through fire rated construction. Provide 3M, Hilti or approved equal

B. Use only prime quality, new materials, apparatus and equipmer

Provide ASTM A36 structural steel for supports. Galvanize members installed in fan plenums or areas of high humidity or condensation, and outside. Furnish other members with 2 coats rust resistant ename Shop fabricate for field assembly using bolts.

systems. Submit shop drawings for each type of fire stop system required for the project.

Minimize field welding. Retouch paint after field welding. 6. Provide unistrut or equal support system.

ASBESTOS CONTAINING MATERIALS

PART 3 EXECUTION INSTALLATION OF THE WORK

A. Examine all the drawings before proceeding with the layout and installation of his work. General and electrical wiring A. Examine all the drawings before proceeding with the layout and installation of his work. General and electrical willing contract drawings will be made available to this Contractor. SHOULD DISCREPANCIES AFFECTING THE WORK BE FOUND, IMMEDIATELY REPORT SAME TO THE ENGINEER FOR INSTRUCTIONS. Provide for and cover the expense of subsequent changes made necessary by neglecting to discover and report such discrepancies, under the direction of the Engineer. B. "Furnish", "Provide", and/or "Install" are all considered as a requirement to both furnish the equipment and install it unless specific reference is made to the furnishing or installing of the equipment by others. Confer and cooperate with other Contractors on the job in the installation of the work so all work will be installed in proper relationship to the surrounding location and shape of any part to avoid conflicts. Provide for the correct size and ocation of any changes, slots, and openings required and do any cutting or patching made necessary by failure to make proper arrangements in this respect with no cost to the owner. Locate piping and ductwork essentially as shown on the drawings, but in exact locations as laid out on the job to suit actual conditions. Arrange exposed pipes as closely as practical to wall or ceiling surfaces. Indicated connections to

equipment are necessarily based on equipment of a given manufacturer. If the use of "approved equal" equipment is proposed, then assume the responsibility for proper location in a manner approved by the Engineer. Make changes that are necessary for this reason without additional cost to the Owner. Follow the equipment manufacturer's instructions and recommendations in the installation and connection of all equipment and materials furnished under this contract. In the event of conflict or discrepancy between manufacturer's

instructions and the contract documents, notify the Engineer before proceeding. Do not make any equipment installation in a manner that voids the manufacturer's warranty of the equipment Provide all anchoring devices and supports.

Use structural supports suitable for equipment, or as indicated Check loadings and dimensions of equipment with shop drawings

o not cut or weld to building structural members. All floor and roof mounted equipment is to be bolted to the floor or roof.

G. Provide temporary storage covering and shielding for all equipment provided to protect from damage. No equipment shall be stored on the site or in the building unless covered and protected from damage. Protect nameplates on motors, pumps and similar equipment. Protect plumbing fixtures, trim, valves and piping from damage. Keep dirt and debris out of pipes and ducts.

Repair, restore and replace damaged items. Take all necessary precautions to protect the building structure, finishes, furnishings, mechanical systems, electrical systems, and all contents from damage during the construction work. Repair or replace all such damage. M. Keep roads, corridors and exits clear of materials and debris. Provide barricades and signs where necessary to prevent access by unauthorized personnel.

Make arrangement for and pay for all necessary permits, fees, licenses, and inspections. Install piping and ductwork parallel to walls and vertically plumb. 2. In elevator machine rooms, fire rated stair enclosures and electrical equipment rooms, install no piping or ductwork

except for items serving the room itself. Refer to section 232116 for cleaning of the heating and chilled water piping systems. Remove labels, stickers, etc., and leave the entire installation in a clean, usable condition.

Thoroughly clean heating and cooling equipment, tanks, heat exchangers, pumps, traps, ducts, etc., and install new

A. Protect the finishes of all mechanical equipment during storage, installation and until final acceptance. "Touch up" any damage or imperfections or if extensive, repaint the entire unit as directed by the Engineer. 3.4 FIRE BARRIER PENETRATIONS

. Seal all cracks, voids, or holes for the passing of mechanical and electrical items through floors and fire rated walls, or ceilings with fire rating of 1 hour or more with a fire barrier caulk. B. Provide 3M CP 25 caulk for fire barrier caulking system.

Install fire barrier caulking system in accordance with the manufacturer's recommendations to maintain a fire rating of A. The Mechanical Contractor will set and maintain all sleeves. Provide sleever for any pipe passing through building construction including walls, floors, roofs or masonry partitions in accordance with the following. B. Provide all pipe sleeves through slabs, floors, masonry walls and partitions that are 1/2 inch greater in inside diameter than the external diameter of pipe passing through. Provide sleeves for insulated piping that are large enough to

accommodate the insulation without harming the insulation or vapor barrier. Provide all sleeves that are fabricated from new material cut square and reamed.

C. Provide sleeves in all masonry partition walls and floors. Provide sleeves that are Schedule 40 steel pipe. Provide wall sleeves that are flush with the wall surface. Extend the top of floor sleeves 1" above the floor, and the bottom of Protect the space between the pipe and the sleeves, through fire rated walls and floors as designated below. Furnish and install chrome-plated wall, floor and ceiling plates on all exposed pipes where they pass through walls,

loors, or ceilings in finished greas. Provide the wall plates with set screws or spring locks for clamping to the pipe. de watertight seal at all sleeves through flo

A. Provide all openings required for the passage of ductwork and mechanical equipment in the construction. Determine the correct location for all openings.

B. Provide the inside dimensions of all openings that are 1/2 inch greater than the size of the ductwork or equipment passing through the opening. Provide openings for insulated ductwork are large enough to accommodate the insulation without harming the insulation or vapor barrier.

Protect all openings through fire rated walls and floors as described above.

A. Patch and seal all openings through all non—fire rated construction around piping or ductwork. Seal openings to match construction material or provide fire rated caulking as described in "Fire Barrier Penetrations" above. Seal all openings around piping and ductwork in return air plenums to prevent non-plenum rated materials from being Verify that equipment will fit support layouts indicated.

Where substitute equipment is used, revise indicated supports to fit. Arrange for necessary openings to allow for admittance of equipment.

Where equipment cannot be installed as structure is being erected, provide and arrange for building in of boxes, eves or other devices to allow later installation

Make all penetrations through roofs prior to installation of roofing. For penetrations required after installation of H. In shingle roofing, provide all curbs, cants and base flashings.

In single ply membrane roofing (ESR), arrange for base flashing work by authorized roofer. Install rain hoods and metal flashings to make all penetrations of mechanical work through walls and roofs water and Furnish all clamps, water proofing material and labor necessary.

Verify the exact location of all existing building services extended and/or relocated for this project. Also verify the

act location and take proper precautions to protect all services which may be encountered during construction Protect, brace, and support all active services which are encountered where required for proper execution of the work d without interruption of service if possible. Protect all inactive services which are encountered or remove as directed by the Owner, Utility Company, or Municipal gency having jurisdiction. When active services must be temporarily interrupted, make arrangements to work continuously including overtime if required, to assure that services will be interrupted only as long as actually required to complete necessary work. No mechanical system component requiring acces for maintenance or adjustment is allowed to be concealed by Provide access to all motors, valves, dampers, controls, specialties, etc., for maintenance purposes. Provide all access

doors, access panels, removable sections, etc., required for access. If shown on the drawings, the General Contractor will provide access panels and doors required in the building construction. If access panels are not shown on the drawings to furnished by the General Contractor, it is the responsibility of the mechanical contractor to provide all required access panels whether shown or not. Coordinate the location of the access openings relative to the mechanical equipment to Provide all access openings required for all manual, motorized, fire and smoke dampers and other devices requiring access in the ductwork, plenums, housings, tanks, etc., under this portion of the contract

3.9 PROTECTIVE DEVICES Protect all sheaves, belts, drives, couplings, and moving parts by approved permanent guards, shields, or railings, which ill be in place whenever the equipment is in operation and will be in accordance with applicable safety standards. .10 INSTALLATION OF EQUIPMENT FURNISHED BY OTHERS Receive, uncrate and set in place all equipment furnished by others where shown or specified. Remove, relocate and re install all existing mechanical equipment to be re used.

Provide rough in and final connections to all equipment requiring mechanical services. For equipment furnished by others: Obtain rough in data from final shop drawings. Install all fittings, valves, and other items furnished as integral part of equipment, but shipped loose.

1 TESTS

Conduct all tests in the presence of the engineer and/or owner. Prior to conducting any tests or balancing of the systems, obtain and file a letter with the engineer's office if the tests are to be witnessed by the owner. Where required, erform such tests in the presence of local or state building inspection officials. Maintain reports of all tests as they are

Test performed and portion of system tested. Test results Name and signature of person performing test. Name and signature of witness of the test.

Upon completion of the project, submit the test reports with the operation and maintenance manuals for review by the

Perform indicated tests to demonstrate workmanship, operation, and performance Furnish or arrange for use of electrical energy, water or gas required for tests. Furnish all lubricating materials required for test. Repair or replace equipment and systems found inoperative or defective and re test. If equipment or system fails re test, replace it with products which conform with Contract Documents.

Continue remedial measures and re tests until satisfactory results are obtained.

Testing and charging refrigeration system:
PIPING TESTS: After the refrigeration piping and fittings have been assembled, remove all flux from connections and clean all lines. Blow out the piping system out with dry nitrogen to remove any free water or dirt which might be present. Charge the refrigerant lines with dry nitrogen and prove them tight at minimum gauge pressures of 300 PSI on the high side and 150 PSI on the low side. The system is required to hold these pressures for a period of 24 hours without pressure drop except for pressure change due to temperature differential.

2. EVACUATION AND DEHYDRATION: After the piping system has been proven tight by the pressure test, accomplish evacuation and dehydration of the system using the double evacuation method described in the following paragraphs.

3. EQUIPMENT AND CONDITIONS: Provide a two—stage, high vacuum pump capable of pumping down to 100 microns or lower while evacuating the system, and of adequate displacement to evacuate the various systems within a reasonable

mercury absolute. Also provide a wetbulb vacuum indicator, a supply of 100 percent methyl alcohol for use with this instrument and a temperature-pressure conversion chart for 100 percent methyl alcohol. Do the evacuation only when the ambient air temperature is 50 degrees F or higher. Be careful to go no lower than 5.16 millimeters of mercury absolute SYSTEM EVACUATION: This procedure begins after the vacuum pump and wet-bulb indicator have been properly ttached to the piping system. The vacuum is operated continuously until the pressure within the system reaches 5.16 illimeters of mercury absolute at which point the pump is stopped. REFRIGERATION AND OIL CHARGE: Charge the system with the proper amount of refrigerant and oil as recommended by he manufacturer based on the system size and refrigerant piping lengths. After charging the system, check the system ub—cooling and the suction and discharge pressure to ensure the system is properly charged with refrigerant. Verify that the oil level is correct as recommended by the unit manufacturer. Operate the systems as near as possible to design conditions for 48 hours, not necessarily continuous. During this time sufficient data will be logged to provide proof of satisfactory operation. 3.12 ALL EQUIPMENT FURNISHED UNDER DIVISION 230000:

At a time set by the contractor and gareed to by the owner, arrange to place equipment in operation and have ake necessary adjustments to equipment, and to prove satisfactory operation prior to turning facility over to the owner. Repair or replace any irregularities, faulty equipment, etc., as required prior to acceptance. Run operating test for 30 hour periods and submit data for approval. Charge all equipment with clean media and completely finish installation prior to acceptance. Properly balance all pumped water systems.

Properly balance all air systems. Balance the CFM of all diffusers to within 10% of the CFM listed on the schedule. 13 OPERATION AND MAINTENANCE MANUALS Prepare electronic PDF versions with complete sets of shop drawings of the equipment used in the erection of the mechanical systems and equipment testinas, cleanina and maintenance instructions, operation and maintenance manuals, list materials for the maintenance, parts list, wiring diagrams, and name and address of authorized service organization Properly identify all material with job name, date, and the names and addresses of the contractor, architect, and

engineer.
C. Submit the PDF version to the engineer for review of material and completeness prior to final inspection, and when pproved by the engineer, turn the portfolios over to the owner at the time of the final ins Where indicated in the specification, provide the services of a factory trained representative to instruct the owner's authorized personnel in the operation, control, and maintenance of equipment. Instruct owner's personnel in the operation of all other equipment and systems.

Include the following close-out documents in the manuals: Final Test and Balance reports. Valve taa chart.

Asbestos letter. Warranty letter.

Equipment start—up and functional test reports.

1.14 PROJECT CLOSE OUT See Division 1 for MSU Project Closeout Requirements. The Mechanical Contractor will arrange for an inspection of all items installed in the ceiling before the ceiling or ceiling tile is installed. Inform the engineer at least one week before the planned installation of the ceiling to arrange the inspection. If the ceiling tile is installed before the inspection, the mechanical contractor will remove all the ceiling tiles prior to the inspection. General: Refer to Division 1 sections for general closeout requirements. Maintain a daily log of operational data on mechanical equipment and systems throughout the closeout period; record hours of operation, assigned personnel, fuel onsumption and similar information; submit copy to engineer.

Record Drawings: Give special attention to the complete and accurate recording of underground conduit, piping and cealed and non—accessible work, branching arrangement and valve location of all piping systems, location of dampers and coils in duct systems, locations of control system sensors and other control devices, and work of change orders where Closeout Equipment/Systems Operations: Sequence operations properly so that work of the project will not be damaged or endangered. Coordinate with seasonal requirements. Operate each item of equipment with the owner's operating personnel present to demonstrate sustained, satisfactory performance. Adjust and correct operations as needed for proper operation. Clean and lubricate each system, and replace dirty filters, excessively worn parts and similar expendable parts of the system. Operating Instructions: Conduct at least a full day walk through instruction seminar for the Owner's personnel to be involved in the operation and maintenance of the mechanical equipment and systems. If more time is needed, continue instruction until the owner's personnel are familiar with the operation of the system. Explain the identification system,

operational diagrams, emergency and alarm provisions, sequencing requirements, seasonal provisions, security, safety, efficiency and similar features of the system. Turn-Over of Operation: At the time of substantial completion, turn over the prime responsibility for the operation of the system to the owner's personnel. However until the time of final acceptance, provide at least one full—time operating engineer, who is completely familiar with the work, to consult with and continue training the owner's personnel. Final Completion: The following special requirements will be provided in addition to those specified elsewhere: Do not call for final completion check until the mechanical systems and equipment have been installed, adjusted, balanced, and are in full and complete satisfactory operation and the following certifications of inspection from equipment suppliers have been completed and submitted with the architect/engineer. Certifications of inspection are required for the

following items of equipment: Type II kitchen exhaust fans (Factory Rep.) The certifications will consist of letters signed by Factory Trained and Authorized service engineers stating the following: They have inspected all their equipment on the project.

They approve the condition of their equipment and its installation.

They have fully checked its operation and certify that it is operating properly.

They will note any problems, conditions or objections that could lead to future operating problems. Log sheets will be provided on start—up of all Condensing Units, AHU's and Terminal Units. 3. Exceptions may be permitted upon written request from the contractor listing any minor items that are uncompleted and beyond his reasonable control. Provide a full guarantee that they be completed at a named later date and the uarantee will be extended as required to provide a full warranty. Final Payment will not be made until the contractor has satisfactorily completed all final inspection items.

Guarantee: Fully guarantee all equipment and work, parts and labor for one year from the date of substantial completion, unless noted otherwise. Guarantee all equipment and work and assume full responsibility to repair any equipment with no additional expense to the Owner which the manufacturer refuses to quarantee. The Owner has the right to order repairs to any equipment or work provided hereon and to charge the contractor for the same if repairs are not made during a reasonable period of time not to exceed 24 hours during an emergency or 72 hours on a non-critical item. END OF SECTION 230000

SECTION 230010 - DEMOLITION The extent of demolition is shown on the drawings.

1.2 Owner will retain ownership of plumbing fixtures and mechanical equipment (Fan coil units, cabinet unit heaters, 1.3 Remove all items which the owner does not wish to retain and dispose of off site.

1.4 SUBMIT PROPOSED SCHEDULE OF WORK TO ARCHITECT AND OWNER FOR REVIEW PRIOR TO START WORK. INCLUDE IN SCHEDULE COORDINATION FOR SHUT-OFF CAPPING AND CONTINUATION OF UTILITIES. PART 2 PRODUCTS (Not Applicable)
PART 3 EXECUTION

3.1 Demolish in an orderly and careful manner as required to accommodate new work. Protect existing supporting 3.2 Field verify exact locations of existing services and construction prior to demolition work. Take all necessary recautions to avoid damage to existing utilities or structure. .3 Repair all demolition performed in excess of that required at no cost to the owner.

4 Cap all pipes below floor or above ceiling. Remove all excess pipes and ducts. 5 Carefully remove all items to be retained by owner and store as directed by the owner. Remove from site all debris, rubbish, and all other items which the owner does not retain and dispose of off site.

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

1.1 WORK INCLUDED Provide pipe hangers that adequately support the piping system. Install near or at changes in piping direction and at concentrated loads. Install to provide vertical adjustment to maintain pitch required for proper drainage. Install to allow for expansion and contraction of the piping.

B. Construct and install duct hangers in accordance with the SMACNA HVAC Duct Construction Standards. Do not attach duct, piping or equipment hangers to wood sub-flooring, pan decks or wood roof decking. Attach nangers to the concrete floor structure or structural steel construction with joist or beam clamps. SEISMIC REQUIREMENTS

Provide and install duct, piping and equipment supports to meet all seismic requirements as required in the International Building Code and American Society of Civil Engineer (ASCE), ASCE-7, latest editions. 3. Each manufacturer of seismic system components will submit a certificate of compliance for review and acceptance by the engineer and/or the authority having jurisdiction. Submit shop drawings in accordance with Section 230000.

Indicate pipe hangers to be used for each size and type of pipe. Indicate seismic supports to be used for each type of pipe, duct or equipment on the project. CONCRETE BASES Provide (in coordination with the General Contractor) all concrete bases required for equipment (boilers, air handling units, tanks, pumps, furnaces, water heaters, etc.) inside the building and condensing units outside the

building. After the bases are poured, allow them to set at least five (5) days before mounting equipment.

PART 2 PRODUCTS Provide seismic supports for piping, ductwork and equipment as manufactured by Amber Booth, Mason Industries, r approved equal.

A. Provide hangers that are constructed of malleable or wrought iron, and hangers supporting copper pipe that are copper plated. Hangers for pipe 3 inches and smaller must be adjustable split ring, ELCEN FIG. 89, Galv. and ELCEN FIG. 389 copper plated. For piping above 3 inches, hangers must be adjustable, Clevis type, ELCEN FIG. 12. Support rod loading: Provide total hanger rod load (including piping, insulation, and medium) that does not exceed following limits: 3/8 IN 600 LE

1/2 IN 1100 LB 5/8 IN 1800 LE 7/8 IN 4900 LB

thick outdoor bases with re bar twelve inches on centers both ways.

D. Provide all uni-strut, angle iron, structural attachments and all accessories for a complete installation.

2.3 CONCRETE ANCHORS A. Provide Hilti (or approved equal) concrete inserts installed per the manufacturers recommendations. Coordinate Provide four inch thick indoor equipment bases with re-bar twelve inches on centers both ways. Provide six inch

B. Provide wedge anchors to attach the indoor pads to the concrete floors. Provide anchors in the pads to match the equipment support requirements. 3.1 PIPE SUPPORT INSTALLATION A. Where groups of three or more pipes occur, they may be supported with trapeze hangers using two hangers as specified with a capped pipe cross member. . Do not attach pipe hangers to the roof deck. Attach hangers to the steel construction with beam clamps, beam attachment and brackets bolted to joists and beams. Hang near joist panel joints wherever possible.

C. Provide pipe hangers for insulated piping that are large enough to encompass the insulation, using a metal shield so the vapor barrier jacket will not be broken. See Section 230713, Duct Insulation. Hanging from one pipe to another is prohibited. Install pipe hangers with the following spacing: HORIZONTAL STEEL PIPE: Maximum Spacing Up to 1−1/4" 1-1/2" to 3" 10 feet HORIZONTAL COPPER PIPE/TUBE: Maximum Spacing

1-1/4" Support horizontal cast iron soil pipe at five foot intervals except where 10 ft. lengths of pipe are used, 10 ft. | END OF SECTION 230900 intervals may be used. 2. Support horizontal and vertical plastic pipe 4'-0" on center.
3. Support vertical piping except plastic at each floor.
END OF SECTION 230529

SECTION 230900 - TEMPERATURE CONTROLS (AUTOMATIC)

PART 1 GENERAL

1/2" to 3/4"

1.1 WORK INCLUDED A. The work involved in this specification and the accompanying drawings consists of performing all labor and furnishing of all material and equipment necessary to install a complete Automatic Temperature Control (ATC) System for Heating, Ventilating and Air Conditioning systems as specified herein, including minor items obviously necessary for complete and operating installation. Also included in this section is relocation of any existing control equipment as required by the work.

B. Connect new equipment to the existing building control Direct Digital Control (DDC) and all necessary Stand Alone Controllers, Application Specific Controllers, Personal Computer Interface, Room Sensors, Air Stream Sensors, Relays, Valves, Damper Operators and other accessory equipment. Provide a complete system of electrical wiring to fill the intent of the Specifications. Competent mechanics regularly employed by the supplier of the temperature control equipment will install this system. C. Section 230000, Mechanical Special Conditions, in its entirety, including reference to applicable provisions of the General Requirements, are hereby adopted and made part of this section of the specification.

SHOP DRAWINGS Submit shop drawings as indicated in Section 230000. Include in shop drawings Bill of Materials, Schematic Diagrams, Control Instruments, Valves, Sequences of Operation, Schedules and Wiring Diagrams. Also include in submittal a trunk cable schematic diagram depicting the personal computer interface, control panel locations and a description of the communication type,

media and protocol. D. Also include in submittal a complete point list of all connected points to the DDC system. E. Include complete performance data and manufacturer's descriptive literature for all products used on the project.

Submit complete approved shop drawings and as-built documentation for inclusion in the mechanical contractors operation and maintenance manuals. 1.3 CONTRACTOR'S QUALIFICATIONS A. The temperature control contractor is required to be a factory approved representative of an approved temperature control manufacturer. Competent mechanics regularly employed

by the temperature control contractor are required to install the system. B. All Controls to be provided and installed by Electro Controls to match the existing systems. Electro Controls. 406-721-3084

C. The Installer is not allowed to subcontract out the installation to another entity that is not an authorized representative of the Manufacturer and/or has not completed the Manufacturer's certified training

At the time of bid, the Installer is required to have a fully staffed support office located within a 150-mile radius of the project site and must directly employ service technicians. Installer is required to be able to provide the owner with 24/7 emergency service within a reasonable time frame. 1.4 CODES AND STANDARDS

Refer to section 230000 for applicable code requirements. B. Install wiring per the latest adopted edition of the National Electric Code and per division 260000

A. Provide a one year warranty for all components, parts and assemblies against defects in material and workmanship after approved system demonstration. Expressed warranties are conditionally based on the requirement that the items covered within the guarantee are used and maintained in accordance with the manufacturer's recommendations. Guarantee commences at time of acceptance and continues for the previously indicated duration. Individual or aggregate beneficial use means the Owner's operators are able to use the system and receive reliable information from inputs and outputs completed by the ATC

B. The following procedures will govern the guarantee period. Within thirty days after the Owner is receiving beneficial use or approved operation, ATC Contractor will initiate the guarantee period by formally transmitting to the Owner commencement notification of the period for the system(s), subsystem(s), and devices previously accepted. Guarantee notification will be formally transmitted in like manner for subsequent phases of portions thereof which remain incomplete at the time of initial notification.

All products used in this installation must be new, currently under manufacture, and must be applied in standard off the shelf products. Spare parts must be available for at least 5 years after completion of this contract. PART 2 PRODUCTS

2.1 GENERAL A. Provide connection to existing DDC system comprised of a network of interoperable, stand—alone digital controllers, a personal computer, graphical user interface software. portable operator terminals, printers, network devices and other devices as specified herein.

2.2 CONTROLLER SOFTWARE A. Building software existing to remain. Integrate new equipment into controls from the existing building software.

2.3 GRAPHICAL USER INTERFACE SOFTWARE (GUI) A. Utilize existing building Interface software.

2.4 MATERIALS

ELECTRICAL WIRING Provide all electrical wiring in connection with the temperature control system under this section of the specifications in accordance with Division 26 of the Specifications. 2. Provide all power wiring as required for a complete operational temperature control system. Provide all power wiring not indicated in the electrical plans and documents for all temperature control devices and panels. Hire the project electrical contractor to install line voltage wiring and conduits and temperature control conduits. Include all conduit and wiring costs in the bid.

B. RELAY AND MISCELLANEOUS DEVICES:

1. Furnish and install necessary relays of the positive and gradual acting type as required for the successful operation of the system. Install all such devices in local temperature control panels or equipment enclosures.

C. CONTROL LABELS: Provide all temperature control devices, whether or not located on temperature control panels, with plastic nameplates indicating their purpose in the Sequence of Operation. Attach permanent labels to all temperature control devices except room thermostats.

PART 3 EXECUTION

3.1 SEQUENCE OF OPERATION:

EXISTING VAV UNIT, (E)VAV-23, (N)FAN COIL UNITS FCU1-1,2,3,4 and HP1-1 Existing VAV-23 currently provides both heating, ventilation, and economizer cooling at rooms 51, 54, and 40. Fan coil units and a heat pump are being added to provide mechanical cooling and supplemental heat throughout these spaces. Provide Carrier SUB-K KSAlC0601230 Mini Controller interface (24V) for each fan coil

terminal connection for cooling control. 3. (NEW) Fan Coil Unit FCU1-1 and FCU1-2: FCU1-1 to be master controller for Heat pump system. Interlock Fan Coil unit FCU1-1 and FCU1-2 together (refer to electrical drawings and manufacturer wiring for this connection).

unit. Connect DDC controller to the W terminal connection for heating control and Y

a. Occupied mode: 1) Upon a call for cooling of the space operate (E)VAV-23 cold deck as first stage of cooling when OAT is at or below space temp. If OAT is above space temp, set (E)VAV-23 to minimum air. Lock out the hot deck of (E)VAV-23. For second stage of cooling operate fan coil units FCU1-1 and FCU1-2 with Heat pump HP1-1 in cooling mode. 2) Upon a call for heating of the space Operate (E)VAV-23 hot deck as well as heating stage of Fan Coil Units with Heat Pump HP1—1 in the heating mode.

In unoccupied mode: Cooling shall modulate cold deck damper to maintain unoccupied cooling setpoint of 80 degrees F and FCU-1 and FCU-2, unless not allowed by code or other reason. 2) Upon a call for heating below its unoccupied heating setpoint of 60 degrees F, the hot deck variable air volume damper shall modulate to maintain heating air setpoint shall be modulated to maintain the space at its unoccupied heating setpoint. Fan Coil units to l remain off.

(NEW) Fan Coil Unit FCU1-3 a. Program fan coil unit controller to meet owner's occupancy requirements. FCU1—1 to be master controller for Heat pump system. 1) Upon a call for heat from the FCU1—1 thermostat provide heat to the space from the Fan Coil Unit.

2) Upon a call for cooling, operate the mechanical heat pump in cooling mode. (Note, Heat pump can only provide either heating or cooling to FCUs at one time.) 3) In unoccupied mode Fan Coil Unit to remain off with VAV—23 providing the heating I and coolina to the space. (NEW) FCU1-4(ADD ALT 1)

Upon a call for cooling of the space operate (E)VAV-21 cold deck as first stage of cooling. Lock out the hot deck of (E)VAV-21. For second stage of cooling operate fan coil units FCU1-4 with Heat pump HP1-1 in cooling mode. Reduce the cold deck to 25% of the airflow to the space. 2) Upon a call for heating of the space Operate (E)VAV-21 hot deck as well as heating stage of Fan Coil Units with Heat Pump HP1-1 in the heating mode. 3) Note, Heat pump can only provide either heating or cooling to FCUs at one time. This

office control is limited to what heat/cool position that FCU1-1 mode is in.

Program fan coil unit controller to meet owner's occupancy requirements.

4) In unoccupied mode Fan Coil Unit to operate with VAV-21 providing the heating and cooling to the space to meet unoccupied setpoints. 5) In occupied mode, VAV—21 cold ventilation deck to be set to minimum 25% of airflow. This minimum is required by 2021 IMC 1104.4.2 Exception. 3.2 OPERATOR INSTRUCTION:

Refer to Division 1 Specifications.

SECTION 232113 - HVAC PIPING AND PIPE FITTINGS PART 1 GENERAL

WORK INCLUDED Furnish and install where shown on the drawings and required to connect fixtures and equipment, pipe and fittings of type and material for the various services as noted below.

Submit shop drawings in accordance with Section 230000.

B. Indicate ASTM or ANSI ratings, pipe and fitting weights, pressure and temperature classifications and joining methods for all types of piping used in the project. A. Submit certification that each welder has passed A.W.S. qualification tests for the welding process involved and that certification is current. Provide all welding that is in compliance with the ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications". Comply with provisions of ASME B31 Series "Code for Pressure

2.1 REFRIGERANT PIPING A. Provide Line Set refrigerant grade, copper tubing meeting ASTM B1103. Provide fully annealed copper tubing

pressure rated to 700 psi 250F and UL listed.Provide with copper brazing type fittings ANSI B16.22, suitable for connection with brazing filler metal meeting AWS A5.8 for all refrigerant piping. While sweating fittings together, sweep y nitrogen through the tubing to prevent oxidation. Maximum Length of 150 Linear feet and 50 Vertical feet. INSTALLATION

Route Refrigerant Line Sets from Condensing Units to FCU units tight to ceiling with hanger supports every 8—foot maximum spacing. Provide Isolation Unistrut, hangers, and clamps with Neoprene coating to hang refrigerant Line Sets.

B. Provide all pipes, round and straight, of required size. Do cutting with proper tools and ream pipes to full size Properly enclose, support, guide, anchor, sway brace, connect, test, clean and flush out piping and properly D. Pipe sizes shown on the drawings are nominal pipe internal sizes and not outside diameters unless noted

E. Run pipes substantially as indicated on the drawings. However, the architect/engineer reserves the right to require this Contractor to make minor changes in pipe locations where conflicts occur with other trades. Provide for such changes without extra cost to the Owner. Install piping with ample provisions for expansion and contraction to prevent injury to the same and to the building construction. Make such provision by means of piping offsets, changes in direction, expansion loops and/or suitable expansion joints. Provide suitable anchors and guides to permit proper deflection and compression of offset loops and expansion joints. Do not use expansion joints in lieu of offsets, changes in direction or loops, except where specified and/or indicated on the drawings or where otherwise obviously necessary. Run all pipes with proper grade to provide for easy draining and in group runs where applicable and in a neat

and orderly manner, to the satisfaction of architect/engineer. Install lines required to be enclosed in ceiling,

chaseways or spaces to permit such enclosure as intended. Carefully lay out all pipe runs and schedule to avoid

H. Install dielectric unions at each piping joint between ferrous and non-ferrous piping and joints between dissimilar metals. Comply with manufacturer's installation instructions. Provide standard products recommended by manufacturer for use in service indicated, which effectively isolate piping (electric conductance), prevent galvanic action and stop At all fixture connections where nipples are necessary between copper tubing and fixtures, provide such nipples that are standard weight full iron size chrome plated brass pipe nipples with suitable brass or copper adapters. Steel or iron nipples will not be permitted in any location in copper lines where connections are made to brass fixtures valves or trim

A. Threaded Joints: Cut piping straight and square, ream, thread and work into place without springing. Use prepared pipe thread lubricant on outside threads only. B. Flanged Joints: When bolting flanged joints, take care to insure that there is no restraint on opposite end of pipe or fittings which would prevent uniform gasket compression or cause unnecessary stress in flanges. Keep one flange free to move in any direction while flange bolts are being tightened. Tighten bolts gradually and at a uniform rate, so that gasket compression is uniform over entire area of gasket. High temperature soldered joints: Take care to avoid annealing of pipe material. Copper potable water piping will have soldered or brazed joints. Clean jointing surfaces thoroughly by hand. Apply flux immediately after cleaning. Do not rely on flux for actual cleaning. Fill all voids with solder as flux leaves to insure a strong joint. Select flux compatible with type joint being made. Provide all joints that comply with local codes and ordinances and are nstalled per the Copper Development Association recommendations.

A. Test piping as outlined in Section 230000. END OF SECTION 232113 SECTION 238127 - MINI-SPLIT AND MULTI-SPLIT SYSTEMS

PART 1 GENERAL A. Section Includes heat pumps and fan coil units for mini-split and multi-split systems.

A. Air—Conditioning and Refrigeration Institute (ARI): ARI 210/240 - 2005, Unitary Air-Conditioning and Air-Source Heat Pump Equipment.

2. ARI 270 - 1995, Sound Rating of Outdoor Unitary Equipment.

B. Servicing Standards: Underwriters Laboratories, Inc.® (UL) Underwriters Laboratories of Canada® (ULC) Department of Energy (DOE), units rated to 9001 registered manufacturing quality system

Units to Be Energy Star® compliant

SEER must exceed 18.

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 01 Submittal

B. Product Data: Submit product data for specified products

Submit shop drawings in accordance with Section 230000.

Warranty: Commencing on Date of Installation. 2. Other Covered Components: Two years.

PART 2 PRODUCTS 2.1 AIR CONDITIONERS/SPLIT SYSTEM UNITS Manufacturer: Carrier with Daikin, LG or approved equa

Provide factory assembled units, wired and piped, assembled in the USA, factory tested prior to shipping. steel with corrosion free pre-painted cabinet finish and corrosion pre-painted base section. Provide with fan guard.

2. Refrigerant Line Connections: a. Sweat connection vapor and liquid lines located on cabinet corner.

Inverter scroll compressor with factory installed reversing valve.

4. Refrigerant System: a. Refrigerant: R454-B

Outdoor Coil Fan: Direct drive fan with horizontal air discharge. b. Fan motor to be DC, direct drive with permanently lubricated bearings and balanced prior to assembly.

Provide copper tube with flared shoulder connections, silver solder construction

Provide with wired remote controller, field installed with the following options:

Provide the fan coil units are factory assembled, wired and run tested. Provide the unit containing all factory wiring, piping, control cucuitry and fan/motor. Provide ducted slim-duct type units with duct collars on both supply

Provide galvanized steel cabinet with filter rack. Provide the fan is direct drive DC motor, statically and dynamically balanced with permanently lubricated bearings. 4. Construct the coil of aluminum plate fins on copper tubing. Provide all tubing that is factory brazed and leak

Auto change over from heating to cooling. Temperature settings. Time settings.

END OF SECTION 238127

equipment as required for a complete installation.

Start/stop, fan, timer e. Microprocessor located in the fan coil unit will sense the return air temperature, coil temperature and process the commands to operate the condensing unit as required. Provide unit with auto restart after power failure. Controls signal will be be on the same wiring as the power wiring between the indoor and outdoor units.

A. Site Verification of Conditions: Verify that substrate conditions, which have been previously installed under other

MECHANICAL SPECIFICATIONS

PART 3 EXECUTION 3.1 MANUFACTURER'S INSTRUCTIONS . Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions and product carton installation instruction

A. Install air conditioners in accordance with manufacturer's instructions and regulations of authorities having

NO SCALE

UNIVERSITY BOZEMAN, MONTANA PHONE: 406.994.5413 FAX: 406.994.5665

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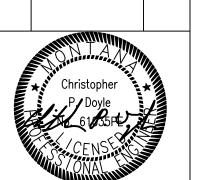
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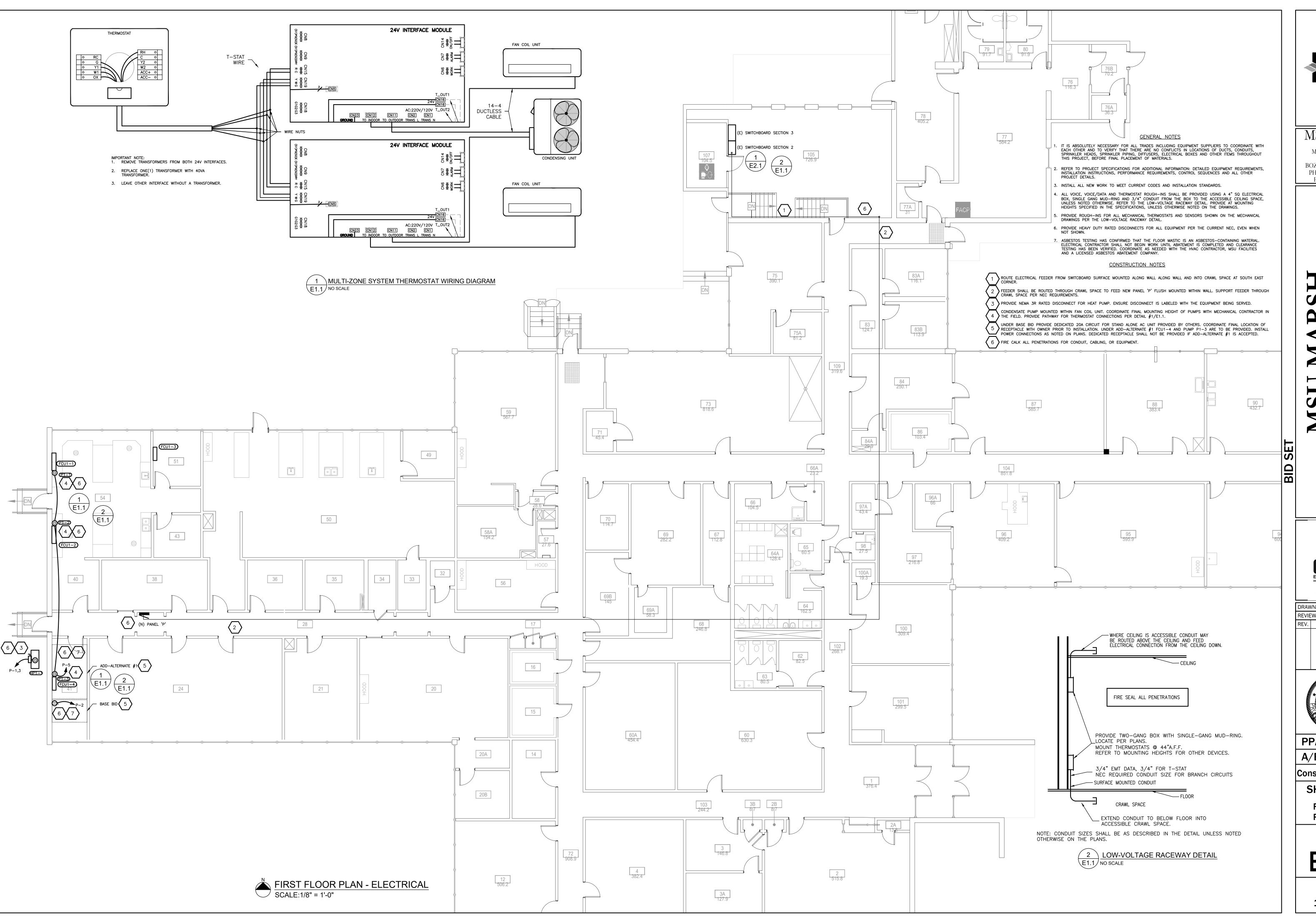
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PPA#25-1248

SHEET TITLE MECHANICAL LEGEND. DETAILS AND SCHEDULES

SHEET



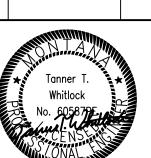
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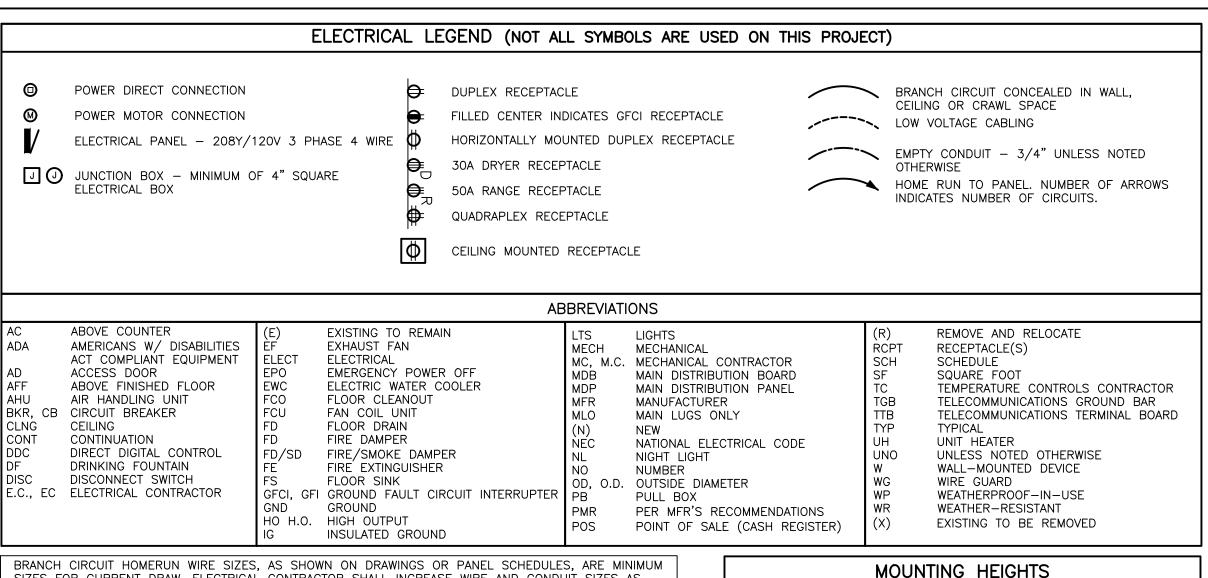


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SHEET TITLE FIRST FLOOR

> PLAN - ELEC SHEET



BRANCH CIRCUIT HOMERUN WIRE SIZES, AS SHOWN ON DRAWINGS OR PANEL SCHEDULES, ARE MINIMUM SIZES FOR CURRENT DRAW. ELECTRICAL CONTRACTOR SHALL INCREASE WIRE AND CONDUIT SIZES AS REQUIRED TO LIMIT BRANCH CIRCUIT VOLTAGE DROP TO 3%. BASED ON ACTUAL HOMERUN LENGTHS REQUIRED IN FIELD. BRANCH CIRCUIT VOLTAGE DROP CALCULATIONS SHALL BE PERFORMED IN ACCORDANCE WITH THESE CRITERIA:

	TYPE OF LOAD	LOAD CURRENT	DISTANCE
	DUPLEX RECEPTACLE	16A	TO FARTHEST RECEPTACLE
	OTHER RECEPTACLES	80% OF RATED CURRENT	TO FARTHEST RECEPTACLE
	LIGHT FIXTURES	TOTAL VA OF ALL FIXTURES ON CKT	TO FIRST FIXTURE VIA SWITCH(ES) INCLUDING LENGTH OF TRAVELERS
	MOTORS	125% OF NAMEPLATE FLA	TO MOTOR/EQUIPMENT
	HEATERS MISCELLANEOUS	BASED ON TOTAL VA	TO DEVICE/EQUIPMENT
1	•		_

IN GENERAL, BASED ON COPPER WIRES, MINIMUM WIRE SIZES FOR 120V, 20A BRANCH CIRCUITS SHALL BE AS SHOWN IN TABLES BELOW:

20A RECEPT/ EQUIF	P BRANCH CIRCUITS
LENGTH (FEET)	WIRE SIZE (AWG)
UP TO 60	#12
UP TO 95	#10
UP TO 150	#8
LIP TO 240	#6

ALL DUPLEX AND GFI RECEPTACLES SHALL BE RATED FOR 20A. MC CABLE MAY BE USED, BUT ONLY WHERE IT IS FISHED INSIDE EXISTING WALLS OR CEILINGS.

UNDER NO CIRCUMSTANCES SHALL MC CABLE BE INSTALLED WHERE IT IS EXPOSED. WHEREVER MC CABLE IS INSTALLED, IT SHALL HAVE ONE SPARE CURRENT CARRYING CONDUCTOR FOR FUTURE USE.

RECEPTACLES (WALL)	18" A.F.F. TO CENTER
RECEPTACLES (ABOVE COUNTER)	44" A.F.F. TO CENTER
RECEPTACLES (UNFINISHED AREA)	44" A.F.F. TO CENTER
RECEPTACLES (HORIZONTAL)	32" A.F.F. TO CENTER
SURFACE RACEWAY RECEPTACLE STRIPS	42" A.F.F. TO BOTTOM
LIGHT SWITCHES	44" A.F.F. TO CENTER
VOICE OUTLET (WALL)	54" A.F.F. TO CENTER
VOICE/DATA OUTLET	18" A.F.F. TO CENTER
CLOCK OUTLET	96" A.F.F. TO CENTER
EXIT SIGN	CENTER ON DOOR,
	12" ABOVE DOOR
FIRE ALARM PULL STATION	44" A.F.F. TO CENTER
FIRE ALARM HORN/STROBE	80" A.F.F. TO BOTTOM
	OR 6" BELOW CEILING
CARD READERS	44" A.F.F. TO CARD SLOT
SECURITY SYSTEM CONTROLS	44" A.F.F. TO CENTER
THERMOSTATS/ HVAC CONTROLS	44" A.F.F. TO CENTER
ELECTRICAL PANELS	72" A.F.F. TO TOP
SAFETY SWITCHES/MOTOR STARTER/ VFD'S	72" A.F.F. TO TOP
	(TOP OF HANDLE NOT
	TO EXCEED 78" A.F.F.)
MOTOR CONTROL PUSHBUTTONS	60" A.F.F. TO CENTER
SUBSCRIPT "AC" BESIDE RECEPTACLES DENOTE	S THAT RECEPTACLE IS TO
BE INSTALLED WITH BOTTOM OF BOX TWO INC	
COUNTERTOP OR BACKSPLASH. COORDINATE W	ITH THE GENERAL
CONTRACTOR AND THE CASEWORK SUPPLIER.	

HEIGHT

(E)	SWITCHBOARD SECT	ION 2		(E) S'	WITCHBOA	RD :	SECTION 3					(N	I) PA	ANEL	P			
, ,	MPS 208Y/120V VOLT 3 PHASE 4 WIRE	THE PART OF THE PERT OF THE PE		AMPS 208Y/120V VOLT 3 PHASE 4 V		2000			225 AMPS	MLO 208Y/120V	OLT 3 PHASE 4 WIRE SURFACE MO	1						
BREAK	ER DESCRIPTION	CIRCUIT	BREA	KER DESCRIPTION	CIRCUI	CIRCUI	T DESCRIPTION BREAK	∃R B	BREAKER	DESCRIPTION	CIRCI	UIT	PHAS	ELOADS	CIRCUIT DI	ESCRIPTION		BREAKER
AMPS P	DLES	#	AMPS	POLES	#	#	AMPS PO	OLES AM	MPS POLES		WATTS			ВС	# WATTS			AMPS POLES
225	3 PANEL A	1		PROVISION	1	2		4	15 3	HP1-1	3640		3640	į	10.00	PARE		20 1
-		3		PROVISION	3	4					3640	3	3	3640		PARE		20 1
-		5		PROVISION	5	6			-	PUMPS P1-1, P1-2, F	1-3 180	5		180		PARE		20 1
225	3 PANEL C	7		PROVISION	7	8	PANEL BM-2			SPA RE		7	0			PARE		20 1
		9		PROVISION	9	10				SPA RE		9		0		PARE		20 1
-		11		M-VET METERING POWER	11	12				SPA RE		11	_	0	7/2	PARE		20 1
70	3 WELL	13			13	14	PANEL G		20 1	SPA RE		13				PARE PARE		20 1
-		15			15	16				SPARE SPARE		15 17		0		PARE		20 1
-		17		PNL N SECTION 1&2	17	18				SPARE		19	0	U		PARE		20 1
225	3 (N) PANEL P	19			19	20	PANEL F			SPARE		21		0		PARE		20 1
-	(EXISTING PROVISION SPACE)	21			21	22				SPARE		23	L	0		PARE		20 1
-		23			23	24				SPARE		25	0			PARE		20 1
	PROVISION	25		PANEL E	25	26	PNL ISO LAB	—I ⊢́		PROVISION		27		0		ROVISION		+
	PROVISION	27			27	28		-		PROVISION		29	_	0		ROVISION		+
	PROVISION	29			29	30				PROVISION		31	0			ROVISION		+ + +
225	3 PANEL I	31		PANEL K	31		PANEL BM-1			PROVISION		33		0		ROVISION		+ +
-		33			33	34 36				PROVISION		35	_	0	36 PF	ROVISION		T
-		35			35		POULTE DISCONNICCT	_		PROVISION		37	0		38 PF	ROVISION		
	3 PANEL D	37		PROVISION PROVISION	37 39	38 40	BOILER DISCONNECT			PROVISION		39		0		ROVISION		
		39		PROVISION	41	40				PROVISION		41		0	42 PF	ROVISION		
-		41		PROVISION	41	42	PROVISION						3640 3	3640 180				
225	3 PANEL J	43 45		PROVISION	45	44	PROVISION					_						
-		45		PROVISION	45	48	PROVISION			TOTAL LOADS:	7460	WATTS	S					
-	-	47		A/C UNIT #1	49	50	PROVISION			DEMA ND:								
					51	52	PROVISION											
					53	54	PROVISION				21	AMPS						
					55	56	PROVISION											
				UNKNOWN	57	58	PROVISION											
					59	60	PROVISION											
					61	62	PROVISION											
					63	64	PROVISION											
					65	66	PROVISION	_										
				UNKNOWN	67	68	PROVISION									1		
					69	70	PROVISION											
					71	72	PROVISION											
				A/C UNIT#2	73	74	PROVISION											
					75	76	PROVISION											
					77	78					<u> </u>							
				PROVISION	79		PANEL H							——— I				
				PROVISION	81	82					(E)		(E)					
				PROVISION	83	84					SWITCHBOARD	SWIT	CHBO	ARD				
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					ONE-LINE	DIAGE	RAM NUTES				(E) 1600A					208Y,		
											208Y/120V					3 PH	4W	
				\frown							3PH. 4W.					42 5	PACE	
			(1 225A FEEDER, (4) #300	KCMIL AL. + (1)	#2 AL.	GRD. IN A 3" CONDUIT.				MAIN SWITCH					10,86		
				\bowtie														
			(2 > PROVIDE NEW BREAKER V	WITHIN EXISTING E	LECTRICA	AL GEAR TO FEED NEW ELECTRICAL PANEL	·			(N) 225A BREAKER							
			`	$lue{}$							BKFWKFK							
			/				TO A MINIMUM. ALL OUTAGES SHALL BE									[(1)		
							DAYS PRIOR TO THE OUTAGE.											
				ARRANGEMENTS SHALL BI	E MADE TO WORK	CONTIN	UOUSLY INCLUDING OVERTIME IF											
				REQUIRED, TO ASSURE TH	HAT SERVICES ARE	ONLY	NTERRUPTED AS LONG AS REQUIRED TO											
				COMPLETE NECESSARY W				FXTF	RIOR IN	NTFRIOR -					MECH 105	HALL 28	MAIN L	FVFI
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\EXISTING ELECTRICAL ONE-LINE DIAGRAM E2.1 NO SCALE

SECTION 260500 — ELECTRICAL GENERAL REQUIREMENTS
PART 1 GENERAL .1 GENERAL SUPPLEMENTARY AND OTHER CONDITIONS OF THE CONTRACT

The general, supplementary and other Conditions of the Contract and the General sion 1) are hereby made a part of this section.

1.2' INTENT OF PLANS AND SPECIFICIATIONS The plans and specifications contemplate the complete installation of the system escribed so that at the conclusion of the construction, the systems will be turned over to

the owner complete and ready for safe, efficient operation. The plans and specifications cannot deal individually with the many minute items which may be required by the nature of the systems. The contractor shall be obliged to furnish and install all such items normally d on systems of this type, which while not mentioned directly herein, are obviously essential to the installation and operation of the system and which are normally furnished on The drawings are partly diagrammatic and do not necessarily show exact location of

onduit unless specifically dimensioned. Riser and other diagrams are schematic and do not necessarily show the physical arrangement of the equipment. They shall not be used for In receiving bids, it will be assumed that each bidder has made a thorough inspection of the conditions and is familiar with all conditions affecting the extent or cost of this work. Claims for extra payments as a result of failure to examine the conditions prior to submitting C. The determination of auantities of material and equipment required shall be made by th the bid will not be allowed.

1.3 ELECTRONIC COPIES OF DOCUMENTS

Electronic drawing files are available for construction coordination upon written request t the architect or engineer for a cost of \$100 per drawing. A written release waver will be required to be signed by the entity requesting the drawing(s). Upon receipt of signed waver and payment of drawing fee, electronic files will be delivered. Regardless of files delivered, it is the responsibility of the recipient to field verify all conditions prior to the fabrication or installation of any work.
1.4 CODES, ORDINANCES, PERMITS, AND FEES

Comply with all state and local codes and ordinances applying to the work specified herein. Attention is directed in particular to the NATIONAL ELECTRIC CODE (NEC), NATIONAL FIRE PROTECTION ASSOCIATION (NFPA). AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI). NATIONAL ELECTRICAL MANUFACTURERS INSTITUTE (NEMA), INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE), INTERNATIONAL BUILDING CODE (IBC), UNIFORM FEDERA ACCESSIBILITY STANDARDS (UFAS). INTERNATIONAL ENERGY CONSERVATION CODE (IECC). MANUFACTURERS INSTRUCTIONS AND OR ANY AUTHORITY HAVING JURISDICTION, and local regulations concerning the specified electrical, lighting and special systems equipment

Make application for, obtain and pay for all required permits and certificates of inspection for the work. In the event of conflict between this specification and a governing code or ordinance, the higher standard shall govern. Bidders shall familiarize themselves with local regulations which affect their work in any way. Extra payment will not be allowed for changes required by local regulations.

Cost of primary work noted to be by Utility Company not to be included in Contractor's Bid. All charges made by the Utility Company for their part of the primary work will be billed such discrepancies shall be made by and at the expense of the Contractor, under the lirectly to the Owner and paid for by the Owner. 1.5 RESPONSIBILITY responsible for the installation of a satisfactory and complete system in accordance

with the intent of the drawing and specifications. Provide, at no extra cost, all incidental tems required for completion of the work even though they are not specifically mentioned or indicated on the drawings or in the specifications. The drawings do not attempt to show complete details of the building construction which affect the electrical installation: and reference is therefore required to the Architectural. stural, Landscape and Mechanical drawings and specifications and to shop drawings of all be required to do, at his expense, any cutting or patching made necessary by his failure to trades for additional details which affect the installation of the work covered under this

Location of electrical system components shall be checked for conflicts with openings structural members and components of other systems having fixed locations. In the event o any conflicts, the Architect/Engineer shall be consulted and his decision shall govern. Necessary changes shall be made at no additional expense to the Architect/Engineer or

Determine, and be responsible for, the proper location and character of inserts for hangers, chases, sleeves and other openings in the construction required for the work, and obtain this information well in advance of the construction progress so work will not be Roughing-in fixtures, etc., must be laid out accurately. Connections to equipment of the same class shall be equal heights, plumb, and at right angles to the wall, unless Final location of inserts, hangers, etc., required for each installation, must be coordinated with facilities required for other installations to prevent interference. F. Take extreme caution not to install work that connects to equipment until such time as complete Shop Drawings of such equipment have been approved by the Architect/Engineer.

ny work installed by the Contractor, prior to approval of Shop Drawings, will be at the

At all times during the performance of this Contract, properly protect work from damage and protect the Owner's property from injury of loss. Make good any damage, injury or loss, recommendations to maintain a fire rating of 3 hours minimum. except such as may be directly due to errors in the Bidding Documents or caused by Agents Employees of the Owner. Adequately protect adjacent property as provided by law and the Bidding Documents. Provide and maintain passageways, guard fences, lights and other ities for protection required by Public Authority or Local conditions. H. Circuiting and switching shall be exactly as shown on drawings. Combining of home runs s acceptable. Contractor shall refer to NEC Article 310.8 and adjust accordingly. of wiring of various systems in conduit runs is not acceptable unless otherwise specified

equals for quotations and use, approval will be issued in an addendum.

Contractor's risk.

Proposals to contractor for substitution of material and equipment listed on the drawings and/or these specifications shall be submitted after the architect/engineer's approval has been obtained. For such proposals, materials and equipment will have to conform in type, function, quality of material and assembly and meet the requirements indicated in drawings and specifications. REQUESTS FOR APPROVAL SHALL BE SUBMITTED TO THE ARCHITECT/ENGINEER AT LEAST 10 DAYS PRIOR TO THE BID DATE. Each request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cuts, photometric IES files, performance and test data and any other information needed for an evaluation. A statement etting forth any changes in any other equipment or other work that incorporation of the substitute would require shall be included. The burden of proof of the merit of the proposed substitute is upon the proposer. If these proposed substitutions are considered as acceptable

A. The contractor shall submit to the engineer for approval, prior to the placing of orders

A. The Contractor shall verify the exact location of all existing building services extended for any equipment, a complete schedule of electrical equipment and light fixtures to be installed. The schedule shall consist of at least six (6) sets each of catalogs, cuts, digarams, shop drawings, photometric data or any other descriptive material necessary to fully B. All active services which are encountered shall be protected, braced and supported where describe the equipment proposed and its operating characteristics. The schedules shall list the operating conditions of the equipment at the conditions listed on the schedules. Provide Disconnect and Safety Switches.

DESCRIPTION

Raceway and Fittings. Grounding Connections.

All shop drawings shall be submitted by the contractor and shall have been signed. approved" and initialed by the contractor prior to submittal to the engineer. The engineer will check the shop drawings to aid in interpreting the plans and specifications, and in so doing will assume that the shop drawings conform to all specified requirements set forth in this specification. The approval of the shop drawings by the engineer does not relieve the contractor of the responsibility of complying with all elements of the specification. contractor from the drawings. Schedules on the drawings and in the specification are completed as an aid to the contractor, but where discrepancies arise, it shall not release th contractor from providing the proper number to complete this work.

1.9 ASBESTOS CONTAINING MATERIALS Coordinate all work with the asbestos abatement contractor for this project. Prior to the start of work the Contractor shall review all asbestos reports or sample analysis, that the Owner has had completed. The Contractor shall not cut into or in any other way disturb existing materials which contain asbestos. Asbestos abatement is not within the scope of Division 16 work. If the Contractor must disturb a material that has not been tested for asbestos, request in writing shall be made to the Owner that the material be tested for asbestos prior to the start of work. The Contractor shall provide materials and equipment which do not contain asbestos. At to acceptance. the completion of the project, the Contractor shall certify in writing that the materials and equipment installed do not contain asbestos.

MATERIAL S Fire barrier caulking system shall be 3M CP25 caulk. Fire barrier caulk shall be UL classified and Factory Mutual System approved. INSTALLATION OF THE WORK

The Contractor shall examine all the drawings before proceeding with the layout and installation of his work. General, mechanical, and plumbing contract drawings will be made available to this Contractor. SHOULD DISCREPANCIES AFFECTING THE WORK BE FOUND, THE CONTRACTOR SHALL IMMEDIATELY REPORT SAME TO THE ENGINEER FOR INSTRUCTIONS. Subsequent changes made necessary by the neglect of any Contractor to discover and report direction of the Engineer. Furnish, provide, and/or install shall be considered as requiring the Contractor to both furnish the equipment and install it unless specific reference is made to the furnishing or installing of the equipment by others. The Contractor shall confer and cooperate with other Contractors on the job in the installation of his work so all work will be installed in proper relationship to the surrounding location and shape of any part to avoid conflicts. The Contractor shall be responsible for

the correct size and location of any changes, slots, and openings required by him and shall make proper arrangements in this respect. The Contractor shall follow the equipment manufacturer's instructions and recommendations in the installation and connection of all equipment and materials furnished under this contract. In the event of conflict or discrepancy between manufacturer's instructions and the contract documents, the Contractor shall notify the Engineer before proceeding. No equipment installation shall be made in a manner that voids the manufacturer's warranty of the equipment.

Labels, stickers, etc., shall be removed and the entire installation left in a clean, usable

inal acceptance. Any damage or imperfections shall be "touched up" or if extensive, the entire unit shall be repainted as directed by the Engineer. A. All cracks, voids, or holes for the passing of mechanical and electrical items through floors and fire rated walls, or ceilings with fire rating of 1 hour or more shall be sealed with

a fire barrier caulk. Fire barrier caulking system shall be 3M CP 25 caulk. C. Fire barrier caulking system shall be installed in accordance with the manufacturer's

The Electrical Contractor shall set and maintain all sleeves. Any conduit passing through building construction including walls, floors, roofs or masonry partitions shall be encompassed with sleeves in accordance with the following. B. All conduit sleeves through slabs, floors, masonry walls and partitions shall be 1/2 inch greater in inside diameter than the external diameter of pipe passing through. All sleeves shall 1 fabricated from new material cut square and reamed. Sleeves shall be provided in all masonry partition walls and floors. Sleeves shall be chedule 40 steel pipe. Wall sleeves shall be flush with the wall surface. The top of floor PART 2 PRODUCTS Regular inspections shall be requested of duly authorized inspectors as required by codes sleeves shall extend 1" above the floor, the bottom of the sleeve shall be flush with the The space between the pipe and the sleeves, through fire rated walls and floors shall be protected as designated below. E. Furnish and install chrome-plated wall, floor and ceiling plates on all exposed pipes where they pass through walls, floors, or ceilings in finished areas. The wall plates shall have set screws or spring locks for clamping to the pipe.

> 3.6 OPENINGS All openings required for the passage of multiple conduits and electrical equipment in the construction shall be provided by the Electrical Contractor. The Electrical Contractor shall e responsible for determining the correct location for all openings. The inside dimensions of all openings shall be 1/2 inch greater than the size of the ductwork or equipment passing through the opening. Openings for insulated ductwork shall be large enough to accommodate the insulation without harming the insulation or vapor barrier. All openings through fire rated walls and floors shall be protected as described above. its entire length.

Il sleeves through floors shall be sealed watertight.

take proper precautions to protect all services which may be encountered during construction. required for proper execution of the work and without interruption of service if possible. All inactive services which are encountered shall be protected, or removed as directed by Owner, Utility Company, or Municipal Agency having jurisdiction. When active services must be temporarily interrupted, arrangements shall be made to work continuously including overtime if required, to assure that services will be interrupted only as long as actually required to complete necessary work. 3.8 ACCESS TO EQUIPMENT

Access shall be provided to all motors, junction boxes, relays, controls, specialties, etc... maintenance purposes. All access doors, access panels, removable sections, etc., required for access shall be provided. The General Contractor will provide access panels and doors equired in the building construction where shown on the plans. The location of the access openings relative to the electrical equipment shall be coordinated to assure proper access to

Test all wiring and connections for shorts between conductors, shorts to ground, and for continuity prior to installation of fixtures and equipment. Perform insulation resistance test on all feeder conductors installed under this contract, including neutrals, using a megohmeter. Minimum value shall be 100 megohm at 60 degrees Correct and retest any defects and submit data to engineer. Test all low-voltage cabling, installed within the contract, per industry standards and submit test results to engineer. 3.10 ALL EQUIPMENT FURNISHED UNDER DIVISIONS 26000, 27000, and 28000: At a time set by the contractor and agreed to by the owner, arrange to place equipment in operation and have available at that time, if required, representatives of the

nanufacturer of equipment to assist in starting equipment, to make necessary adjustments to equipment, and to prove satisfactory operation prior to turning facility over to the owner. Any irregularities, faulty equipment, etc., shall be repaired or replaced as required prior 3.11 PROJECT CLOSE OUT

The electrical contractor shall arrange for an inspection of all items installed in the ceiling before the ceiling or ceiling tile is installed. The engineer shall be informed at least one week before the planned installation of the ceiling to arrange the inspection. If the ceiling tile is installed before the inspection, the electrical contractor shall remove all the Record Drawings: Give special attention to the complete and accurate recording of underground conduit and concealed and non-accessible work, and junction box location(s) of all conduit systems, location of lighting controls and remote ballasts in lighting systems, and work of change orders where not shown on contract documents. Operating Instructions: Conduct at least a full day walk through instruction seminar for the Owner's personal to be involved in the operation and maintenance of the electrical equipment and systems. If more time is needed the contractor shall continue instruction until the owner's personal are familiar with the operation of the system. Explain the identification system, operational diagrams, emergency and alarm provisions, seasonal provisions, security, Turn-Over of Operation: At the time of substantial completion, turn over the prime esponsibility for the operation of the system to the owner's personal. However until the time of final acceptance, provide at least one full—time operating engineer, who is completely familiar with the work, to consult with and continue training the owner's personal. Final Completion: The following special requirements shall be provided in addition to those specified elsewhere: The contractor shall not call for final completion check until the electrical systems and

equipment have been installed, adjusted, programmed, and are in full and complete satisfactory operation and the following certifications of inspection from equipment suppliers have been completed and submitted with the architect/engineer. Exceptions may be permitted upon written request from the contractor listing any minor items that are uncompleted and beyond his reasonable control. Provide a full auarantee that they be completed at a named later date and the guarantee shall be extended as required to Final Payment will not be made until the contractor has satisfactorily completed all final nspection items Guarantee: All equipment and work shall be fully guaranteed, parts and labor for one Finishes of all electrical equipment shall be protected during storage, installation and until year from the date of substantial completion, unless noted otherwise. The contractor has the full responsibility to guarantee all equipment and work and shall assume full responsibility to repair any equipment at his cost which the manufacturer refuses to guarantee. The Owner has the right to order repairs to any equipment or work provided hereon and to charge the contractor for the same if repairs are not made during a reasonable period of time not to exceed 24 hours during an emergency or 72 hours on a non-critical item.

SECTION 260513 - MEDIUM, LOW AND CONTROL VOLTAGE CABLES

END OF SECTION 260500

A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section Section 260526 - Grounding and Bonding for Electrical Section 260533 — Electrical Materials and Methods

2.1 CABLE AND WIRE (600 VOLTS AND BELOW) A. Secondary distribution and power cable shall be single conductor stranded copper, No. 12 AWG minimum; with NEC Type THHN insulation rated 90 degrees C, 600 volts. Alan Wire, American Insulated Wire, General, Cerro Wire, Encore, Republic Wire, Rockbestos, Service Wire, Lighting wire for above ground use shall be single conductor stranded copper. No. 12

imum, with NEC Type THHN insulation rated 90 degrees C, 600 volts. Alan Wire, American Insulated Wire, General, Cerro Wire, Encore, Republic Wire, Rockbestos, Service Wire, Lighting wire for underground use in conduit shall be sinale conductor stranded copper .WG minimum, with NEC Type XHHW insulation rated 90 degrees C in dry locations and 75 degrees C in wet locations, 600 volts. American Insulated Wire, General, Cerro Wire, Incore, Republic Wire, Rockbestos, Service Wire, or United Copper Industries. Type MC cable shall be made up of individual conductors as noted above, be color coded, include a separate ground conductor, and shall have a corrugated metal armor over

PART 3 EXECUTION 3.1 INSTALLATION REQUIREMENTS A. Install all cables and wires in raceways. Telecommunications raceways shall be from outlet boxes to above accessible ceiling, for cable to be routed through existing cable trays. recommendations on pulling tensions; sidewall pressures and cable bend radii

Segregate wiring of different voltage levels. Except as follows, circuits operating at

Power and control wiring between variable speed drives and motor disconnect switches may be routed together.

D. Splice power cables with solderless compression butt splices or ring lugs. Terminate power cables including motor leads with solderless compression ring lugs. Splice branch circuit wiring, lighting wiring, and control and instrumentation wiring with wire nut connectors. erminate control and instrumentation wiring with solderless compression ring or spade lugs. Compression connectors and lugs shall be crimped with tools specifically designed for the If no color coding system exists for each indicated system function and voltage, color

Three Phase Power 208/120 Volts: Phase X (A): Black

different voltages shall not share raceways.

Less Than 120 Volts: Use Industry Standard Methods Provide home runs of No. 10 AWG wire for 20 amp branch circuits that exceed 150' i Ground the shields of shielded instrumentation and control cables at one end only. The

Provide identification tags on all cables and conductors terminated in panels. Perform commissioning activities in accordance with Related Sections. SECTION 260533 - ELECTRICAL MATERIALS AND METHODS

RELATED DOCUMENTS

Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification ctions including the Related Sections listed below, apply to this Section.

Section 260513 - Medium, Low & Control Voltage Cables Section 260526 — Grounding and Bonding for Electrical

Provide conduits, boxes, fittings and supports to form a complete, coordinated, and continuously grounded raceway system. Conduits indoors in general areas shall be electrical metallic tubing (EMT) with steel se Conduits indoors in hazardous areas, encased in concrete floor slabs or subjected to water, physical damage or abuse shall be galvanized rigid steel (RS) or intermediate metal conduit (IMC) with cast or malleable iron threaded fittings and bushings. Conduits outdoors shall be galvanized rigid steel or intermediate metal conduit with cast or malleable iron threaded fittings and bushings. Conduits direct buried underground shall be Schedule 40 PVC with matching fittings.

Final connections to motors, transformers and equipment subject to vibration or removal for maintenance shall be 1/2" minimum liquid tight flexible metallic conduit with steel liquid tight fittings. Transformer connections may be non-liquid tight flexible metallic conduit in electrical rooms only. Connections to other recessed devices, (including communication outlet boxes, junction or pull boxes, etc) shall be with standard conduit of the type appropriate for the wall BOX REQUIREMENTS

Provide sheet steel outlet boxes, extensions, and plaster rings for EMT, flexible metal Provide cast or malleable iron outlet boxes and covers for galvanized rigid steel onduits, intermediate metal conduits, and liquid tight flexible metal conduits. . Boxes shall be sized for all conductors and devices to be contained within. Box extensions shall not be used to correct for undersized boxes. A single extension may be used as follows only if all free conductors extend at least 3 inches outside of the extension

On boxes being flush mounted in masonry walls. On existing boxes in walls that are being furred out. On existing boxes for connecting to an existing circuit On fire alarm, security and clock system boxes where required by the system manufacturer's instructions.

1.5 SUPPORT REQUIREMENTS Surface mounted equipment shall be secured to steel channels. The channels shall be attached with toggle bolts to hollow tile, block or similar surfaces, and attached with screws or bolts and expansion shields to solid masonry or concrete.

Electrical metallic tubing shall be thin wall steel tubing, electro-galvanized or hot dipped galvanized inside and outside. Fittings and bushings shall be galvanized steel set screw type with two screws per connection for sizes over 2". Galvanized rigid steel conduit and intermediate metal conduit shall be hot dipped aalvanized inside and outside, in 10' lenaths and threaded on both ends. Fittings and ushings shall be cast or malleable iron, and hot dipped galvanized inside and outside PVC conduit and fittings shall be Type DB for encasement in concrete. Schedule 40 for direct burial, concealed and exposed work, and schedule 80 in parking structures. Fittings shall be of the same type and from the same manufacturer as the conduit. PVC conduit shall be UL Labeled for 90 degrees C cables. Cantex, Carlon or National Pipe & Plastic. Fiberglass reinforced epoxy conduit shall be standard wall, iron pipe size, sunlight esistant, gray color, with matching push—fit fittings. FRE or Champion. E. Flexible metallic conduit shall be galvanized steel or aluminum. Fittings shall be of steel with cadmium or galvanized finish. Fittings shall be machine screw clamp type, single or two-piece. Self-locking, twist-in type fittings are not acceptable.

F. Liquid tight flexible metallic conduit shall consist of a flexible, advanized steel core, a continuous copper ground strip and a polyvinyl chloride jacket. Fittings shall be steel liquid tight grounding type from the same manufacturer as the conduit. Boxes for fixtures, outlets, switches, equipment connections and wire pulling shall be Cast or formed from carbon steel sheets of commercial grade steel not less than

One-piece construction, zinc, or cadmium plated Tapped for mounting plates and covers as required Pull and junction boxes shall be Fabricated from galvanized or painted code gauge cold rolled carbon steel sheets. Welded construction with flat removable covers fastened to the box with machine

material from which the box is constructed or by continuous welding which will provide equivalent strength to flange construction. Self—tapping or sheet metal fasteners are not acceptable. 2.3 SUPPORTS Box covers shall be fastened in place by machine screws or hinges and latches.

Hangers and brackets shall be made of steel pipe, channel iron, angle iron or prefabricated steel channel. Prefabricated steel channel shall be by B-Line, Hilti, Powerstrut B. Anchors shall be lead shield anchors or plastic expansion anchors for small loads, and expansion or epoxy anchors for large loads. Powder-driven anchors shall not be used. La Equipment and disconnect nameplates shall be engraved .125 inch (1/8") thick aminated plastic, white, with black letters. The engraved letters shall be at least one auarter inch (14") high.

Receptacles, disconnects, safety switches and lighting switches shall be labeled using clear adhesive backed nylon or Mylar tape with black text permanently laminated to the tape. Label shall include panel and circuit number feeding labeled devices. Panel directories shall be typed on supplied card stock with panel, or card stock similar in thickness and material as those supplied with the panels. Install supplied clear plastic cover, or one of like material.

PART 3 EXECUTION

Size conduits in accordance with the NEC, but not less than the sizes shown on the drawings. Minimum power and control conduit size shall be 1/2". Minimum telecommunications conduit size shall be 3/4". Install concealed and exposed conduits parallel to or at right angles to building lines Conduits shall not be embedded in concrete slabs except where specifically shown. Install surface raceways as close to room corners or trim features as possible to make the surface raceways less obvious. Where conduits are routed over beams and under corrugate decking, conduits shall be offset 3" below the decking to avoid damage from future decking

Make directional changes in primary power distribution conduits above ground with weeps and long radius elbows, and underground with 20' minimum radius bends. Conceal conduits wherever possible and practical. When conduits cannot be concealed finished areas, use surface raceways with matching boxes from the same manufacturer as the racewavs. Metal conduits, fittings, enclosures and raceways shall be mechanically joined together in a firm assembly to form a continuous electrical conductor providing effective electrical grounding continuity. Provide expansion fittings at the intervals specified in the manufacturer's instructions. Separate raceways from uninsulated steam pipes, hot water pipes, and other hot surfaces by a minimum of 4" horizontally or 12" vertically. Separate raceways from ventilation ducts and insulated pipes so that they do not come into contact with each Low voltage signal circuits shall be separated or shielded from power circuits to prevent the induction of noise into the signal circuits. 1. EMT entering sheet metal enclosures and outlet boxes shall be secured in place by a connector with a locknut. Rigid conduit shall be secured with locknut inside and outside

enclosure so that the bushing will butt tight into the connector or conduit. Bushings shall not be used as jamb nuts or in lieu of locknuts. Flexible metallic conduit to motors and similar equipment shall not exceed 3'-0" in length, and shall have adequate slack to absorb the maximum vibration. Flexible condu connections to lighting fixtures shall not exceed 6'-0" in length. Support all electrical items independently of supports provided by the other trades. B. Support conduits and boxes using steel conduit straps or 1/4—inch minimum diamete threaded rod hangers. Suspended ceiling hangers or hanger wire shall not be used (except to support flexible metallic conduit and manufactured wiring systems). Hangers shall be of sufficient strength that their deflection at mid span does no

and a bushing. Sufficient thread on the connector or conduit shall extend into the

exceed 1/240 of the hanger span length after the cables are installed. to or perpendicular to building lines, and in a neat and workmanlike manner. Coil the excess manufactured wiring systems and Type MC cable, and support independently of the ceiling grid system at intervals not exceeding 3 feet. PENETRATIONS, SLEEVES, AND FIRE SEALS Cut floor and wall penetrations neatly and to the minimum size required for installation 3. Provide galvanized steel pipe sleeves for all conduits penetrating floors, exterior walls

Extend floor sleeves above the floor a minimum of 2 inches. Embed sleeves in new concrete or step-core concrete and grout sleeves into existing concrete with epoxy grout. Seal exterior wall and roof penetrations water tight. Patch both sides of wall penetrations cut for electrical equipment and raceways to seal

Seal conduit penetrations in fire rated walls using fire—sealing caulk approved by a Nationally Recognized Testing Laboratory. Provide expansion fittings at all building expansion joints. Expansion fittings shall be bonded to the raceway on both sides.

Provide nameplates and labels in accordance with Article 2.4. Laminated plastic labels shall be mechanically secured in place with sheet metal screws and/or Labels shall be neatly centered. Place labels in like positions on similar equipment. Color code wiring as noted in Section 260513

Color code junction boxes and box covers of emergency and fire alarm circuits with red paint. lor code junction boxes and box covers of temperature control circuits with blue paint. Mark junction box covers in indelible ink with the panel and breaker numbers of the circuits Label Disconnect switches with the panel and breaker numbers as well as equipment or device

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label for item being controlled from disconnect switch. Provide a 3" by 5" yellow "Warning Arc Flash Hazard" label on the outside of panels in 'occupant areas' — Brady Type 99454 or equivalent from another manufacturer. Center the label horizontally and vertically on outside of door. Provide a 4" by 6"red "Danger Arc Flash and Shock Hazard" label on the outside of panels in areas open only to 'qualified personnel', and on the inside panel door of panels in 'occupant areas' — Brady Type 99459. Center label on gutter areas of distribution panels, centered above or below the directory of panels, and otherwise centered in other applications. In all cases, label will be no lower than 48" or above 84" AFF END OF SECTION 260533

SECTION 262000 - LOW VOLTAGE ELECTRICAL DISTRIBUTION

1.1 RELATED DOCUMENTS Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the elated Sections listed below, apply to this Section.

Related Sections: Section 260513 — Medium, Low & Control Voltage Cables Section 260526 — Grounding and Bonding for Electrical

Section 260533 — Electrical Materials and Methods PART 2 PRODUCTS

LIGHTING AND RECEPTACLE PANELS A. Lighting and receptacle panels shall be of the voltage, amperage and number of positions shown, 3 phase, 4 wire, 22,000 amps AIC minimum unless shown otherwise, circuit breaker type, with main circuit breaker or main lugs only as shown, copper bus, fully rated neutral and ground bars, NEMA Type 1 enclosure and surface or flush trim as shown. In main circuit breaker panels, the main circuit breaker shall be separate from and not mounted in feeder breaker positions. Front cover shall be factory manufactured. UL/NRTL listed. one-piece, hinged "door-in-door" type with: Interior hinged door with and—operated latch or latches as required to provide access to circuit breaker operating handles only; not energized parts. Outer hinged door to provide access to the entire closure including the deadfront and all wiring gutters. Outer door shall be kept securely closed with factory bolts, screws, clips or other fasteners to the panel box, requiring a tool for entry; hand operated latches are not acceptable. Both inner and outdoor doors shall open left to right. Include one—piece, removable, inner deadfron cover, independent of the panelboard cover. Door shall have concealed hinge, flush handle, lock with 2 keys and panel directory frame. All panel locks shall be keyed alike. Load center type panels are not acceptable. Provide circuit breakers as shown. Eaton Pow-R-Line 1 or 2, GE A series, Siemens P1 or

CIRCUIT BREAKERS Circuit breakers shall be molded case, bolt-on, quick make and quick break, thermal-magnetic type with trip indication, and shall be from the same manufacturer as the panel in which they are Eaton, GE, Siemens or Square D. Circuit breakers for power and distribution panelboards shall have a minimum interrupting rating of 5,000 amps RMS at 240 volts AC or 25,000 amps RMS at 480 volts AC. Circuit breakers for lighting and receptacle panelboards shall have a minimum interrupting rating of 000 amps RMS at 240 volts AC or 25,000 amps RMS at 480 volts AC. PART 3 EXECUTION

Where shown on the drawings, provide a separate neutral conductor for each single-phase branch The neutrals of these single-phase circuits shall not be shared or daisy-chained. Provide nameplates in accordance with Section 260500.

Provide a detailed typed directory for all new and modified panelboards. FIELD QUALITY CONTROL

3.3 COMMISSIONING

Perform testing in accordance with Section 260800 and submit a test report. Perform Commissioning activities per Related Sections above. END OF SECTION 262000

PPA#25-1248 A/E#00-00-00

ENGINEERIN

DRAWN BY : TTW

REVIEWED BY: TTW

REV. DESCRIPTION

|Consultant #: 2514

SHEET TITLE **ELECTRICAL PANEL** SCHEDULES, LEGEND,

DETAILS AND SPECS

12-5-2025