

MECHANICAL GENERAL NOTES:

- PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS WHICH MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER AND/OR OWNER OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS AND SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. COORDINATE NEW WORK AND DEMOLITION WITH OTHER DISCIPLINES AND EXISTING CONDITIONS PRIOR TO CONSTRUCTION.
- COORDINATE THE INSTALLATION OF THE MECHANICAL SYSTEMS WITH OTHER TRADES TO ENSURE A NEAT AND ORDERLY INSTALLATION. INSTALL DUCTWORK AND PIPING AS TIGHT TO STRUCTURE AS POSSIBLE. COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS. COORDINATE INSTALLATION OF DUCTWORK AND PIPING TO AVOID CONFLICTS WITH ELECTRICAL PANELS, LIGHTING FIXTURES, ETC. ANY MODIFICATIONS REQUIRED DUE TO LACK OF COORDINATION WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AT NO EXTRA COST TO THE OWNER.
- WHERE SHUTDOWN OF EXISTING SYSTEMS IS REQUIRED DURING NEW WORK, COORDINATE SHUTDOWN TIME AND DURATION WITH THE OWNER TO MINIMIZE DOWNTIME. NOTIFY OWNER SEVEN (7) DAYS PRIOR TO INTERRUPTION OF SERVICE.
- DURING INSTALLATION OF NEW WORK, AVOID DAMAGING EXISTING SURFACES AND EQUIPMENT TO REMAIN. REPAIR DAMAGE CAUSED DURING CONSTRUCTION AT NO EXTRA COST TO THE OWNER.
- PROVIDE TEMPORARY BARRIERS TO CONTAIN DUST AND DEBRIS RESULTING FROM THE PERFORMANCE OF THE WORK TO THE AREA WHERE WORK IS BEING PERFORMED.
- ALL MECHANICAL EQUIPMENT SHOWN ON THE MECHANICAL PLANS SHALL BE PROVIDED BY DIVISION 23 UNLESS OTHERWISE NOTED.
- NEW MECHANICAL EQUIPMENT, DUCTWORK AND PIPING ARE SHOWN AT APPROXIMATE LOCATIONS. FIELD MEASURE FINAL DIMENSIONS AND PIPING LOCATIONS PRIOR TO FABRICATION AND MAKE ADJUSTMENTS AS REQUIRED TO FIT THE DUCTWORK AND PIPING WITHIN THE AVAILABLE SPACE. VERIFY THAT FINAL EQUIPMENT LOCATIONS MEET MANUFACTURER'S RECOMMENDATIONS REGARDING SERVICE CLEARANCE AND PROPER AIRFLOW CLEARANCE AROUND EQUIPMENT.
- REFER TO ARCHITECTURAL DRAWINGS FOR RELATED CONSTRUCTION DETAILS AS APPLICABLE TO THE HVAC SYSTEM. VERIFY CHASES AND PENETRATIONS SHOWN ON ARCHITECTURAL DRAWINGS THAT ARE INTENDED FOR DUCTWORK AND PIPING MEET REQUIREMENTS.
- COORDINATE LOCATION OF ROOF MOUNTED HVAC EQUIPMENT AND ROOF PENETRATIONS WITH THE ARCHITECTURAL AND STRUCTURAL DRAWINGS.
- INDOOR AIR QUALITY MEASURES: PROTECT INSIDE OF (INSTALLED AND DELIVERED) DUCTWORK AND HVAC UNITS FROM EXPOSURE TO DUST, DIRT, PAINT AND MOISTURE. REPLACE INSULATION THAT HAS BECOME WET AT ANY TIME DURING CONSTRUCTION. DRYING THE INSULATION IS NOT ACCEPTABLE. SEAL ANY TEARS OR JOINTS OF INTERNAL FIBERGLASS INSULATION. REMOVE DEBRIS FROM CEILING/RETURN AIR PLenums INCLUDING DUST. AN INDEPENDENT PROFESSIONAL DUCT CLEANING COMPANY SHALL VACUUM CLEAN ANY DUCTWORK CONNECTED TO HVAC UNITS THAT WERE OPERATED DURING THE CONSTRUCTION PERIOD AFTER FINAL FILTERS ARE INSTALLED AND PRIOR TO TURNING SYSTEM OVER TO THE OWNER. THE INTERNAL SURFACES AND ASSOCIATED COILS OF ANY HVAC UNITS THAT WERE OPERATED SHALL ALSO BE CLEANED.
- INSTALL DUCTWORK AND PIPING PARALLEL TO BUILDING COLUMN LINES UNLESS OTHERWISE SHOWN OR NOTED.
- OVERHEAD HANGERS AND SUPPORTS FOR EQUIPMENT, DUCTWORK AND PIPING SHALL BE FASTENED TO BUILDING JOISTS OR BEAMS. DO NOT ATTACH HANGERS AND SUPPORTS TO THE ABOVE FLOOR SLAB OR ROOF EXCEPT WHERE CONCRETE INSERTS IN CONCRETE SLABS ARE ALLOWED BY THE SPECIFICATIONS.
- COORDINATE LOCATION OF EQUIPMENT SUPPORTS WITH LOCATION OF EQUIPMENT ACCESS PANEL SIDOORS TO ENABLE SERVICE OF EQUIPMENT AND/OR FILTER REPLACEMENT.
- COORDINATE THE EXACT MOUNTING SIZE AND FRAME TYPE OF DIFFUSERS, REGISTERS AND GRILLES WITH THE SUPPLIER TO MEET THE CEILING, WALL AND DUCT INSTALLATION REQUIREMENTS.
- ADJUST LOCATION OF CEILING DIFFUSERS, REGISTERS AND GRILLES AS REQUIRED TO ACCOMMODATE FINAL CEILING GRID AND LIGHTING LOCATIONS.
- LOCATE AND SET THERMOSTATS AND SENSORS AT LOCATIONS SHOWN ON PLANS. VERIFY EXACT LOCATIONS WITH ARCHITECT PRIOR TO INSTALLATION. INSTALL DEVICES WITH TOP OF DEVICE AT MAXIMUM 48" AFF TO MEET ADA REQUIREMENTS UNLESS NOTED OTHERWISE ON PLANS. PROVIDE INSULATED BACKING FOR THERMOSTATS MOUNTED ON EXTERIOR BUILDING WALLS. INSTALL WIRING IN CONDUIT PROVIDED BY DIVISION 26. AT A MINIMUM, PROVIDE CONDUIT IN THE WALL FROM THE JUNCTION BOX TO 4" ABOVE THE CEILING.
- COORDINATE THE LOCATION AND ELEVATION OF WALL MOUNTED DEVICES WITH PRESENTATION BOARDS, DISPLAY CABINETS, SHELVES OR OTHER COMPONENTS SHOWN ON THE ARCHITECTURAL DRAWINGS THAT ARE TO BE INSTALLED UNDER OTHER DIVISIONS. CONTRACTOR WILL NOT BE RESPONSIBLE FOR RELOCATION OF WALL-MOUNTED DEVICES CAUSED BY A LACK OF COORDINATION.
- PROVIDE A MANUAL BALANCING DAMPER IN EACH DUCT TAKEOFF FROM SUPPLY, RETURN, OUTDOOR AND EXHAUST AIR DUCTS.
- PROVIDE A PREFABRICATED 45 DEGREE, HIGH EFFICIENCY, RECTANGULAR ROUND BRANCH DUCT TAKEOFF FITTING FOR BRANCH DUCT CONNECTIONS AND TAKE-OFFS TO INDIVIDUAL DIFFUSERS, REGISTERS AND GRILLES. PROVIDE WITH INTEGRAL MANUAL BALANCING DAMPER AND LOCKING QUADRANT WHERE INDICATED ON PLANS.
- BRANCH DUCTWORK TO AIR OUTLETS SHALL BE SAME SIZE AS OUTLET NECK SIZE UNLESS OTHERWISE NOTED.
- REFER TO SPECIFICATIONS FOR DUCTWORK AND PIPING INSULATION REQUIREMENTS. DUCT SIZES ON MECHANICAL PLANS INDICATE CLEAR INSIDE AIRFLOW DIMENSIONS, INCREASE SHEET METAL SIZES ACCORDINGLY TO COMPENSATE FOR THICKNESS OF DUCT LINER.
- FLEXIBLE DUCTWORK SHALL NOT EXCEED 5'-0" IN LENGTH AND SHALL BE INSTALLED AND SUPPORTED TO AVOID SHARP BENDS AND SAGGING. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- RIGIDLY SUSPEND UNIT HEATER FROM STRUCTURE WITH SUPPORTING ANGLES AND ALL-THREAD HANGING RODS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- PROVIDE A NEW SET OF AIR FILTERS IN CONTAINS PRIOR TO TESTING, ADJUSTING AND BALANCING AND BEFORE TURNING SYSTEM(S) OVER TO OWNER.

MECHANICAL SYMBOLS

THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS OR ABBREVIATIONS ARE USED. V2.01

STANDARD MOUNTING HEIGHT

THERMOSTATS (USER ADJUSTABLE) (TOP OF DEVICE)	48"
CONTROLS (TOP OF DEVICE)	48"

USE THE DEFAULT MOUNTING HEIGHTS SHOWN ABOVE UNLESS NOTED OTHERWISE IN THE SPECIFICATIONS OR ELSEWHERE. MOUNTING HEIGHTS LISTED ARE ABOVE FINISHED FLOOR (AFF) OR ABOVE FINISHED GRADE (AFG) TO TOP OF DEVICE. ALL DEVICES SHALL BE INSTALLED IN COMPLIANCE WITH CURRENT ADA AND LOCAL REQUIREMENTS.

ANNOTATION

①	MECHANICAL PLAN NOTE CALLOUT
⬢	MECHANICAL EQUIPMENT DESIGNATION (CONTRACTOR FURNISHED AND INSTALLED UNLESS NOTED OTHERWISE)
⊙	CONNECTION POINT OF NEW WORK TO EXISTING
① ②	DETAIL REFERENCE. UPPER NUMBER INDICATES DETAIL NUMBER LOWER NUMBER INDICATES SHEET NUMBER
① ②	SECTION CUT DESIGNATION

ABBREVIATIONS

A/C	AIR CONDITIONING	H/WP	HEATING WATER PUMP
ACCU	AIR COOLED CONDENSING UNIT	IN WC	INCHES OF WATER COLUMN
AFC	ABOVE FINISHED CEILING	L	LEAVING AIR TEMPERATURE
AFD	ABOVE FINISHED FLOOR	LAT	LEAVING AIR TEMPERATURE
AHG	ABOVE FINISHED GRADE	LDB	LEAVING DRY BULB TEMPERATURE
AHJ	AUTHORITY HAVING JURISDICTION	LP	LOW PRESSURE
AHU	AIR HANDLING UNIT	LWB	LEAVING WET BULB TEMPERATURE
AI	ANALOG INPUT	LWT	LEAVING WATER TEMPERATURE
AO	ANALOG OUTPUT	MAX	MAXIMUM
AP	ACCESS PANEL	MH	1000 BTU PER HOUR
APD	AIR PRESSURE DROP	MD	MOTORIZED DAMPER
AWG	AMERICAN WIRE GAUGE	MFR	MANUFACTURER SYSTEM
BAS	BUILDING AUTOMATION SYSTEM	N/A	NOT APPLICABLE
BB	BACKDRAFT DAMPER	N/C	NORMALLY CLOSED
BD	BLIND/DOWN	N/O	NORMALLY OPEN
BFC	BELOW FINISHED CEILING	NOM	NOMINAL
BFF	BELOW FINISHED FLOOR	NC	NOISE CRITERIA
BH	BRAKE HORSEPOWER	NF	NON-FUSED
BHP	BINARY INPUT	NI	NOT IN CONTRACT
BO	BINARY OUTPUT	OA	OUTSIDE AIR
BOD	BOTTOM OF DUCT	PCV	PRESSURE INDEP. CONTROL VALVE
BOS	BOTTOM OF STRUCTURE	PROVIDE	FURNISH AND INSTALL
BTU	BRITISH THERMAL UNIT	QTY	QUANTITY
CFM	CUBIC FEET PER MINUTE	RA	RETURN AIR
CLG	CEILING	RC	ROOM CRITERIA
CP	CONDENSATE PUMP	RD	RETURN DUCT
CPT	CONTROL POWER TRANSFORMER	REA	RELIEF AIR
CV	CONTROL VALVE	RF	RETURN FAN
CWP	CONDENSER WATER PUMP	RFR	REFRIGERANT RELATIVE HUMIDITY
CJ	CONDENSING UNIT	RH	ROOF HOOD
CHWP	CHILLED WATER PUMP	RPM	REVOLUTIONS PER MINUTE
DB	DECIBELS	RTU	ROOFTOP UNIT
DBA	DECIBEL AVERAGE	SA	SUPPLY AIR
DDC	DIRECT DIGITAL CONTROL	SD	SMOKE DETECTOR
DI	DIGITAL INPUT	SD	SUPPLY DUCT
DISC	DISCONNECT	SF	SUPPLY FAN
DN	DOWN	SH	SENSIBLE HEAT CAPACITY
DS	DUCT SILENCER	SOW	SCOPE OF WORK
DX	DIRECT EXPANSION	SP	STATIC PRESSURE
EA	EXHAUST AIR	STM	STEAM
EAT	ENTERING AIR TEMPERATURE	TBD	TO BE DETERMINED
EDB	ENTERING DRY BULB TEMPERATURE	TC	TEMPERATURE CONTROLS
EF	EXHAUST FAN	TC	TEMPERATURE CONTROLS
EFF	EFFICIENCY	TF	TRANSFER FAN
EMS	ENERGY MANAGEMENT SYSTEM	TH	TOTAL HEAT CAPACITY
ESP	EXTERNAL STATIC PRESSURE	TSP	TOTAL STATIC PRESSURE
ETR	ENTERING TO REMAIN	UH	UNIT HEATER
EWB	ENTERING WET BULB TEMPERATURE	UNO	UNLESS OTHERWISE NOTED
EWT	ENTERING WATER TEMPERATURE	VAV	VARIABLE AIR VOLUME DRIVE
FCU	FAN COIL UNIT	VEL	VELOCITY
FF	FINISHED FLOOR	VFD	VARIABLE FREQUENCY DRIVE
FPI	FEET PER INCH	VRF	VARIABLE REFRIGERANT FLOW
FFM	FEET PER MINUTE	W/	WITH
GC	GENERAL CONTRACTOR	W/O	WITHOUT
GPM	GALLONS PER MINUTE	WB	WET BULB
HP	HORSEPOWER	WC	WATER COLUMN
HTG	HEATING	WPD	WATER PRESSURE DROP

HVAC DUCTWORK AND ACCESSORIES

	LINEAR SLOT DIFFUSER
	INSULATED FLEXIBLE DUCT (MAX. 5'-0" LONG)
	BRANCH DUCT WITH 45° RECTANGLE ROUND BRANCH FITTING AND MANUAL VOLUME DAMPER
	ELBOW WITH TURNING VANES
	BRANCH DUCT WITH BELL-MOUTH FITTING & MANUAL VOLUME CONTROL DAMPER
	RETURN, EXHAUST, OR OUTSIDE AIR DUCT UP
	RETURN, EXHAUST, OR OUTSIDE AIR DUCT DOWN
	SUPPLY AIR DUCT UP
	SUPPLY AIR DUCT DOWN
	EQUIPMENT WITH FLEXIBLE DUCT CONNECTION
	10" (NECK SIZE) CSD-1 (TYPE) 300 CFM (CFM OF SUPPLY DIFFUSER)
	24x24 (NECK SIZE) CEG-1 (TYPE) 800 CFM (CFM OF EXHAUST GRILLE)
	MANUAL VOLUME DAMPER
	SQUARE TO ROUND TRANSITION
	DUCT MOUNTED SMOKE DETECTOR (SD=SUPPLY;RD=RETURN)
	RISER DESIGNATION
	FIRE DAMPER
	FIRE SMOKE DAMPER
	SMOKE DAMPER
	VOLUME DAMPER
	MOTORIZED DAMPER
	BACKDRAFT DAMPER

ALL DUCT DIMENSIONS SHOWN ON DRAWINGS ARE INSIDE DIMENSIONS. REFER TO DUCTWORK SPECIFICATIONS FOR DUCTWORK INSULATION AND LINER INFORMATION.

HVAC CONTROL DEVICES

	HUMIDISTAT
	THERMOSTAT
	STATIC PRESSURE SENSOR
	TEMPERATURE SENSOR
	CARBON MONOXIDE SENSOR
	CARBON DIOXIDE SENSOR
	DIFFERENTIAL PRESSURE SENSOR
	FLOW SWITCH
	HUMIDITY SENSOR
	PULL STATION

PIPING SYMBOLS

	DIRECTION OF FLOW
	CONTROL VALVE
	THREE-WAY CONTROL VALVE
	SHUTOFF VALVE
	CHECK VALVE
	BALANCING VALVE WITH PRESSURE PORTS
	TRIPLE DUTY VALVE WITH PRESSURE PORTS
	STRAINER
	STRAINER WITH BLOWDOWN VALVE
	RELIEF / SAFETY VALVE
	SOLENOID VALVE
	PRESSURE REDUCING VALVE
	GAS PRESSURE REGULATOR
	THERMOSTATIC MIXING VALVE
	PIPE ANCHOR
	EXPANSION JOINT
	PIPE GUIDE
	PIPING SUPPORT
	F & T TRAP
	BUCKET TRAP
	THERMOSTATIC TRAP
	BACKFLOW PREVENTER
	PRESSURE GAUGE
	THERMOMETER
	PRESSURE AND TEMPERATURE TEST PLUG
	UNION
	FLANGE CONNECTION
	VACUUM RELIEF VALVE
	AUTOMATIC AIR VENT
	MANUAL AIR VENT
	PRESSURE / VACUUM SWITCH
	CLEANOUT
	CAP
	ELBOW UP
	ELBOW DOWN
	TEE UP
	TEE DOWN
	ELBOW UP WITH SHUT-OFF VALVE (SOV)
	ELBOW DOWN WITH SHUT-OFF VALVE (SOV)
	TEE UP WITH SHUT-OFF VALVE (SOV)
	TEE DOWN WITH SHUT-OFF VALVE (SOV)
	REDUCER
	RECIRCULATION PUMP
	P-TRAP
	GAS COCK
	TOP BEAM CLAMP
	TRAPEZE HANGER

PIPING LINETYPES

	CONDENSATE DRAIN (CD)
	AUXILIARY CONDENSATE DRAIN (ACD)
	NON-POTABLE WATER (NPW)
	NATURAL GAS (G)
	NATURAL GAS ON ROOF (G)
	MEDIUM PRESSURE NATURAL GAS (MPG)
	MED. PRESSURE NAT. GAS ON ROOF (MGPR)
	FUEL OIL SUPPLY (FOS)
	FUEL OIL RETURN (FOR)
	FUEL OIL VENT (FOV)
	LIQUEFIED PETROLEUM GAS (LPG)
	BOILER FEED WATER (BFW)
	HIGH PRESSURE STEAM SUPPLY (HPS)
	HIGH PRESSURE STEAM CONDENSATE (HPC)
	MEDIUM PRESSURE STEAM SUPPLY (MPS)
	MED. PRESSURE STEAM CONDENSATE (MPC)
	LOW PRESSURE STEAM SUPPLY (LPS)
	LOW PRESSURE STEAM CONDENSATE (LPC)
	CONDENSATE PUMP DISCHARGE (PD)
	HEATING HOT WATER SUPPLY (HWS)
	HEATING HOT WATER RETURN (HWR)
	CHILLED WATER SUPPLY (CHWS)
	CHILLED WATER RETURN (CHR)
	HOT / CHILLED WATER SUPPLY (HCS)
	HOT / CHILLED WATER SUPPLY (HCR)
	CONDENSER WATER SUPPLY (CWS)
	CONDENSER WATER RETURN (CWR)
	HEAT PUMP WATER SUPPLY (HPWS)
	HEAT PUMP WATER RETURN (HPWR)
	REFRIGERANT LIQUID (RL)
	REFRIGERANT DISCHARGE (HOT GAS) (RD)
	REFRIGERANT SUCTION (RS)
	REFRIGERANT DISCHARGE BYPASS (RDB)
	CLEANOUT
	REFRIGERANT VENT (RV)

LINETYPE LEGEND

THROUGHOUT THE DRAWINGS DIFFERENT LINETYPES ARE USED IN COMBINATION WITH THE SYMBOLS TO INDICATE THE STATUS OF ITEMS AS EXISTING, TO BE DEMOLISHED, TO BE INCLUDED AS PART OF NEW WORK AND/OR ITEMS WHICH ARE ANTICIPATED TO BE PROVIDED IN THE FUTURE. THE STATUS OF ITEMS USING THESE LINETYPES ARE RELATIVE TO THE VIEW IN WHICH THEY APPEAR. PHASING SHOWN IN DRAWINGS IS NOT INTENDED TO FULLY DESCRIBE ALL NECESSARY CONSTRUCTION PHASING, WHICH IS DETERMINED BY THE CONTRACTOR AS PART OF THEIR RESPONSIBILITIES. ANY SUCH PHASES DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBING THE PROJECT. THE FOLLOWING LINETYPES MAY BE USED ON ANY DEVICE, EQUIPMENT, NOTE, LINE, SHAPE, ETC.

EXISTING	—————	NEW	—————
DEMOLISH	- - - - -	FUTURE	- - - - -

MECHANICAL DEMOLITION GENERAL NOTES:

- COORDINATE ALL DEMOLITION WITH WHAT IS SHOWN ON ARCHITECTURAL PLANS. NOTIFY ARCHITECT OF ANY DISCREPANCIES.
- PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW GENERAL NOTES, SPECIFICATIONS AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER OR OWNER, AS DEFINED IN BID DOCUMENTS, OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- OWNER RETAINS RIGHTS OF SALVAGE FOR EQUIPMENT AND FIXTURES TO BE REMOVED. COORDINATE WITH OWNER THE EQUIPMENT AND FIXTURES TO BE SALVAGED AND THE LOCATION FOR STORAGE. AVOID DAMAGE TO SALVAGED EQUIPMENT, FIXTURES AND DEVICES DURING DEMOLITION WORK AND DURING TRANSPORT TO OWNER'S DESIGNATED STORAGE LOCATION.
- AVOID DAMAGING EXISTING SURFACES AND EQUIPMENT TO REMAIN FOR NEW INSTALLATION. REPAIR DAMAGE CAUSED DURING WORK AT NO EXTRA COST TO THE OWNER.
- SEAL PENETRATIONS THROUGH FLOORS, WALLS, CEILINGS AND ROOFS WHERE MECHANICAL COMPONENTS ARE REMOVED AND WHERE THE EXISTING PENETRATION IS NOT USED FOR THE NEW INSTALLATION. REPAIR DAMAGED SURFACES TO MATCH ADJACENT AREAS OR AS INDICATED ON THE ARCHITECTURAL DRAWINGS.
- REMOVE HANGERS AND SUPPORTS WHERE DUCTWORK, PIPING AND/OR EQUIPMENT ARE REMOVED AND THE EXISTING HANGERS AND SUPPORTS ARE NOT USED FOR THE NEW INSTALLATION.
- CEASE WORK AND IMMEDIATELY NOTIFY THE OWNER SHOULD ANY HAZARDOUS MATERIALS BE ENCOUNTERED DURING THE PERFORMANCE OF THE WORK.
- REMOVAL, RECOVERY, RECYCLING, AND DISPOSAL OF REFRIGERANT CONTAINED IN ANY EQUIPMENT TO BE REMOVED, SHALL BE PERFORMED IN STRICT ACCORDANCE WITH CURRENT EPA GUIDELINES.

MECHANICAL EMS NOTES:

- COORDINATE ALL CONTROLS, EQUIPMENT ACCESSORIES, AND ASSOCIATED WORK WITH EMS VENDOR PRIOR TO ALL EQUIPMENT PURCHASES AND INSTALLATION.
- GENERAL CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH EMS VENDOR TO PROVIDE A FULLY FUNCTIONAL SYSTEM AT START-UP; FAILURE TO COORDINATE CONTROLS AND REQUIRED EQUIPMENT ACCESSORIES RESULTING IN MODIFICATIONS SHALL BE RESPONSIBILITY OF THE CONTRACTOR AT NO EXTRA COST TO THE OWNER.
- THERMOSTATS AND SENSORS SHALL BE FURNISHED BY EMS VENDOR AND INSTALLED BY DIVISION 26 CONTRACTOR UNLESS NOTED OTHERWISE.
- OUTDOOR SENSOR ASSEMBLY FOR ECONOMIZER CONTROL IS PROVIDED BY EMS VENDOR. PROVIDE CHASE LARGE ENOUGH FOR (2) WIRE PULLS FOR EMS CONTROLS.
- PROVIDE ALL MOTORIZED DAMPERS ON PLAN, AS APPLICABLE, TO BE ABLE TO CONNECT TO ACTUATOR PROVIDED BY EMS VENDOR. MOTORIZED DAMPERS SHALL BE ACCESSIBLE FROM WITHIN SPACE VIA DUCT ACCESS PANELS. REFER TO SPECIFICATIONS FOR MORE INFORMATION.
- PROVIDE ALL ECONOMIZER MIXING BOXES ON PLAN, AS APPLICABLE, WITHOUT CONTROLS AND A FACTORY INSTALLED ACTUATOR CAPABLE OF ACCEPTING A 0-10VDC OR 4-20mA ANALOG CONTROL SIGNAL.

LANDLORD MECHANICAL NOTES:

- NO ROOF OR EXTERIOR WALL PENETRATIONS ARE TO BE MADE BY THE TENANT CONTRACTOR WITHOUT PRIOR NOTICE TO AND WRITTEN APPROVAL FROM LANDLORD. IF PENETRATIONS ARE TO BE MADE, THE TENANT CONTRACTOR WILL BE REQUIRED TO UTILIZE THE ROOFING CONTRACTOR REQUIRED BY THE LANDLORD TO MAINTAIN THE INTEGRITY OF ANY ROOF WARRANTY THAT MAY BE IN PLACE.

COMMISSIONING / FUNCTIONAL TESTING:

CONTRACTOR'S BID SHALL INCLUDE PROVISIONS TO PROVIDE ALL SERVICES RELATED TO THE CODE REQUIRED BUILDING SYSTEMS COMMISSIONING INCLUDING A COMMISSIONING PLAN, FUNCTIONAL TESTING, AND RELATED DOCUMENTATION, REPORTS, AND OWNER TRAINING. THIS INCLUDES RETAINING THE SERVICES OF A 3RD PARTY REGISTERED DESIGN PROFESSIONAL OR APPROVED AGENCY. REFER TO THE LATEST ADOPTED EDITION OF THE APPLICABLE ENERGY CODE FOR MORE INFORMATION. CONTRACTOR SHALL COMPLETE ALL RELATED COMMISSIONING REQUIREMENTS PRIOR TO FINAL INSPECTIONS IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS, CODE, AND MANUFACTURER'S INSTRUCTIONS.

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TEMPLATE ISSUE DATE: 11/28/2018

Fixture Package:

UNITE

Stamp:



06/16/2022

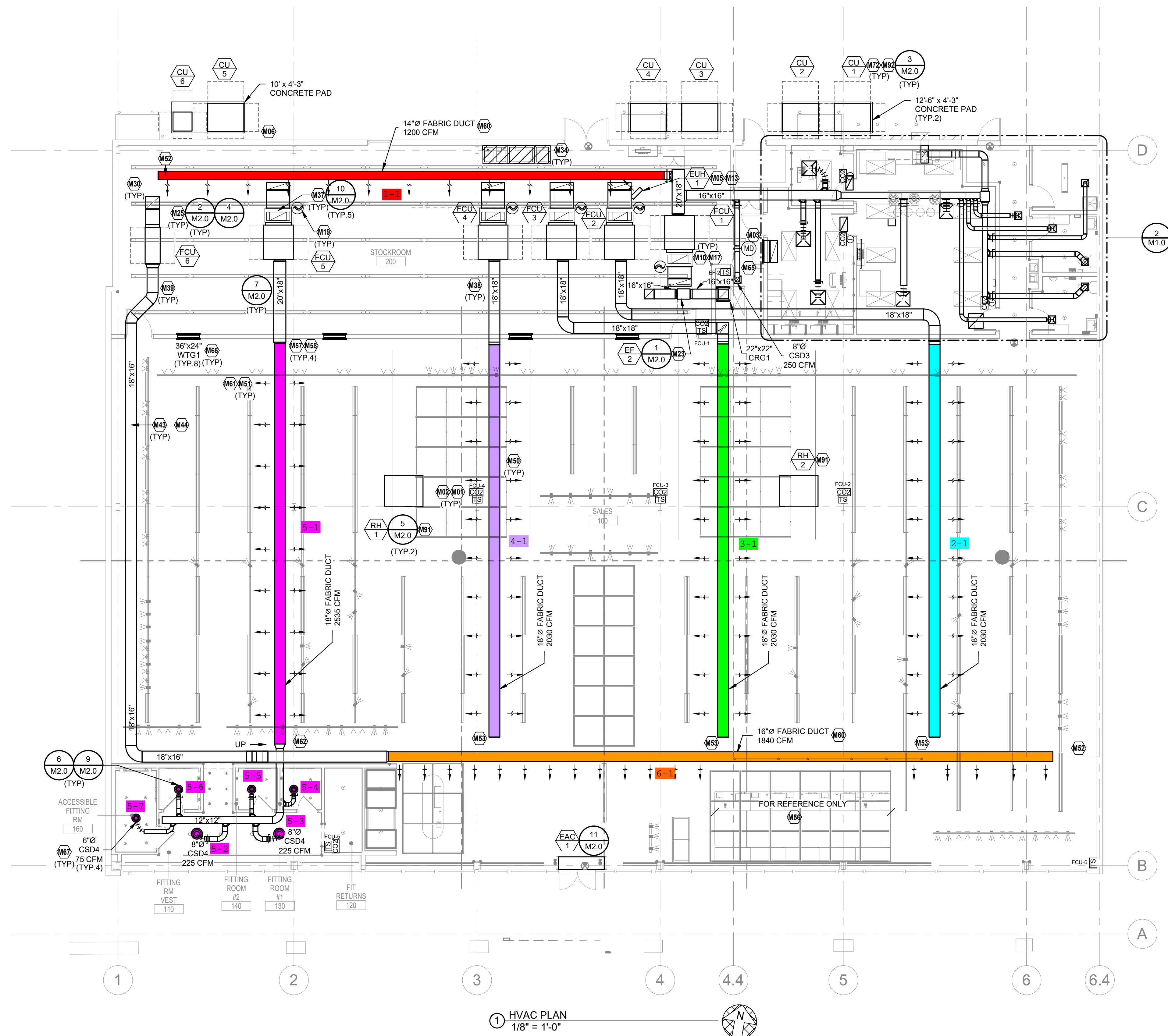
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CONSTRUCTION

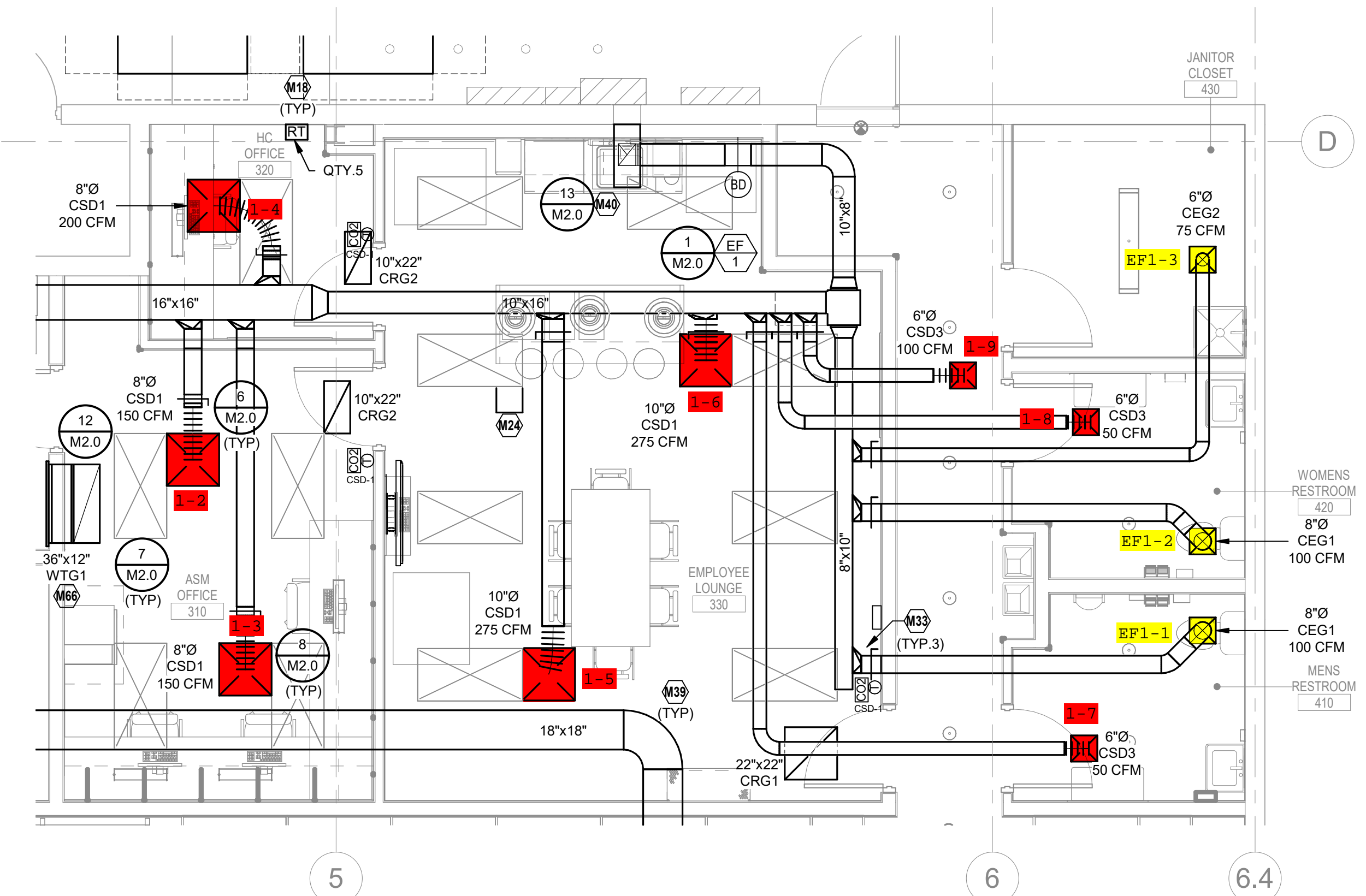
Issue Date:

06/20/2022

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1 HVAC PLAN
1/8" = 1'-0"



2 ENLARGED BACK OF HOUSE HVAC PLAN
1/4" = 1'-0"

KEYNOTES ARE PROTOTYPICAL. MISSING KEYNOTE NUMBERS INDICATE A PROTOTYPICAL NOTE IS NOT USED OR REMOVED.

MECHANICAL PLAN NOTES

- M01 ALL THERMOSTATS AND SENSORS ARE FURNISHED BY EMS VENDOR AND INSTALLED BY DIVISION 26. UNLESS NOTED OTHERWISE.
- M02 DO NOT INSTALL SENSORS ON WALL GRAPHICS. CONFIRM LOCATIONS OF SENSORS WITH PM PRIOR TO INSTALLATION.
- M03 INSTALL DAMPER AND ACTUATOR IN LOCATION INDICATED. DAMPER FURNISHED BY DIVISION 23. ACTUATOR FURNISHED BY EMS VENDOR.
- M05 COORDINATE UNIT HEATER INSTALLATION WITH EMS VENDOR AND VERIFY UNIT THERMOSTAT IS FULLY ACCESSIBLE FOR 24V RELAY INTERFACE WITH EMS. REFER TO MECHANICAL SCHEDULES AND CONTROLS FOR MORE INFORMATION.
- M06 PROVIDE CHASE LARGE ENOUGH FOR (2) WIRE PULLS FOR EMS OUTDOOR SENSOR ASSEMBLY. SENSOR ASSEMBLY MOUNTED ON POST NEAR CONDENSING UNIT. COORDINATE WORK WITH DIVISION 26 AND EMS VENDOR.
- M10 PROVIDE NEW DX SPLIT SYSTEM FAN COIL UNIT AS SCHEDULED SUPPORTED FROM STRUCTURE ABOVE. PROVIDE A NEW SET OF MERV 13 AIR FILTERS IN UNIT BEFORE TURNING OVER TO OWNER. COORDINATE CONDENSATE PIPING WITH DIVISION 22.
- M13 PROVIDE NEW ELECTRIC UNIT HEATER AS SCHEDULED. SUPPORT FROM STRUCTURE ABOVE AT 10' AFF. COORDINATE UNIT INSTALLATION WITH EMS FOR 24V RELAY CONNECTION BY EMS VENDOR.
- M17 COORDINATE FINAL INSTALLED LOCATION SUCH THAT THE HVAC EQUIPMENT REMAINS ACCESSIBLE. VERIFY NO OTHER PIPING, ELECTRICAL CONDUIT, STRUCTURE AND/OR CEILING SUPPORTS INTERFERE IN ANY WAY. INSTALL HVAC EQUIPMENT WITHIN [16'-0"] ABOVE FINISHED FLOOR FOR SERVICEABILITY. REFRIGERANT PIPING SHALL BE ROUTED AS CLOSE TO DECK AS POSSIBLE. LANDLORD SHALL PROVIDE CHASE FOR REFRIGERANT LINES AND INFORM ENGINEER OF FINAL DEVELOPED LENGTH.
- M18 PROVIDE LOW VOLTAGE WIRING FROM DUCT DETECTOR TO REMOTE TEST STATION. MOUNT REMOTE TEST STATION ON WALL AT 48" AFF. COORDINATE QUANTITIES WITH DUCT DETECTORS.
- M19 SMOKE DETECTORS AND WIRING IN RETURN AIR DUCTS SHALL BE PROVIDED BY DIVISION 28 CONTRACTOR. SMOKE DETECTORS SHALL SHUT-DOWN UNIT UPON ALARM.
- M23 EXHAUST FAN SERVES TO PROVIDE TRANSFER AIR ONLY AND SHALL DISCHARGE AIR INTO THE STOCKROOM.
- M24 INSTALL VAV POWER MODULE FOR CONTROL OF OFFICE VAV DIFFUSERS IN AN ACCESSIBLE LOCATION ABOVE THE CEILING. DIVISION 26 CONTRACTOR SHALL PROVIDE 120V POWER TO MODULE. REFER TO ELECTRICAL DRAWINGS FOR DETAILS.
- M25 FAN COIL UNIT AND SERVICE AREA FOR UNIT SHALL NOT BE LOCATED ABOVE PIPING. FINAL LOCATION TO BE DETERMINED ON FINAL CONSTRUCTION DOCUMENTS.
- M30 ROUTE SHEET METAL RETURN AIR DUCT AS SHOWN WITH TERMINATION DIRECTED UPWARD. SIZE PLENUM FULL SIZE OF RETURN AIR INLET. PROVIDE DUCT LINER IN RETURN AIR DUCTWORK FOR SOUND ATTENUATION. COVER INLET WITH 1/2" BIRD SCREEN.
- M33 EXHAUST AIR DAMPERS SHALL BE ACCESSIBLE FROM LAY-IN CEILING. COORDINATE FINAL INSTALLED LOCATION SUCH THAT THE DAMPERS REMAIN ACCESSIBLE.
- M34 DO NOT ROUTE DUCTWORK OVER ELECTRICAL EQUIPMENT. NOTIFY ENGINEER OF CONFLICTS IN FIELD.
- M37 ROUTE OUTSIDE AIR DUCT FROM ROOF GOOSENECK TO UNIT MIXING BOX OPENING. REFER TO MECHANICAL DETAILS FOR SYSTEM INSTALLATION.
- M38 ROUTE NEW DUCTWORK ABOVE ALL HVAC EQUIPMENT SERVICE AREAS.
- M39 ROUTE DUCTWORK BELOW AND TIGHT TO STRUCTURE.
- M40 PROVIDE BIRDSCREEN IN EXISTING LOUVER. NEW 12"x8" PLENUM ON THE BACK OF LOUVER FOR RESTROOM EXHAUST.
- M43 ROUTE DUCTWORK TIGHT TO WALL.
- M44 ROUTE DUCTWORK AND BRANCH TAPS TIGHT TO CEILING. AVOID DUCTWORK VISIBILITY FROM SALES FLOOR AND DISPLAY WINDOWS.
- M50 INSTALL FABRIC DUCT ABOVE ARCHITECTURAL LIGHTING GRID. REFER TO BOXED NOTES FOR ADDITIONAL INFORMATION.
- M51 ARROWS INDICATE DIRECTION AND DISPERSION OF AIRFLOW VOLUME. PROVIDE VENTS ON FABRIC DUCT TO DIRECT AIRFLOW AS SHOWN ON PLAN.
- M52 EXTEND AND TIGHTEN HANGING CABLE TO WALL. GENERAL CONTRACTOR TO PROVIDE 2X WOOD BACKING. COORDINATE REQUIREMENTS WITH FABRIC DUCT MANUFACTURER.
- M53 FIELD FABRICATE L BRACKET FOR SUPPORTING END OF FABRIC DUCT. COORDINATE REQUIREMENTS WITH FABRIC DUCT MANUFACTURER.
- M56 DO NOT INSTALL AIR VENTS ON FABRIC DUCT ADJACENT TO BACKDROP WALL. DIMENSION SHOWN FOR REFERENCE ONLY.
- M57 GALVANIZED DUCTWORK SHALL BE ROUTED THROUGH WALL. TRANSITION TO FABRIC DUCT IMMEDIATELY AFTER WALL PENETRATION.
- M58 PROVIDE ANGLED DUCT TAKEOFF BETWEEN FABRIC DUCTWORK AND GALVANIZED DUCTWORK TRUNK. ANGLE SHALL MATCH ROOF SLOPE. COORDINATE WITH FABRIC DUCTWORK VENDOR PRIOR TO INSTALL.
- M60 SUPPORT FABRIC DUCTWORK WITH MANUFACTURER'S DOUBLE-CABLE CROSS BRACING SUPPORTS. COORDINATE REQUIREMENTS WITH FABRIC DUCT MANUFACTURER.
- M61 PROVIDE FABRIC DUCT WITH AIRFLOW PERFORATIONS AT AN ANGLE OF 22.5° FROM HORIZONTAL TOWARDS THE SALES FLOOR.
- M62 TRANSITION END OF FABRIC DUCT TO SHEET METAL DUCT. TRANSITION TO RECTANGULAR DUCT DIRECTLY BEFORE WALL PENETRATION. COORDINATE FABRIC DUCT LENGTH PRIOR TO ORDERING.
- M65 LOUVERED DOOR FOR MAKEUP AIR BY GENERAL CONTRACTOR. REFER TO ARCHITECTURAL DRAWINGS FOR MORE INFORMATION.
- M66 PROVIDE GRILLE ON WALL FOR TRANSFER AIR. MOUNT AS HIGH AS POSSIBLE WITHIN STRUCTURE AND INSTALL WITH BLADES ANGLED UP TOWARDS STRUCTURE FOR REDUCED VISIBILITY.
- M67 COORDINATE LOCATION OF FITTING ROOM DIFFUSERS WITH LIGHTS, SPRINKLERS, SPEAKERS, AND OTHER CEILING DEVICES FOR A NEAT AND ORDERLY INSTALLATION. INSTALL CEILING DEVICES IN-LINE WITH EACH OTHER WHERE POSSIBLE.
- M72 ROUTE REFRIGERANT PIPING FROM EXTERIOR CONDENSING UNIT TO ASSOCIATED FCU. ROUTE PIPING IN A NEAT AND ORDERLY FASHION.
- M91 PROVIDE RELIEF HOOD AT THE LOCATION SHOWN AS SCHEDULED.
- M92 PROVIDE NEW EQUIPMENT CONCRETE PAD AND ADJUST BOLLARDS AS NECESSARY.

INSTALL DUCTWORK AND PIPING AS TIGHT TO STRUCTURE AS POSSIBLE. COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS. COORDINATE INSTALLATION OF DUCTWORK AND PIPING TO AVOID CONFLICTS WITH ELECTRICAL PANELS, LIGHTING FIXTURES, ETC. DO NOT INSTALL DUCTWORK BELOW THE BOTTOM OF THE LIGHT FIXTURES.

FABRIC DUCT GENERAL NOTES:
 PROVIDE FABRIC DUCT THROUGHOUT THE SPACE AS SHOWN ON PLAN. FABRIC DUCT SHALL NOT REPLACE RECTANGULAR DUCT DROPS OR EXHAUST DUCTS. BASIS OF DESIGN SHALL BE "PRIHODA", "NM" NONPOROUS FABRIC WITH "PERFORATIONS" (AIR OPENINGS) WITH ADJUSTABLE FLOW DEVICES (I.E. AFD'S) AT OPENINGS, AND ONE ROW, GALVANIZED CABLE. INTERNAL HOOP SUPPORT SYSTEM SHALL BE PROVIDED ON ALL FABRIC DUCT UNLESS NOTED OTHERWISE. INCLUDE ALL COMPONENTS AND ACCESSORIES REQUIRED TO MAKE A COMPLETE SYSTEM AS RECOMMENDED BY PRIHODA DURING BID PHASE, INCLUDING HANGING STRAPS AND CLIPS, END-CAPS, CONNECTIONS TO METAL DUCTS, ETC. PRIHODA FABRIC DUCT SHALL BE SIZED PER FACTORY RECOMMENDATIONS TO PROVIDE MINIMUM AIRFLOWS IN BRANCH DUCTS AS SHOWN. CONFIRM FABRIC DUCT COLOR WITH ARCHITECT PRIOR TO ORDERING. FABRIC DUCT COLOR FOR INTERIOR PARTITIONING WALL IS BASIS OF DESIGN. CONTACT PRIHODA SALES DEPARTMENT (E-MAIL: SALES@PRIHODA-NA.COM, PHONE: 1-855-774-4632) FOR PRICING INFORMATION.

FABRIC DUCT DESIGN GUIDELINE:
 DISTRIBUTE FABRIC DUCT ALONG FABRIC DUCT IN THE DIRECTION OF FLOW ARROWS. ORIENT AND SIZE FABRIC DUCT DIFFUSER OPENINGS TO PROVIDE A 50 FPM THROW VELOCITY HALF-WAY TO THE NEAREST ADJACENT FABRIC DUCT OR TO THE NEAREST PARTITIONING WALL AS APPLICABLE. VENTS ON FABRIC DUCT SHALL BE LOCATED AT 22.5 DEGREES BELOW HORIZONTAL UNLESS NOTED OTHERWISE.

FABRIC DUCT COORDINATION NOTE:
 DURING THE FIRST WEEK OF THE PROJECT, THE GENERAL CONTRACTOR'S SUPERINTENDENT, MECHANICAL SUB-CONTRACTOR, AND A REPRESENTATIVE FROM "PRIHODA" SHALL MEET AT THE PROJECT SITE FOR CONFIRMATION OF ALL FIELD DIMENSIONS AND POTENTIAL OBSTRUCTIONS. THIS EVENT MUST PRECEED ORDERING OF ANY MATERIALS FROM "PRIHODA". CHANGE ORDERS AND EXPEDITING FEES WILL NOT BE APPROVED DUE TO LACK OF ON-SITE COLLABORATION AND/OR MEASUREMENT DURING SITE MEETING AT PROJECT COMMENCEMENT.

FABRIC DUCT INSTALLATION NOTE:
 INSTALL FABRIC DUCT ABOVE ARCHITECTURAL LIGHTING SYSTEM. COORDINATE FABRIC DUCT INSTALLATION WITH GENERAL CONTRACTOR AND DIVISION 26. GENERAL CONTRACTOR SHALL VERIFY FABRIC DUCT IS INSTALLED SUCH THAT IT DOES NOT CLASH WITH ARCHITECTURAL LIGHTING SYSTEM, INCLUDING LIGHT FIXTURES, ARCHITECTURAL LIGHTING SYSTEM GRID AND SUSPENSION CABLES, OR ANY OTHER HUNG LIGHTING FIXTURES WHEN DEFLATED.

THE DUCTWORK LAYOUT INDICATED ON THE DRAWINGS IS SCHEMATIC AND SHOWS DESIGNED INTENT ONLY. PRIOR TO FABRICATION AND INSTALLATION OF DUCTWORK, DIVISION 23 SHALL HAVE A QUALIFIED, EXPERIENCED SKETCHER PREPARE AND SUBMIT SHEET METAL SHOP DRAWINGS. SHOP DRAWINGS SHALL TAKE INTO ACCOUNT ALL EXISTING CONDITIONS, INCLUDING BUT NOT LIMITED TO, STRUCTURAL MEMBERS, CONDUITS AND PIPING TO REMAIN. SHOP DRAWINGS SHALL ALSO TAKE INTO ACCOUNT ALL NEW DESIGN CONDITIONS, INCLUDING BUT NOT LIMITED TO, STRUCTURAL MEMBERS, PIPING, CEILINGS, SOFFIT HEIGHTS, AND LIGHT FIXTURES.

SHOP DRAWINGS SHALL INDICATE ALL REVISIONS TO THE LAYOUT REQUIRED TO ACCOMMODATE THE EXISTING CONDITIONS AND/OR MAINTAIN THE CEILING HEIGHTS AND CLEARANCES REQUIRED. NOTIFY THE ARCHITECT AND ENGINEER OF ANY LOCATION WHERE THE DESIGN INTENT CANNOT BE MET PRIOR TO FABRICATION AND INSTALLATION OF DUCTWORK. REVISIONS TO DUCTWORK, EQUIPMENT, CONDUIT AND/OR PIPING REQUIRED BY CONTRACTOR'S FAILURE TO SUBMIT PROPERLY PREPARED SHOP DRAWINGS SHALL BE THE RESPONSIBILITY OF DIVISION 23 AT NO ADDITIONAL COST TO THE CLIENT OR DELAY TO THE PROJECT SCHEDULE.

GENERAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING TO ARCHITECT, ENGINEER, LANDLORD, AND BUILDING OFFICIAL/INSPECTOR A FINAL TEST AND BALANCE REPORT PER THE SPECIFICATIONS. PROVIDE TEST AND BALANCE REPORT TO ARCHITECT, ENGINEER, AND LANDLORD PRIOR TO THE FINAL BUILDING INSPECTION.

LANDLORD REQUIREMENTS:
 LANDLORD APPROVED ROOFING CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING ALL CUTS THROUGH THE EXISTING ROOF, MODIFYING EXISTING OPENINGS, AND/OR ALTERING CURB FLASHING AT GENERAL CONTRACTOR'S EXPENSE. COORDINATE WITH GENERAL CONTRACTOR.

EMS CONTROLS:
 CONTRACTORS ARE RESPONSIBLE FOR COORDINATING ALL EQUIPMENT CONTROLS WITH EMS VENDOR PRIOR TO PURCHASE AND INSTALLATION. CONTRACTORS SHALL COORDINATE WITH EMS VENDOR TO PROVIDE ALL NECESSARY EQUIPMENT AND ACCESSORIES FOR A FULLY FUNCTIONING SYSTEM.

TEMPERATURE CONTROLS:
 EMS VENDOR SHALL FURNISH SENSORS AND CONTROL COMPONENTS AS INDICATED ON PLANS AND AS NECESSARY TO ACCOMPLISH THE INTENT OF THE DRAWINGS. ALL CONTROLS SHALL BE TIED INTO THE EMS SYSTEM UNLESS NOTED OTHERWISE.

GENERAL CONTRACTOR SHALL INSTALL CARRIER FURNISHED TEMPORARY THERMOSTATS AND FEED THE WIRING DOWN INTO THE SPACE FOR START UP AND CONTROL OF RTU'S UNTIL THE EMS SYSTEM IS OPERABLE. REFER TO M30 FOR CARRIER CONTACT INFORMATION.

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SPLIT SYSTEM CONTROL MATRIX									
CONTROL FEATURE	UNITS	FCU-1	FCU-2	FCU-3	FCU-4	FCU-5	FCU-6	POINT TYPE INTERFACE WITH DDC (READ/WRITE)	NOTES
		SETPOINT OR Y/N	SETPOINT OR Y/N	SETPOINT OR Y/N	SETPOINT OR Y/N	SETPOINT OR Y/N	SETPOINT OR Y/N		
BUILDING AUTOMATION SYSTEM (BAS)									
ENERGY MANAGEMENT SYSTEM INTERFACE		Y	Y	Y	Y	Y	Y	BACNET	A
SETPPOINTS									
COOLING - OCCUPIED SETPOINT	'F	72	72	72	72	72	72	READWRITE	
COOLING - UNOCCUPIED SETPOINT	'F	77	77	77	77	77	77	READWRITE	
DEAD BAND - MINIMUM HEATING AND COOLING TEMPERATURE SETPOINT DIFFERENCE	'F	5	5	5	5	5	5		
HEATING - OCCUPIED SETPOINT	'F	70	70	70	70	70	70	READWRITE	
HEATING - UNOCCUPIED SETPOINT	'F	60	60	60	60	60	60	READWRITE	
HEATING - SUPPLY AIR TEMPERATURE SETPOINT	'F	90	90	90	90	90	90	READWRITE	
PROGRAMMED CONTROL FEATURES									
REMOTE TEMPERATURE SENSOR		Y	Y	Y	Y	Y	Y	READ	C
DEMAND CONTROL VENTILATION - CO2 SENSOR FEEDBACK	PPM	750	750	750	750	750	NA	READWRITE	C
EQUIPMENT ACCESSORIES AND CONTROL MODULES									
OUTSIDE AIR DAMPER - MOTOR OPERATED (MODULATING)		Y	Y	Y	Y	Y	N	READ POSITION	L
ECONOMIZER MIXING BOX		Y	Y	Y	Y	Y	N		B
HEATING COIL (ELECTRIC)		Y	Y	Y	Y	Y	Y	READ STATUS	J
AIRSIDE ECONOMIZER - FIXED DRY BULB	'F	Y	Y	Y	Y	Y	N	READWRITE	S.T
COOLING COIL - DX STAGED		Y	Y	Y	Y	Y	N	READ STATUS	N
SUPPLY FAN CONTROL METHODS									
ON DURING OCCUPIED HOURS		Y	Y	Y	Y	Y	Y		
CYCLE WITH LOADS DURING UNOCCUPIED HOURS		Y	Y	Y	Y	Y	Y		
OPTIMUM START SEQUENCE		Y	Y	Y	Y	Y	Y		R
CONSTANT VOLUME FAN CONTROL		N	N	N	N	N	Y	READ STATUS	
VARIABLE VOLUME - STAGED FAN CONTROL IN RESPONSE TO ACTIVE COOLING COIL STAGES		Y	Y	Y	Y	Y	N	READ STATUS	J.N
SAFETIES, INTERLOCKS, AND ALARMS									
RETURN AIR SMOKE DETECTOR - UNIT SHUTDOWN		Y	Y	Y	Y	Y	N	READ	D
AUXILIARY DRAIN PAN FLOOD DETECTOR - UNIT SHUTDOWN		Y	Y	Y	Y	Y	Y	READ	B
DIV. 23 CONTRACTOR SHALL PROVIDE CONTROL PANEL(S), WIRING, THERMOSTAT(S), TEMPERATURE SENSOR(S), HUMIDISTAT(S), AND/OR CO2 SENSOR(S) WHERE SHOWN ON THE DRAWINGS AND AS REQUIRED TO FACILITATE THE SCHEDULED CONTROL MODULES AND SEQUENCES OF OPERATION. EACH UNIT SHALL CONTROL BASED ON ITS OWN INTERNAL SAFETIES, TIME DELAYS, AND SEQUENCES UNLESS NOTED OTHERWISE. COORDINATE WITH OWNER FINAL BUILDING AND EQUIPMENT SCHEDULES DURING STARTUP. REFERENCE DIVISION SPECIFICATIONS FOR INDIVIDUAL DEVICE REQUIREMENTS.									
NOTES:									
A. PROVIDE UNIT WITH TERMINAL STRIP TO RECEIVE CONTROL INPUT(S) COMMUNICATED FROM A CENTRAL DDC CONTROLLER. EMS SHALL PROVIDE REMOTE SETPOINT ADJUSTMENT, SCHEDULING, AND MONITORING OF THE POINTS LISTED IN THE SCHEDULE FOR EACH UNIT.									
B. DIVISION 23 CONTRACTOR SHALL PROVIDE POINTS LISTED IN THE SCHEDULE FOR EACH UNIT.									
C. EMS CONTRACTOR SHALL PROVIDE DEVICE.									
D. DIVISION 28 CONTRACTOR SHALL PROVIDE DEVICE.									
J. MODULATE AND/OR CYCLE SUPPLY FAN SPEED SETTINGS AND COIL CAPACITY STAGES SUBJECT TO THE INTERNAL SAFETIES AND SEQUENCES TO MAINTAIN SCHEDULED SETPOINTS.									
L. DIVISION 23 SHALL PROVIDE ECONOMIZER MIXING BOX WITH INTEGRAL MOTORIZED DAMPER AND EMS CONTRACTOR SHALL PROVIDE CONTROLS CAPABLE OF ADJUSTING THE DAMPER POSITION TO MAINTAIN THE SCHEDULED OUTSIDE AIR ON THE DRAWINGS. EMS CONTRACTOR SHALL PROGRAM MULTIPLE DAMPER POSITION SETPOINTS IN THE FIELD DURING TESTING AND BALANCING TO MAINTAIN MINIMUM PROGRAM DAMPER SHALL ADJUST BASED ON DEMAND CONTROL VENTILATION.									
N. CYCLE COIL CAPACITY STAGES TO MAINTAIN SCHEDULED SETPOINTS.									
R. DURING OPTIMUM START SEQUENCE, THE UNIT SHALL SUPPLY THE LESSER OF THE MINIMUM RATE OF OUTDOOR AIR OR SUPPLY 3 COMPLETE AIR CHANGES DURING THE 1-HOUR PERIOD BEFORE NORMAL OCCUPIED MODE.									
S. THE SYSTEM SHALL UTILIZE THE ECONOMIZER CONTROL DAMPERS FOR FREE COOLING WHEN OUTDOOR AIR CONDITIONS ARE SUITABLE. FOR THE ECONOMIZER TO OPERATE DURING OCCUPIED HOURS, THE FOLLOWING CONDITIONS MUST BE TRUE: <ul style="list-style-type: none"> - OUTDOOR AIR TEMPERATURE IS LESS THAN 65°F. - THE INDOOR FAN HAS BEEN ON FOR AT LEAST 30 SECONDS. - THE UNIT HAS A VALID SUPPLY AIR TEMPERATURE INPUT. - THE UNIT HAS A VALID SPACE TEMPERATURE INPUT. 									
IF THE PRECEDING CONDITIONS ARE NOT TRUE, THE OUTSIDE AIR CONTROL DAMPERS SHALL BE SET TO THE MINIMUM DAMPER POSITION (TBD BY TAB CONTRACTOR). IF ALL OF THE PRECEDING CONDITIONS ARE TRUE, THE ECONOMIZER PID LOOP SHALL MODULATE THE DAMPER, THE ECONOMIZER DAMPERS SHALL MODULATE TO MAINTAIN A MIXED AIR TEMPERATURE OF 55°F.									
T. DURING UNOCCUPIED HOURS, UNOCCUPIED FREE COOLING SHALL BE ENABLED. THE ECONOMIZER SHALL REMAIN CLOSED UNLESS THE FOLLOWING CONDITIONS ARE TRUE: <ul style="list-style-type: none"> - OUTDOOR AIR TEMPERATURE IS LESS THAN THE SPACE TEMPERATURE - OUTDOOR AIR TEMPERATURE IS BELOW THE ECONOMIZER HIGH DAT LOCKOUT SETPOINT. 									
IF ALL OF THE PRECEDING CONDITIONS ARE TRUE AND THE SPACE TEMPERATURE RISES 1 DEGREE ABOVE THE EFFECTIVE UNOCCUPIED COOLING SETPOINT, THE SUPPLY FAN SHALL START AND THE ECONOMIZER DAMPER SHALL OPEN AS NECESSARY TO COOL THE SPACE. THE DAMPER SHALL REMAIN OPEN UNTIL THE SPACE IS SATISFIED OR THE PRECEDING CONDITIONS ARE NO LONGER TRUE. IF ANY OF THE PRECEDING CONDITIONS ARE NOT TRUE, THE ECONOMIZER SHALL CLOSE COMPLETELY.									

CARRIER UNIT STARTUP REQUIREMENTS

INSTALLING CONTRACTOR SHALL COMPLETE THE PRE-START CHECKLIST AND EMAIL JENIFER.TYE@COMFORTSYSTEMSUSA.COM TWO WEEKS PRIOR TO SCHEDULING EQUIPMENT STARTUP.

COORDINATE EQUIPMENT STARTUP WORK WITH COMFORT SYSTEMS USA EMAIL: JENIFER.TYE@COMFORTSYSTEMSUSA.COM, OFFICE: (317) 246-5176

DEPARTMENT MANAGER EMAIL: KLORI.KARAMDAD@COMFORTSYSTEMSUSA.COM, OFFICE: 317-246-4656

TECHNICAL SUPPORT EMAIL: RICK.FARRIS@COMFORTSYSTEMSUSA.COM, MOBILE: 317-638-5363 X4454

PRE-START CHECKLIST (VERIFY FOR ALL UNITS)

- VERIFY ALL ITEMS ON THE EQUIPMENT ORDER RECEIVED.
- VERIFY ALL PACKAGING MATERIAL REMOVED FROM THE UNIT.
- VERIFY CURB GASKETS PROPERLY INSTALLED.
- VERIFY ROOFTOP UNIT INSTALLED LEVEL AND PROPERLY ALIGNED WITH CURB.
- VERIFY DUCTWORK/FABRIC DUCT COMPLETELY INSTALLED PER MECHANICAL PLANS.
- VERIFY ON HOOD INSTALLED, AIR INLET SCREEN INSTALLED.
- VERIFY POWER EXHAUST ACCESSORY INSTALLED, (IF APPLICABLE)
- VERIFY CLEAN PLEATED FILTERS INSTALLED, MINIMUM MERV 8 RATING.
- VERIFY CONDENSATE DRAIN LINE INSTALLED, MINIMUM 2" DEEP TRAP, DRAIN PAN CHECK LEVEL.
- VERIFY SUPPLY FAN ROTATES FREELY IN THE HOUSING.
- VERIFY PULLEYS ALIGNED AND BELT TENSION CORRECT.
- VERIFY SMOKE DETECTORS INSTALLED IN DUCTWORK, CLEANED AND TESTED.
- VERIFY GAS METER INSTALLED AND GAS AVAILABLE FROM THE UTILITY, GAS PIPING COMPLETED, CHECKED FOR LEAKS AND PURGED (IF APPLICABLE).
- VERIFY GAS PIPING DRIP LEG INSTALLED PROPERLY, (DOWNSTREAM OF SHUTOFF VALVE AND NO INTERFERENCE WITH ACCESS DOOR)
- VERIFY FLUE HOOD INSTALLED.
- VERIFY JOBSITE POWER SUPPLY MATCHES THE VOLTAGE ON THE UNIT DATA PLATE.
- VERIFY ELECTRIC POWER CONNECTED TO UNIT VIA THE ACCESS PROVIDED. IF NOT, DATE POWER WILL BE AVAILABLE
- VERIFY NO WIRES TOUCHING REFRIGERANT LINES OR SHARP EDGES.
- VERIFY ELECTRIC CONNECTORS AND TERMINALS TIGHT.
- VERIFY THRU-THE-CURB UTILITY CONNECTIONS COMPLETE.
- VERIFY UNIT TRANSFORMER PRIMARY TAPPED FOR JOBSITE VOLTAGE.
- VERIFY VENSTAR THERMOSTAT INSTALLED IN THE RETURN AIR DUCT DROP AND WIRED FOR TEMPORARY UNIT OPERATION.

EMS INSTALLATION CHECKLIST

ITEMS ON EMS CHECK-OFF LIST MUST BE COMPLETED PRIOR TO EMS AND GBS COMMISSIONING AT THE END OF THE JOB. SOME ITEMS LISTED BELOW MAY NOT BE APPLICABLE.

COORDINATE EQUIPMENT STARTUP WORK WITH COMFORT SYSTEMS USA EMAIL: PAUL.SAWYER@COMFORTSYSTEMSUSA.COM OFFICE: 317-246-5176

EMS CHECKLIST

- REVIEW EMS PRINT SET AND INSTALL EMS OPUS PANEL AND LCP AS DESCRIBED IN THE EMS PRINT SET.
- REVIEW EMS PRINT SET AND PULL ALL WIRE AND TERMINATE ON DEVICES AS DESCRIBED IN THE EMS PRINT SET.
- REVIEW EMS PRINT SET AND INSTALL ALL EMS HVAC CONTROLS AS DESCRIBED IN THE EMS PRINT SET.
- REVIEW EMS PRINT SET AND INSTALL ALL EMS LIGHTING CONTROLS AS DESCRIBED IN THE EMS PRINT SET.
- REVIEW EMS PRINT SET AND WATTSTOPPER SUBMITTAL AND INSTALL THE WATTSTOPPER LIGHTING SYSTEM AND PULL ALL WIRE AS DESCRIBED IN THE EMS PRINT SET AND WATTSTOPPER SUBMITTAL.

SEQUENCE OF OPERATION

A. DX SPLIT SYSTEM UNIT CONTROL (FCU/UCU-1-7)
Refer to Split System Control Matrix for sequence of operations.

B. VAV DIFFUSER CONTROL (CSD1)
In occupied mode, the VAV diffuser shall modulate airflow to maintain the room temperature setpoint (adjustable). Set VAV diffuser minimum position to maintain 30% of the maximum airflow.
The room occupancy sensor, upon sensing the space to be vacant for 15 minutes (adjustable), shall signal the diffuser through the EMS to maintain an unoccupied temperature setpoint (adjustable). When occupancy is detected, the EMS shall direct the diffuser to control to the room temperature setpoint.
In unoccupied mode, upon reading a CO2 level above 100 PPM (adjustable) above ambient CO2 level (400 PPM), shall signal the diffuser through the EMS to modulate the zone damper between its minimum and maximum position. The system shall start to modulate the damper open when CO2 level rises 100 PPM above ambient CO2 level and continue to open to its maximum position as CO2 level rises to and above 700 PPM (adjustable) above ambient CO2 levels. As the CO2 level drops, the system shall start to modulate the dampers to the minimum position.
In unoccupied mode, VAV diffuser control shall be disabled unless occupancy is detected. When occupancy is detected, the EMS shall direct the diffuser to control at the room temperature setpoint.

C. MOTORIZED DAMPER CONTROL SERVING IT ROOM (MD)
When FCU-1 is in heating mode, the motorized damper shall be closed.
When FCU-1 is in cooling mode and the supply air temperature drops below 65 degrees Fahrenheit (adjustable), the motorized damper shall open.
A damper end switch shall prove if the motorized damper is open when called. If failure to open occurs, an alarm shall be generated to the EMS.

D. RESTROOM EXHAUST FAN CONTROL (EF-1)
In occupied mode, the exhaust fan shall be enabled and the motorized damper shall open.
In unoccupied hours, the exhaust fan shall be disabled and the motorized damper shall be closed.
A damper end switch shall prove if the motorized damper is open when called. If failure to open occurs, the fan shall not be enabled and an alarm shall be generated to the EMS.

E. IT ROOM EXHAUST FAN CONTROL (EF-2)
The exhaust fan shall be enabled when the space temperature rises 1 degree above the cooling setpoint (75 degrees Fahrenheit, adjustable) and shall continue to operate until the space temperature drops to 1 degree below the cooling setpoint.

F. UNIT HEATER CONTROL (EUH-1)
In occupied mode, the heater shall be enabled when the space temperature drops below room temperature setpoint (65 degrees Fahrenheit, adjustable).
In unoccupied mode, the heater shall be enabled when the space temperature drops below the unoccupied room temperature setpoint (55 degrees Fahrenheit, adjustable).
The unit heater thermostat shall interface with EMS using 24v relay provided by EMS Vendor. Coordinate Unit Heater installation with EMS Vendor such that thermostat remains fully accessible.
The EMS shall shut down unit heater heating coil stages when the EMS measures an outside air temperature above 55 degrees Fahrenheit (adjustable).

G. ELECTRIC AIR CURTAIN CONTROL (EAC-1)
Interlock air curtain with door limit switch to energize when the door opens. Units scheduled with heating coils shall cycle stages of electric heat to maintain room temperature setpoint (65 degrees Fahrenheit, adjustable). The unit's heater shall be disabled when the outside air temperature is above 55 degrees Fahrenheit (adjustable).

EMS CONTROLS:
CONTRACTORS ARE RESPONSIBLE FOR COORDINATING ALL EQUIPMENT CONTROLS WITH EMS VENDOR PRIOR TO PURCHASE AND INSTALLATION. CONTRACTORS SHALL COORDINATE WITH EMS VENDOR TO PROVIDE ALL NECESSARY EQUIPMENT AND ACCESSORIES FOR A FULLY FUNCTIONING SYSTEM.

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Project Number:
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Sheet Title:
MECHANICAL CONTROLS
Sheet Number:
M3.1

TEMPLATE ISSUE DATE: 11/28/2018

PROJECT DESIGN CONDITIONS

CLIMATE CONDITIONS				BUILDING OPERATING HOURS:			
WEATHER STATION: HERSHEY, PA, USA				MONDAY - FRIDAY			
CLIMATE ZONE: 5A				TBD BY OWNER			
HEATING (DB): 99.6% 10.4 °F				SATURDAY			
DESIGN HEATING CONDITIONS (DB): 99.6% 10.4 °F				TBD BY OWNER			
HUMIDIFICATION (DP/HR MCB): 99.6% -3.2 °F 4.7 g/ft³ 13.8 °F				SUNDAY			
COOLING (DB/MCB): 0.4% 91.8 °F 75.2 °F				HOLIDAY			
DESIGN COOLING CONDITIONS (DB/ MCB): 0.4% 91.8 °F 75.2 °F				TBD BY OWNER			
DEHUMIDIFICATION (DP/HR MCB): 0.4% 75.1 °F 133.4 g/ft³ 83.0 °F							

UNIT /SPACE DESCRIPTION	SET POINTS												SPACE OPERATING HOURS OCCUPIED / UNOCCUPIED			NOTES
	COOLING / DE-HUMIDIFICATION				HEATING				HUMIDIFICATION				ZONE VENTILATION RESET			
	OCC °F	UNOCC °F	MAX RH %	MIN RH %	OCC °F	UNOCC °F	MIN RH %	MAX RH %	CONTROL METHOD	BASE PPM	MAXIMUM PPM	M-F	SAT	SUN		
FCU-1 OFFICE & BOH	72	77	60%	NA	70	60	NA	NA	CO2	400	750	TBD	TBD	TBD	A-D	
FCU-2 SALES FLOOR	72	77	60%	NA	70	60	NA	NA	CO2	400	750	TBD	TBD	TBD	A-D	
FCU-3 SALES FLOOR & FR	72	77	60%	NA	70	60	NA	NA	CO2	400	750	TBD	TBD	TBD	A-D	
FCU-6 SOLAR ZONE	72	77	60%	NA	70	60	NA	NA	NA	NA	NA	TBD	TBD	TBD	B-D	

NOTES:
A. ZONE LEVEL VENTILATION RESET / DEMAND CONTROL VENTILATION (DCV) CONTROL METHOD: CARBON DIOXIDE SENSOR (CO2).
B. ZONE LEVEL SET POINT CONDITIONS SHALL BE AS SCHEDULED UNLESS OTHERWISE SCHEDULED OR NOTED ON THE DRAWINGS FOR ROOM SPECIFIC SPACE CONDITIONS.
C. ZONE LEVEL OCCUPANCY HOUR SCHEDULE SHALL BE PER BUILDING OPERATING HOURS UNLESS OTHERWISE SCHEDULED.
D. ZONE LEVEL CONTROLS SHALL BE CAPABLE OF OPERATING WITH INDEPENDENT OCCUPANCY SCHEDULES.

OUTSIDE AIR REQUIREMENTS, IMC-2018 (IP)

SYSTEM DESIGNATION	SYSTEM TYPE	SINGLE-ZONE SYSTEMS		MULTI-ZONE SYSTEMS		FLOOR AREA SERVED BY SYSTEM [AS] (SF)	SYSTEM AVERAGED AREA-BASED OUTDOOR AIR RATE (CFM/SF)	SYSTEM POPULATION [P] (PEOPLE)	SYSTEM AVERAGED PEOPLE-BASED OUTDOOR AIR RATE (CFM/P)	CODE REQUIREMENTS		DESIGN VALUES		NOTES
		VENTILATION ZONE ASSOCIATED WITH SYSTEM	WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS [Ez]	SYSTEM VENTILATION EFFICIENCY [Ev]	REQUIRED O/A INTAKE FLOW [Vol] (CFM)					REQUIRED DCV O/A INTAKE FLOW [Vol] (CFM)	MIN O/A INTAKE FLOW [Vol] (CFM)	ABS MIN O/A INTAKE FLOW [Vol] (CFM)		
FCU-1	MULTI-ZONE	-	-	0.87	3,379	0.095	16.00	3.8	437	368	450	375	ALL	
FCU-2-6	MULTI-ZONE	-	-	0.93	9,725	0.117	147.52	7.1	2,357	1,223	2,800	1,250	ALL	
									TOTALS	2,794	1,591	3,050	1,625	

NOTES:
A. VENTILATION CALCULATIONS BASED ON 2018 INTERNATIONAL MECHANICAL CODE.
B. SYSTEM POPULATIONS BASED ON MAX SEATING AND/OR CODE MAXIMUM VALUES.
C. MULTI-ZONE RECIRCULATING SYSTEMS: CALCULATOR TAKES THE MAXIMUM OUTSIDE AIRFLOW REQUIRED BY IMC AND ASHRAE 62.1 ON A SYSTEM LEVEL. THE CALCULATION USED TO DETERMINE VENTILATION AIRFLOW IN COMPLIANCE WITH VPP AND SECTION 4.0.4. VENTILATION RATE SHOWN IS ACTUAL CALCULATED WITH CORRECTION FACTORS INCLUDED. EACH ZONE IS CALCULATED WITH ITS WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS (HEATING/COOLING) AS PART OF CALCULATIONS TO FIND EV.
D. THE ABSOLUTE MINIMUM OUTSIDE AIRFLOW (ABS MIN O/A) DESIGN VALUE IS THE DEMAND CONTROL VENTILATION (DCV) DESIGN AIRFLOW VALUE.

ROOF HOOD SCHEDULE

MARK	SERVICE (INTAKE EXHAUST)	MANUFACTURER	MODEL	CFM	MAX THROAT VEL (FPM)	MAX PD. (IN)	THROAT (L" X W")	CURB (L" X W")	NOTES
RH-1	EXHAUST	COOK	30X48GR	4200	440	0.06	48"X30"	52"X34"	ALL
RH-2	EXHAUST	COOK	30X48GR	4200	440	0.06	48"X30"	52"X34"	ALL

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. PROVIDE WITH INTEGRAL BIRDSCREEN.
B. PROVIDE INSULATED ROOF CURB WITH MINIMUM HEIGHT REQUIRED TO MAINTAIN BOTTOM OF EQUIPMENT A MINIMUM OF 16 INCHES ABOVE FINISHED ROOF SURFACE. PROVIDE SLOPED CURBS IF NEEDED TO MATCH ROOF SLOPE. COORDINATE WITH ROOF INSULATION THICKNESS AND ROOF TAPER AT INSTALLED LOCATION. COORDINATE CURB TYPE WITH DRAWINGS.
C. PROVIDE INTEGRAL BACKDRAFT AND BAROMETRIC DAMPER.

AIR CURTAIN SCHEDULE (ELECTRIC HEAT)

MARK	AREA SERVED	MANUFACTURER	MODEL	UNIT SPECS				HEATING SPECS				MAX SOUND POWER (DB)	NOTES
				LENGTH (IN)	MAX AIRFLOW (CFM)	FAN QTY	MOTOR (HP)	NOM KW	HEATING ELECTRICAL	NOM KW	HEATING ELECTRICAL		
EAC-1	VESTIBULE EXCEPTION	BERNER	AND10-2072E	75	2770	2	1/2	208/3	41.9	60	75	ALL	

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. AIR CURTAIN PROVIDED BY DIVISION 23. REFER TO SEQUENCE OF OPERATION FOR UNIT CONTROLS.
B. MOUNT UNIT PER MANUFACTURER'S RECOMMENDATIONS TO FACE OF WALL AND SUPPORT VERTICALLY.
C. PROVIDE AIR CURTAIN WITH MAGNETIC NORMALLY CLOSED DOOR LIMIT SWITCH FOR INSTALLATION ON DOOR.
D. PROVIDE FACTORY INSTALLED DISCONNECT SWITCH INSTALLED ON THE SERVICE SIDE OF UNIT.
E. PROVIDE FACTORY INSTALLED INTEGRAL STARTER.
F. PROVIDE WITH INTEGRAL THERMOSTAT.
G. PROVIDE WITH TIME DELAY MICROSWITCH WITH ADJUSTABLE DELAY TIMERS PRE MOUNTED IN THE AIR CURTAIN CONTROL PANEL.
H. PROVIDE WITH POWDER COATED, FINISH COLOR AS SELECTED BY THE ARCHITECT.

UNIT HEATER SCHEDULE (ELECTRIC HEAT)

MARK	MANUFACTURER	MODEL	MOUNTING	MIN OUT (MBH)	NOM (KW)	MIN NO OF STAGES	CFM	MOTOR HP	THROW (FT)	ELECTRICAL			WEIGHT (LBS)	NOTES
EUH-1	Q MARK	IUH-1020	SUSPENDED	31.4	9.6	2	500	1/10	15	208/3	27.6	30	60	A - E

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. PROVIDE WITH UNIT-MOUNTED THERMOSTAT. COORDINATE INSTALLATION OF UNIT WITH EMS VENDOR. 24V CONTROLS RELAY BY EMS VENDOR.
B. PROVIDE MANUAL SUMMER/WINTER CHANGE-OVER SWITCH.
C. PROVIDE FACTORY MOUNTED DISCONNECT INSTALLED ON SERVICE SIDE OF UNIT.
D. PROVIDE NECESSARY MOUNTING BRACKETS FOR SUSPENDED INSTALLATION. COORDINATE EXACT LOCATION WITH ARCHITECT AND FIELD CONDITIONS.
E. MOUNT 10'-0" ABOVE FINISHED FLOOR WITHOUT OBSTRUCTING AIRFLOW. COORDINATE LOCATION SUCH THAT UNIT HEATER IS FULLY ACCESSIBLE.

FAN COIL UNIT SCHEDULE (DX COOLING, ELECTRIC HEATING)

MARK	MANUFACTURER	MODEL	SUPPLY FAN				COOLING COIL				HEATING COIL				MIN ABS MIN O/A (CFM)	ABS (CFM)	ELECTRICAL			WEIGHT (LBS)	NOTES		
			CFM	ESP (IN)	TH (MBH)	SH (MBH)	EAT (°F DB)	LAT (°F WB)	REFR TYPE	MIN OUT (MBH)	NOM (KW)	EAT (°F DB)	LAT (°F DB)	MIN NO OF STAGES			MIN O/A (CFM)	V/PH	MCA			MOCP	
FCU-1	CARRIER	40RUAAD08	2,650	1.00	89	71	77.6	63.7	53.2	52.2	R-410A	86	26.3	60	80	2	450	375	208/3	74	80	410	A - O
FCU-2	CARRIER	40RUAAD07	2,030	1.00	75	51	77.9	65.9	55.2	53.8	R-410A	72	21.1	52	85	2	600	300	208/3	74	80	400	A - O
FCU-3	CARRIER	40RUAAD07	2,030	1.00	75	51	77.9	65.9	55.2	53.8	R-410A	72	21.1	52	85	2	600	300	208/3	74	80	400	A - O
FCU-4	CARRIER	40RUAAD08	2,535	1.00	95	63	78.3	66.2	55.5	54.0	R-410A	93	27.3	51	85	2	800	350	208/3	74	80	410	A - O
FCU-6	CARRIER	FV4CNB006	1,840	1.00	46	41	72.0	60.0	51.7	51.1	R-410A	30	8.8	70	85	2	0	0	208/3	48	50	210	A - N

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. ASSOCIATED CONDENSING UNIT SHALL BE BY THE SAME MANUFACTURER.
B. EQUIPMENT SIZED FOR 100°F AMBIENT TEMPERATURE.
C. PROVIDE 2" MERV 13, PLEATED THROWAWAY AIR FILTERS.
D. PROVIDE WITH BACK INLET CONNECTION.
E. PROVIDE WITH FRONT OUTLET CONNECTION.
F. PROVIDE WITH 7-DAY PROGRAMMABLE THERMOSTAT WITH STAGED HEATING AND COOLING CAPABILITY AS REQUIRED FOR OPERATION OF AUXILIARY HEATING AND COOLING CONTROLS.
G. HUSED DISCONNECT SWITCH PROVIDED BY DIVISION 26 CONTRACTOR.
H. SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT. FILTER LOSS IS AT A MAXIMUM OF 400 FPM FACE VELOCITY.
J. PROVIDE MOTOR HORSEPOWER TO OVERCOME INTERNAL UNIT STATIC PRESSURE DROP PLUS SPECIFIED EXTERNAL STATIC PRESSURE DROP.
K. NOMINAL MOTOR HP SHALL BE NO LARGER THAN THE FIRST AVAILABLE NOMINAL MOTOR SIZE GREATER THAN THE REQUIRED BHP.
L. DIVISION 23 CONTRACTOR SHALL PROVIDE SMOKE DETECTORS IN RETURN AIR DUCT(S).
M. PROVIDE WITH SPRING VIBRATION ISOLATION AND ALL-THREAD HANGING RODS.
N. PROVIDE AUXILIARY DRAIN PAN WITH FLOOD DETECTOR SWITCH TO SHUT OFF UNIT WHEN WATER IS PRESENT IN DRAIN PAN.
O. PROVIDE UNIT WITH ECONOMIZER MIXING BOX BY MICROMET, OR EQUIVALENT ECONOMIZER OPERATION. MIXING BOX SHALL BE PROVIDED WITHOUT CONTROLS AND A FACTORY INSTALLED ACTUATOR CAPABLE OF RECEIVING A 0-10VDC SIGNAL. COORDINATE CONTROLS WITH EMS VENDOR PRIOR TO PURCHASE.

CONDENSING UNIT SCHEDULE

MARK	SERVICE	MANUFACTURER	MODEL	REFR TYPE	TH (MBH)	MIN NO OF STAGES	NO OF CIRCUITS	MIN EFF		ELECTRICAL			WEIGHT (LBS)	NOTES
								(EER)	(IEER)	V/PH	MCA	MOCP		
CU-1	FCU-1	CARRIER	38AUZE08	R-410A	89	2	1	11.2	14	208/3	37	60	400	ALL
CU-2	FCU-2	CARRIER	38AUZE07	R-410A	75	2	1	12	14	208/3	25	30	400	ALL
CU-3	FCU-3	CARRIER	38AUZE07	R-410A	75	2	1	12	14	208/3	25	30	400	ALL
CU-4	FCU-4	CARRIER	38AUZE07	R-410A	75	2	1	12	14	208/3	25	30	400	ALL
CU-5	FCU-5	CARRIER	38AUZE08	R-410A	95	2	1	11.2	14	208/3	37	60	400	ALL
CU-6	FCU-6	CARRIER	24AB8360	R-410A	46	1	1	11.5	13.5	208/3	22	30	240	ALL

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. ASSOCIATED FAN COIL UNIT SHALL BE BY THE SAME MANUFACTURER.
B. PROVIDE LOW AMBIENT CONTROL TO 0°F.
C. EQUIPMENT SIZED FOR 100°F AMBIENT TEMPERATURE.
D. COORDINATE WITH THE MANUFACTURER THE HORIZONTAL AND VERTICAL REFRIGERANT PIPE ROUTING TO DETERMINE PIPE SIZES FOR THE REFRIGERANT PIPING. MANUFACTURER SHALL PROVIDE DETAILED REFRIGERANT PIPING DIAGRAMS INCLUDING DIMENSIONAL DATA FOR ALL REFRIGERANT PIPING DEVICES. THE MANUFACTURER SHALL SIZE AND LOCATE THE ASSOCIATED REFRIGERANT TRAPS BASED ON THE ACTUAL ROUTING AND PROVIDE OTHER APPURTENANCES TO PROVIDE A FULLY FUNCTIONAL AND OPERATIONAL SYSTEM. COORDINATE WITH THE MANUFACTURER LOCATIONS FOR ALL REFRIGERANT PIPING DEVICES TO MAINTAIN SERVICEABILITY AND ACCESSIBILITY.
E. PROVIDE LIQUID LINE FILTER DRYER AND SIGHT GLASS.
F. PROVIDE CONCRETE HOUSEKEEPING PAD PER SPECIFICATIONS.
G. PROVIDE FACTORY MOUNTED DISCONNECT INSTALLED ON SERVICE SIDE OF UNIT.
H. STARTERS FOR ALL MOTORS SHALL BE PROVIDED INTEGRAL WITH UNIT.
J. COORDINATE SIZE OF CONDUCTOR TERMINATION LUGS WITH CONDUCTOR SIZES SHOWN ON ELECTRICAL DRAWINGS.
K. PROVIDE CONDENSER COIL HAIL GUARDS.
L. PROVIDE HARD START KIT FOR ALL SINGLE PHASE UNITS.

FAN SCHEDULE

MARK	SERVICE DESCRIPTION	MANUFACTURER	MOUNTING	MODEL	CFM		ESP (IN)	BHP	NOM HP	FAN RPM	DRIVE (BELT/DIRECT)	VFD (Y/N)	ELECTRICAL	WEIGHT (LBS)	NOTES
					MIN	MAX									
EF-1	RESTROOM	GREENHECK	INLINE	SQ-080-VG	275	275	0.5	0.07	1/10	1684	DIRECT	N	120/1	49	A,B,D,E,F,G,H,L
EF-2	IT CLOSET	GREENHECK	INLINE	SQ-100-VG	1000	1000	0.3	0.17	1/4	1513	DIRECT	N	120/1	45	A,E,F,G,H,K

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. INSTALL FAN WITHIN 16'-0" ABOVE FLOOR OR WITHIN 12" OF CEILING FOR SERVICEABILITY. COORDINATE LOCATION WITH STRUCTURE, LIGHTS, PIPING, AND DUCTWORK SUCH THAT FAN IS FULLY ACCESSIBLE.
B. CONTRACTOR SHALL PROVIDE BIRDSCREEN AND MOTORIZED DAMPER CAPABLE OF ACCEPTING ACTUATOR PROVIDED BY EMS VENDOR. COORDINATE CONNECTIONS WITH EMS VENDOR PRIOR TO INSTALLATION.
D. INSTALL EXHAUST FAN OR EXTERIOR DUCT TERMINATION TO MAINTAIN A MINIMUM OF 15'-0" FROM AIR INTAKES.
E. PROVIDE WITH RUBBER IN SHEAR ISOLATION AND ALL-THREAD HANGING RODS.
F. PROVIDE WITH FACTORY-MOUNTED STARTER AND DISCONNECT SWITCH.
G. PROVIDE WITH FACTORY-MOUNTED CONTROL POWER TRANSFORMER CAPABLE OF ACCEPTING A 24V RELAY FROM EMS.
H. PROVIDE WITH MANUFACTURER'S ELECTRONICALLY COMMUTATED (EC) MOTOR. CONTRACTOR SHALL USE FAN POTENTIOMETER FOR BALANCING PURPOSES.
J. NOMINAL MOTOR HP SHALL BE NO LARGER THAN THE FIRST AVAILABLE NOMINAL MOTOR SIZE GREATER THAN THE BHP.
K. INTERLOCK FAN OPERATION WITH SPACE TEMPERATURE SENSOR. 24V RELAY FURNISHED BY EMS VENDOR.
L. INTERLOCK FAN OPERATION WITH EMS. 24V RELAY FURNISHED BY EMS VENDOR.

GRILLE, REGISTER, AND DIFFUSER SCHEDULE

MARK	MANUFACTURER	SERVICE	MODEL	CONSTRUCTION	FACE TYPE	MOUNTING LOCATION	BORDER TYPE	FACE SIZE (IN)	MAX. NO	MAX. PRESS. DROP (IN. W.C.)	NOTES
CEG1	TITUS	EXHAUST	OMNI	STEEL	PLAQUE	CEILING	--	12x12	25	0.1	B, C, F, H
CEG2	TITUS	EXHAUST	PAR	STEEL	PERFORATED	CEILING	--	12x12	25	0.1	B, C, F, H
CRG1	TITUS	RETURN	PAR	STEEL	PERFORATED	CEILING	--	24x24	25	0.1	B, C, F, H
CRG2	TITUS	RETURN	PAR	STEEL	PERFORATED	CEILING	--	12x24	25	0.1	B, C, F, H
CSD1	TITUS	SUPPLY	PROXIDY	STEEL	PLAQUE	CEILING	--	24x24	25	0.1	A, C, F, H, J
CSD3	TITUS	SUPPLY	OMNI	STEEL	PLAQUE	CEILING	--	12x12	25	0.1	A, C, F, H
CSD4	TITUS	SUPPLY	R-OMNI	STEEL	PLAQUE	CEILING	--	18"Ø	25	0.1	A, C, F, H
WTG1	TITUS	TRANSFER	350RL	STEEL	LOUVERED	WALL	--	REFER TO PLANS	25	0.1	B, D, G, H

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. 4-WAY THROW PATTERN UNLESS OTHERWISE INDICATED BY FLOW ARROWS ON DRAWINGS.
B. NECK SIZE SHOWN ON DRAWINGS. PROVIDE BRANCH DUCT TO MATCH NECK SIZE UNLESS OTHERWISE SHOWN ON DRAWINGS.
C. BAKED ENAMEL FINISH, COLOR TO MATCH WALL, DUCT, AND/OR CEILING COLOR. COORDINATE WITH ARCHITECT PRIOR TO ORDERING.
D. FRONT BLADES PARALLEL TO LONG DIMENSION. INSTALL WALL GRILLE HIGH ON WALL WITH AIR BLADES POINTED UPWARD. COORDINATE EXACT LOCATIONS PRIOR TO INSTALLATION.
F. PROVIDE WITH RAPID MOUNT FRAMING OPTION FOR LAY-IN TYPE DIFFUSERS INSTALLED IN A HARD CEILING.
G. FRAME TYPE TO MATCH CEILING/WALL CONSTRUCTION. COORDINATE WITH ARCHITECTURAL REFLECTED CEILING/WALL PLAN.
H. PROVIDE DIFFUSERS AND GRILLES WITH NO EXPOSED MOUNTING SCREWS. COORDINATE WITH MANUFACTURER FOR NECESSARY MOUNTING BRACKETS OR ACCESSORIES.
J. VARIABLE VOLUME DIFFUSER TO BE INTERLOCKED WITH SPACE MOUNTED THERMOSTAT. MAXIMUM AIRFLOW SHALL BE AS NOTED ON PLANS. MINIMUM AIRFLOW SHALL BE 30% OF MAXIMUM AIRFLOW. PROVIDE PRESSURE RELIEF COLLAR WITH DIFFUSER. DIFFUSER SHALL BE FURNISHED BY EMS VENDOR. INSTALLED BY MECHANICAL CONTRACTOR.

EMS CONTROLS:
CONTRACTORS ARE RESPONSIBLE FOR COORDINATING ALL EQUIPMENT CONTROLS WITH EMS VENDOR PRIOR TO PURCHASE AND INSTALLATION. CONTRACTORS SHALL COORDINATE WITH EMS VENDOR TO PROVIDE ALL NECESSARY EQUIPMENT AND ACCESSORIES FOR A FULLY FUNCTIONING SYSTEM.

Architect:



ARCHITECT OF RECORD:
BRR ARCHITECTURE, INC.
8131 METCAL AVENUE
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TEMPLATE ISSUE DATE: 11/28/2018

Fixture Package:

UNITE

Stamp:



06/16/2022

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CONSTRUCTION

Issue Date:

06/20/2022

Revisions:

NO.	REASON	DATE

Division 23 HEATING, VENTILATING, AND AIR CONDITIONING

1. GENERAL REQUIREMENTS

All requirements under Division 01 and the general and supplementary conditions of these specifications apply to this section and division. Where the requirements of this section and division exceed those of Division 01, this section and division take precedence. Become thoroughly familiar with all the contents of this division, section, and both. Work required under the division includes all materials, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications, or reasonably inferred to be necessary to facilitate the function of each system as implied by the design and the equipment specified.

The specifications and drawings for the project are complementary, and any portion of work described in one shall be provided as if described in both. In the event of discrepancies, notify the Engineer and request clarification prior to proceeding with the work involved.

Drawings are graphic representations of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the scope of work, including the intended general arrangement of the system without showing all of the exact details as elevations, offsets, control lines, and other installation requirements. Use the drawings as a guide when fabricating and installing materials and equipment to be into the designated spaces, and which when installed per manufacturer's requirements, will ensure a complete, coordinated, satisfactory, and properly operating system.

B. DEFINITIONS

Division: References contained in this specification follow the numbering system defined in the Construction Specifications Institute (CSI) MasterFormat 2004 Edition. Specification Divisions 01 through 13 provided with this project may reference the CSI MasterFormat 1995 Edition. The correspondence between the 2004 Edition and 1995 Edition are as follows:

2004 Edition	1995 Edition
Division 21 - Fire Suppression	Division 10
Division 22 - Plumbing	Division 15
Division 23 - HVAC	Division 16
Division 26 - Electrical	Division 16
Division 27 - Communications	Division 16
Division 28 - Electronic Safety and Security	Division 16

Furnish: To supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations.

Install: To perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, working, applying, working, fitting, cutting, protecting, cleaning, testing, commissioning, starting up and similar operations, and the necessary rework to complete the work.

Provide: To furnish and install.

Furnished by Owner (or Owner/Furnished) or Furnished by Others: An item furnished by the Owner or under other divisions or contracts, and installed under the requirements of this division, complete and ready for intended use, including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the warranty required by this division.

Engineer: Where referenced in this division, "Engineer" is the Engineer of Record and the Design Professional for the work under this division, and is considered to, and an authorized representative of the Architect, as defined in the General and/or Supplementary Conditions. When used in this division, "Engineer" means increased involvement by the Engineer in addition to involvement by and obligations to the Architect.

AIA: The local code and/or inspection agency (Authority) having jurisdiction over the work.

NRTL: Nationally recognized testing laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA), and acceptable to the AIA for this project. Nationally recognized testing laboratories and standards listed are used only to improve the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AIA and conform to meet the specifications.

Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals.

1. Substitutions for Cause: Changes proposed or required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantages to Contractor or Owner.

The terms "approved equal," "equivalent," or "equal" are used synonymously and shall mean "accepted" by the Architect or the Engineer as the terms to the term or manufacturer specified. The term "approved" shall mean listed, labeled, and, by an NRTL, and acceptable to the AIA for this project.

C. CREPID SITE VISIT

Prior to submitting bid, visit the site of the proposed work and become fully informed as to the conditions under which the work to be done. Failure to comply with this requirement shall not be considered sufficient justification to request or obtain extra compensation over and above the Contract price.

D. MATERIAL AND WORKMANSHIP

Provide new material, equipment, and apparatus under this contract unless otherwise stated herein, of best quality normally used for the purpose in good commercial practice, and free from defects. Install material and equipment in accordance with the manufacturer's installation instructions. Model numbers listed in the specifications or shown on the drawings are not necessarily intended to designate the required item, written descriptions of the item govern over model numbers.

Pipe, pipe fittings, pipe specialties and valves shall be manufactured in plants located in the United States or certified to meet the specified ASTM and ANSI standards.

Work performed under this contract shall provide a neat and "workmanlike" appearance when completed, to the satisfaction of the Architect and Engineer. Workmanship shall be the finest possible by experienced mechanics. Installations shall comply with applicable codes and laws.

The complete installation shall function as designed and intended with respect to efficiency, capacity, noise level, etc. Abnormal noise caused by materials, equipment, or devices, and apparatus and equipment shall be corrected. Materials and equipment shall be of commercial specification grade of quality. Light duty and residential grade equipment shall not be accepted unless otherwise indicated.

Remove from the premises waste material present as a result of work, including cuttings, crumpled paper, stickers, and/or excavation material not used in backfilling, etc. Clean equipment installed under this contract to present a neat and clean installation at the termination of the work.

Repair or replace public and private property damaged as a result of work performed under this contract to the satisfaction of authorities and regulations having jurisdiction. Provide all safety signs, guards, and warning signs required for the performance of the work and for the safety of the public.

E. MANUFACTURERS

In other articles where lists of manufacturers are introduced, subject to compliance with requirements, provide products by one of the manufacturers specified.

Where a list is provided, manufacturers are listed alphabetically and do not indicate any ranking or preference.

Where manufacturers are not listed, provide products subject to compliance with requirements with manufacturers that have been actively involved in manufacturing the specified product for no less than 5 years.

F. COORDINATION

Coordinate work with that of other trades so that the various components of the systems are installed at the proper time, fit the available space, and will allow proper service access to those items requiring maintenance. Components which are installed without notice to the above shall be reworked at the additional cost to the Owner.

Unless otherwise indicated, the General Contractor shall provide chases and openings in building construction required for installation of the systems specified. Contractor shall furnish the General Contractor with information where chases and openings are required. Contractor shall keep informed as to the work of other trades engaged in the construction of the project and shall execute work in a manner as to not interfere with or delay the work of other trades.

Figured dimensions shall be taken in preference to scale dimensions. Contractor shall take his own measurements at the building, as variations may occur. Contractor shall be held responsible for errors that could have been avoided by proper checking and inspection.

Provide materials with trim that will properly fit the types of casing, wall, or floor finishes actually installed. Model numbers listed in the specifications or shown on the drawings are not intended to designate the required item.

G. ORDINANCES AND CODES

Work performed under this contract shall, at a minimum, be in conformance with applicable national, state and local codes having jurisdiction. Equipment furnished and associated installation work performed under this contract shall be in strict compliance with current applicable codes as adopted by the local AIA, including any amendments.

1. National Electrical Code (NEC)

2. National Fire Protection Association (NFPA)

3. Underwriters Laboratories (UL)

4. International Building Code (Administration) (IBCA)

5. American Society of Mechanical Engineers (ASME)

6. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)

7. American National Standards Institute (ANSI)

8. American Society of Testing and Materials (ASTM)

9. Other national standards and codes where applicable.

Where the contract documents exceed the requirements of the referenced code, standards, etc., the contract documents shall take precedence. Where conflicts between various codes, ordinances, rules, and regulations exist, comply with the most stringent.

Promptly bring all conflicts observed between codes, ordinances, rules, regulations, referenced standards, and these documents to the attention of the Architect and Engineer for final resolution. Contractor will be held responsible for any violation of the law.

Procure and pay for permits and licenses required for the accomplishment of the work herein described. Where required, obtain pay, and furnish certificates of inspection to Owner.

H. PROTECTION OF EQUIPMENT AND MATERIALS

Store and protect from damage equipment and materials delivered to jobsite. For materials and equipment susceptible to changing weather conditions, dampness, or temperature variations, store inside in conditioned spaces. For materials and equipment not susceptible to these conditions, cover with waterproof, tear-resistant, polyethylene plastic or polyethylene plastic as required to protect from splatter, dust, dirt, water, or physical damage. Replace insulation that has become wet at any time during construction. Drying the insulation is not acceptable. Seal any leaks or joints of internal fiberglass insulation. Equipment and materials damaged by construction activities shall be repaired and Contractor shall furnish new equipment and material of a like kind at his own expense.

Keep premises clean and free of foreign material created during work performed under this contract. Piping, equipment, etc. shall have a neat and clean appearance at the termination of the work. Remove debris from ceiling/drop air plenum, including dust.

Plug, seal, or cap open ends of ductwork and piping systems within stored and installed during construction when not in use to prevent the entrance of debris into the systems. Remove temporary protection prior to starting equipment and turning the system over to the owner.

I. SUBSTITUTIONS

Materials, products, equipment, and systems described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be used in the proposed substitution. The base list shall include only the products from manufacturers specifically named in the drawings and specifications. To request a substitution, request the Substitution Request Form from the Architect or Engineer.

Request a Substitution Request Form for each material, product, equipment, or system that is proposed to be substituted. The burden of proof of the merit of the proposed substitution is upon the proposer.

Unless stated otherwise in writing to the Engineer, the Contractor, Contractor warrants to the Architect, Architect, and Owner the following:

1. Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects unless stated otherwise in the substitution request.

2. Proposed substitution is consistent with the Contract Documents and will produce indicated results, including functional clearances, maintenance and access to other structural elements.

3. Proposed substitution has received necessary approvals of authorities having jurisdiction.

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

5. Accepted substitution fails to perform as required. Contractor shall replace substitute material or system with that originally specified and bear costs thereof.

6. Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects.

No substitutions will be considered unless the Substitution Request Form is completed and attached with the appropriate substitution documentation. No substitution will be considered prior to receipt of bids unless written request for approval to bid has been received by the Engineer at least 10 (ten) calendar days prior to the date for receipt of bids.

If the proposed substitution is approved prior to receipt of bids, such approval will be stated in an addendum. Bidders shall not rely upon approvals made in any other way. Written approval will not be given. No substitutions will be considered after the contract is awarded unless specifically provided in the contract documents.

I. SYSTEM TESTING, ADJUSTING, AND BALANCING

Upon completion of each phase of the installation, test each system in conformance with local code requirements and as noted below. Furnish labor and equipment to complete each test. Each test shall be performed in conformance with the test procedures specified. Provide positive, direct, two-way damper control with no sleeves, springs or screw adjustments to come loose after installation. Provide cable length to span the distance from the damper to the remote operator location. Install damper in branch duct. Do not install in diffuser neck. Install remote operator on the back of the diffuser frame or side of a diffuser plenum. Support cable assembly to avoid bending of cable. Do not use manufacturer recommended materials. Where approved by architect, a ceiling cup with cover plate may be used for access to cable controls. Provide round dampers by Metropolitan and Technology model RT-200, Young's Regulator model 320-120, or approved equal. Provide remote cable control by Metropolitan Air Technology model RT-200, Young's Regulator model 320-120, or approved equal.

Round or oval ductwork shall be FlaktRUGO (VMA, United, Hercules Industries or equal), sheetmetal, with smooth interior surface, with low surface roughness and low air resistance. TAB control standards shall be used for all ductwork. Round ductwork gauges per the following table (reference SMACNA HVAC duct construction standards for gauges when pressures exceed 2 inches w.g.):

Size	Duct Gauge	Fitting Gauge
14" & under	24	24
15" & 16"	24	22

Leak & Lambert, Link Lines Industries Linde Safe, or approved equal factory-manufactured round ductwork and fittings may be substituted for specified round branch ductwork, at Contractors option. Heavy liquid joint sealant may be omitted on factory-manufactured round ductwork.

Low pressure (duct pressure class up to and including 2 inches w.g.) Fittings 24 inches w.g. may be fabricated, spot-welded and internally sealed. Continuously weld fittings larger than 24 inches in diameter. Fitting gauge shall be 22 gauge for 36 inch fittings and under; 20 gauge for larger sizes. 90 degree tees shall be conical type. Seal longitudinal and transverse ductwork joints airtight with heavy liquid sealant approved according to manufacturer's instructions. Provide gauge thickness in medium pressure (duct pressure class 3 inches to 6 inches w.g.) ductwork as recommended by SMACNA.

If permanent HVAC equipment is used during the construction period, provide temporary filters at all openings in the ductwork and inside equipment to protect the system from dust, dirt, paint, and moisture. Replace and maintain filters when needed, but not less than every month. On the day of Substantial Completion, clean the unit and ductwork and provide a new set of filters in the unit. Refer to section "Air Filtration" for filter details.

An independent, professional duct cleaning company shall vacuum clean all internal surfaces of equipment, coils, and ductwork connected to permanent HVAC units that are operated during the construction period. Conduct cleaning after new air filters are installed and prior to turning the system over to the owner.

D. FABRIC DUCT

Fabric duct shall be Phibroda MM with perforations and adjustable flow devices at openings or approved equal fabric air dispersion system. Fabric shall be made of woven or knitted fabric with a minimum weight of 1.5 oz/sq. yd. and a minimum thickness of 1/8 inch. Fabric shall be non-permeable coating. Fabric and coating must weigh 7.0 oz/sq. yd. per ASTM D3776 and provide an air permeability of 0.01 m³/m² at 0.1 inch w.g. per ASTM D3737. Fabric and coating shall have a temperature range of 0 to 180 degrees Fahrenheit and shall be classified by Underwriters Laboratories in accordance with the flame spread and smoke developed requirements of NFPA 90A and UL 2514.

Fabric ducts shall be suspended using Phibroda internal aluminum rings support. Hardware shall include cable, eye bolts, hrimbles, cable clamps, and turnbuckles as required. Fabric duct attachment shall be made to support using nylon cable clips spaced at 24 inches. Install chosen hardware in accordance with the requirements of the manufacturer.

Clean air handling equipment and ductwork prior to installing fabric ductwork. Clean external surfaces of foreign substances which may cause corrosion to the equipment and ductwork. Fabric ducts which are not connected to equipment or distribution devices of time of ductwork installation shall be covered with polyethylene film or other covering to keep the system clean until installation of fabric duct is completed. If fabric duct becomes soiled by installation, it should be removed and cleaned following the manufacturer's standard terms of warranty.

E. FLEXIBLE DUCT

Low pressure (duct pressure class up to and including 2 inches w.g.) and medium pressure (duct pressure class 2.1 inch to 6 inches w.g.) flexible duct shall be Flexmaster type 8B, Thermflex type G-AM, M-KE, -PL, type Silver Jacket, or equal (flex resistant polyethylene) protective vapor barrier, UL-181 Class 1, acoustical insulation duct, R-4.2 fiberglass insulation, Pressure CPE liner with possible weld mechanically locked together.

Flexible duct runs shall not exceed 5 feet in length, and shall be installed fully extended and straight as possible avoiding tight turns. Install flexible duct in accordance with manufacturer's instructions. Support flexible duct at maximum 5 feet on center and within 6 inches of bends. Bends shall not exceed a centerline radius of one duct diameter. Duct sag shall not exceed 1/2 inch. Supporting material in direct contact with the duct shall not be less than 1-1/2 inches in width.

Connect flexible duct to rigid metal duct or air devices as recommended by the manufacturer. At a minimum, install two wraps of duct tape around the inner cone connection and a metallic or non-metallic duct over the tape and two wraps of duct tape or a clamp over the outer jacket. Duct clamps shall be labeled in accordance with UL-181B and marked 181B-C. Duct tape shall be labeled in accordance with UL 181B and marked 181B-F.

F. AIR DEVICES

Air device as scheduled on drawings, manufactured by Price or Titus. VAV diffusers shall be Price Prodyne models only, all other air devices shall be Titus. No substitutions are permitted. Select VAV diffuser panel on room noise level to be higher than NC-30 unless otherwise shown. Provide devices with a soft plastic gasket to make an airtight seal against the mounting surface. Coordinate final location, frame, and material type of air devices with architectural ceiling conditions.

Submit complete shop drawings including information on noise level, pressure drop, CFM for each air device, styles, borders, etc. Clearly mark with specified equipment number. Submit samples of each air device as requested by the Engineer.

Provide wall return air grilles and exhaust air registers with horizontal 30 x 45 degree angle vision-proof frame. Provide concealed fasteners for wall mounted registers and grilles. Floor floor supply air registers of aluminum heavy duty type with 0 degree deflection.

Provide opposed blade dampers for supply air registers and exhaust air registers unless indicated otherwise on drawings.

Provide ceiling mounted air devices of lay-in or surface mounted type as required to be compatible with ceiling construction. Provide ceiling diffusers and grilles with white enamel finish unless noted otherwise.

G. CONTROL DAMPERS

Motorized dampers used for ventilation air intake, exhaust air, or relief air shall have leakage rates not to exceed 4.0 CFM/square foot in full closed position at 1 inch V.G. Pressure differential across the damper.

Provide dampers as manufactured by Greenheck, CESCO, Potoff, Nalor, or Ruskin. Reference manufacturer with model number is Ruskin CD-35 dampers of galvanized steel.

Coordinate with Comfort Systems to provide damper operator for each automatic damper with sufficient capacity to operate the damper under all conditions as scheduled, and to guarantee proper operation for ductwork of fire sizes. Where access doors are required, provide access doors for normally closed or normally open position for full safe operation in accordance to fire, low temperatures, or power interruption as required by the specifications.

H. SMOKE DETECTORS

Duct-mounted smoke detector shall be provided by Diviside. For Carrier Rooftop Units provided with System/Vu controls, units shall have factory-installed, field-installed smoke detector kits. Coordinate smoke detector kits with Carrier and Diviside. Control units shall shut down unit alarm.

I. LOUVERS, PLENUMS, SCREENS

Construct plenums with galvanized steel framing members and galvanized sheet metal, braced with galvanized angles. Gauges and bracing shall conform to SMACNA recommendations for ductwork of fire sizes. Where access doors are required, provide access doors with 20/22 V.G. weather-tight connections to louvers, sloping bottom of plenum to drain water to weepholes in bottom of louver.

Provide screens on louvers, ducts, hoods, fans, and openings to the outdoors as scheduled and/or noted on the drawings. Insect screens shall be galvanized steel mesh with 1/8 inch openings. Provide screens on louvers, ducts, hoods, fans, and openings to the outdoors as scheduled and/or noted on the drawings. Insect screens shall be galvanized steel mesh with 1/8 inch openings. Provide motorized control dampers or backdraft dampers where shown on the drawings.

J. EXHAUST AIR SYSTEMS

Provide in-line (duct) mounted exhaust fans as scheduled on the drawings. ACME, Carnes, Cook, Greenheck, Penberthy, or Twin City Fans complete with isolated blower unit and ceiling grille. Provide backdraft damper, discharge duct, and vibration isolation as scheduled or shown on the drawings.

K. HVAC EQUIPMENT

A. CONDENSING UNITS

Split system, air cooled condensing units as scheduled on the drawings, manufactured by Carrier, Dakin, Lennox, Trane, or York, with configuration as scheduled, complete with zinc coated, heavy gauge, galvanized steel cabinet with weather-resistant baked enamel finish; internally insulated access doors; direct expansion cooling coil section of aluminum/copper construction; condensate drain pan; statically and dynamically balanced centrifugal fan section with built-in motor thermal overload protection; factory installed and wired controls including evaporator defrost control and single point electrical power controller; magnetic motor starters and condensers as required; air filter rack with 1 inch thick throwaway filters. Provide spring return air filters and all-throwing handgrips for horizontally suspended installations. Provide an auxiliary drain pan for suspended units with flood detector switch to shut off unit when water is detected in auxiliary drain pan. Flood detector switch shall be Diversitech wet switch or equivalent. Detector shall shut system down when water comes in contact with the hydrophilic pad of the detector. Place detector at the lowest location in the auxiliary drain pan. Wire detector to remote alarm, Diversitech universal alarm or equivalent.

B. FAN COIL UNITS (DIRECT EXPANSION, 1.5-2 TONS)

Provide split system, fan coil units as scheduled on the drawings, manufactured by Carrier, Dakin, Lennox, Trane, or York, with configuration as scheduled, complete with zinc coated, heavy gauge, galvanized steel cabinet with weather-resistant baked enamel finish; internally insulated access doors; direct expansion cooling coil section of aluminum/copper construction; condensate drain pan; statically and dynamically balanced centrifugal fan section with built-in motor thermal overload protection; factory installed and wired controls including evaporator defrost control and single point electrical power controller; magnetic motor starters and condensers as required; air filter rack with 1 inch thick throwaway filters. Provide spring return air filters and all-throwing handgrips for horizontally suspended installations. Provide an auxiliary drain pan for suspended units with flood detector switch to shut off unit when water is detected in auxiliary drain pan. Flood detector switch shall be Diversitech wet switch or equivalent. Detector shall shut system down when water comes in contact with the hydrophilic pad of the detector. Place detector at the lowest location in the auxiliary drain pan. Wire detector to remote alarm, Diversitech universal alarm or equivalent.

C. FAN COIL UNITS (DIRECT EXPANSION, 6-20 TONS)

Provide split system, fan coil units as scheduled on the drawings, manufactured by Carrier, Dakin, Lennox, Trane, or York, with configuration as scheduled, complete with zinc coated, heavy gauge, galvanized steel cabinet with weather-resistant baked enamel finish; internally insulated access doors; direct expansion cooling coil section of aluminum/copper construction; condensate drain pan; statically and dynamically balanced centrifugal fan section with built-in motor thermal overload protection; factory installed and wired controls including evaporator defrost control and single point electrical power controller; magnetic motor starters and condensers as required; air filter rack with 1 inch thick throwaway filters. Provide spring return air filters and all-throwing handgrips for horizontally suspended installations. Provide an auxiliary drain pan for suspended units with flood detector switch to shut off unit when water is detected in auxiliary drain pan. Flood detector switch shall be Diversitech wet switch or equivalent. Detector shall shut system down when water comes in contact with the hydrophilic pad of the detector. Place detector at the lowest location in the auxiliary drain pan. Wire detector to remote alarm, Diversitech universal alarm or equivalent.

D. ELECTRIC UNIT HEATERS

Provide electric unit heaters as scheduled on the drawings, manufactured by Berko, Brasch, Ince, Markel, QMark, or Raywall, single stage propeller unit heaters with overhead mounting brackets and hardware for horizontal air flow. Furnish heater fan motors complete with a manual electrical disconnect switch and a manual reset circuit breaker. Provide a manual disconnect switch, and other codes required safety devices. Provide unit mounted thermostat and manual summer/winter changeover switch.

Architect:

BRB ARCHITECTURE, INC.
153 WEST MAIN STREET
OVERLAND PARK, KS 66204

TEL: 913-242-9400
FAX: 913-242-9444

ARCHITECT OF RECORD:

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Engineer:

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8345 LENEXA DRIVE, SUITE 300
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2150004201

Project Owner:

NIKE, Inc.
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Project Address:

NIKE FACTORY STORE
46 OUTLET SQUARE
HERSHEY, PA 17033

TEMPLATE ISSUE DATE: 11/28/2018

Fixture Package:

UNITE

Stamp:

PROFESSIONAL
JARED CARLSON
ENGINEER
E080044
STATE OF MISSOURI

06/16/2022

Issued For:

CONSTRUCTION

Issue Date:

06/20/2022

Revisions:

NO. REASON DATE

PROJECT MANAGER:
BAW
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HW
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HW

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