GENERAL HVAC NOTES

1. ALL MECHANICAL EQUIPMENT AND INSTALLATIONS SHALL CONFORM WITH THE REQUIREMENTS OF THE LOCAL CODE OFFICE'S LATEST APPROVED VERSION OF THE INTERNATIONAL MECHANICAL CODE, THE INTERNATIONAL BLDG. CODE, THE STATE ENERGY CODE, NFPA 54, NFPA 90A, 101, UNDERWRITERS LABORATORIES AND ALL APPLICABLE LOCAL CODES AND ORDINANCES.

2. PRIOR TO PURCHASING ANY MATERIALS OR STARTING ANY WORK, CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, DUCTWORK SIZES, EQUIPMENT LOCATIONS, ETC. SHOWN ON THE DRAWINGS OR AFFECTING THIS WORK AND SHALL REPORT ANY DEVIATIONS TO THE ARCHITECT.

3. SUBMITTALS AND SHOP DRAWINGS SHALL BE SUBMITTED TO AND APPROVED BY THE ARCHITECT AND MECHANICAL ENGINEER PRIOR TO ORDERING, PURCHASING, OR FABRICATING ANY MECHANICAL EQUIPMENT. THESE SHALL INCLUDE ALL EQUIPMENT SPECIFIED ON THE PLANS OR IN THE PROJECT SPECIFICATIONS.

4. ALL MECHANICAL EQUIPMENT REQUIRING ELECTRICAL POWER SHALL BE INSTALLED WITH DISCONNECT SWITCHES AT EACH PIECE OF EQUIPMENT. COORDINATE SWITCH TYPE (FUSED OR NON-FUSED) WITH EQUIPMENT CHARACTERISTICS, MANUFACTURER'S RECOMMENDATIONS, AND ELECTRICAL PLANS AND SPECIFICATIONS. SEE SPECIFICATIONS FOR DESCRIPTION OF INTERFACE WITH DIVISION 16 WORK.

5. ALL REQUIRED CONTROL WIRING NOT SHOWN ON ELECTRICAL DRAWINGS SHALL BE INCLUDED AS PART OF THE MECHANICAL WORK. WIRING IN HVAC PLENUM SPACES SHALL BE INSTALLED ACCORDING TO CODE REQUIREMENTS.

6. UNLESS OTHERWISE NOTED, STARTERS, TRANSFORMERS, CONTROLS AND CONTROL WIRING REQUIRED FOR ALL MECHANICAL SYSTEMS SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.

7. INSTALL FIRE DAMPERS IN ALL RATED WALL, FLOOR, AND CEILING PENETRATIONS AS APPLICABLE. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATIONS OF RATED AREAS. PROVIDE ACCESS DOORS IN DUCT AT EACH FIRE DAMPER LOCATION. INSTALL SMOKE DAMPERS IN ALL DUCT PENETRATIONS THROUGH SMOKE RATED WALLS. WHERE DUCTS PENETRATE WALLS THAT CARRY BOTH SMOKE AND FIRE RATINGS, THE DAMPERS INSTALLED SHALL BE COMBINATION SMOKE AND FIRE DAMPERS. ALL DAMPERS SHALL BE U.L. 555 LABELED.

8. FIRE ALARM CONTRACTOR SHALL PROVIDE SMOKE DETECTORS FOR THE SUPPLY AIR TRUNKS OF ALL HVAC EQUIPMENT SUPPLYING GREATER THAN 2000 CFM TO ANY SPACE. PER IMC 606, DUCT SMOKE DETECTORS SHALL SHUT DOWN THE AIR DISTRIBUTION SYSTEM ON ACTIVATION. PER IMC 606, DUCT SMOKE DETECTORS TO BE CONNECTED TO THE BUILDING FIRE ALARM PANEL AS APPLICABLE. IF THE OCCUPANCY DOES NOT REQUIRE A FIRE ALARM PANEL, THE ACTIVATION OF DUCT SMOKE DETECTORS SHALL ACTIVATE AN AUDIBLE AND VISIBLE SIGNAL IN AN APPROVED LOCATION. SIGNAL TO BE IDENTIFIED AS "AIR DUCT DETECTOR TROUBLE". HVAC UNITS MAY BE RESET AT FIRE ALARM PANEL.

9. FIRE ALARM CONTRACTOR IS RESPONSIBLE FOR ALL WIRING AND EQUIPMENT TO MONITOR SMOKE DETECTORS AND SHUT DOWN HVAC UNIT UPON SMOKE DETECTOR ACTIVATION. FIRE ALARM CONTRACTOR SHALL PROVIDE DUCT DETECTORS, AND MECHANICAL CONTRACTOR IS RESPONSIBLE FOR INSTALLING DETECTOR IN DUCT. FIRE ALARM CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND OPERATION OF BUILDING FIRE ALARM SYSTEM.

10. ALL MECHANICAL EQUIPMENT SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

11. SUPPLY, RETURN, EXHAUST, AND OUTDOOR AIR DUCTWORK SHALL BE CONSTRUCTED OF GALVANIZED SHEET METAL AS RECOMMENDED IN SMACNA LOW PRESSURE DUCT CONSTRUCTION STANDARDS, LATEST EDITION. ALL JOINTS AND SEAMS IN SUPPLY AND RETURN SHEET METAL DUCTWORK SHALL BE SEALED WITH DUCT SEALER TO SMACNA CLASS A, NO CLOTH DUCT TAPE IS ALLOWED.

12. ALL SHEET METAL SUPPLY, RETURN, AND VENTILATION AIR DUCT WORK SHALL BE INSULATED WITH 2" THICK FIBERGLASS, 1 LB PER CUFT. DUCT INSULATION WITH FOIL VAPOR BARRIER, U.L. LISTED, MINIMUM R-6 OR OTHERWISE AS REQUIRED BY LOCAL ENERGY CODES. EXHAUST DUCT WORK SHALL BE INSULATED WITH THE SAME WITHIN 10' OF EXTERIOR WALL OR ROOF OPENING.

13. ALL MECHANICAL EQUIPMENT SHALL BE LABELED WITH BAKELITE NAMEPLATE WITH 2" HIGH WHITE LETTERS ON A BLACK BACKGROUND. NAMEPLATE SHALL SHOW EQUIPMENT TAG USED ON THESE DRAWINGS. ELECTRICAL DISCONNECTS FOR EQUIPMENT SHALL BE LABELED TO MATCH EQUIPMENT SERVED.

14. ALL DUCTWORK SHALL BE SUPPORTED BY THE BUILDING STRUCTURE AND SHALL NOT HANG FROM OR REST ON CEILING TILES OR CEILING STRUCTURE. DUCT SUPPORTS AND CONNECTION TO STRUCTURE SHALL BE AS PER SMACNA STANDARDS.

15. FLEXIBLE DUCTWORK SHALL BE THERMAFLEX M-KE (U.L. 181 LISTED, CLASS 1 FLEXIBLE AIR DUCT) OR EQUAL. PROVIDE THERMAFLEX M-KE R-6 (R-6 MINIMUM VALUE OR AS REQUIRED BY LOCAL ENERGY CODE) IN ATTICS AND OTHER UNCONDITIONED SPACES. AIR CONNECTORS ARE NOT ACCEPTABLE. SIZE TO MATCH DEVICE NECK, PROVIDE ROUND GALVANIZED STEEL DUCT RUN-OUTS TO PROVIDE A MAXIMUM FLEXIBLE DUCT LENGTH OF 5'-0". FLEXIBLE DUCTWORK SHALL BE ROUTED AS STRAIGHT AS POSSIBLE AND SHALL BE ROUTED AND SUPPORTED WITHOUT FORMING CRIMPS OR OTHER AIR FLOW RESTRICTIONS. PROVIDE SQUARE TO ROUND ADAPTERS OR BOOTS AS REQUIRED TO CONNECT TO AIR DEVICE NECK.

16. BRANCH RUN-OUT DUCTS SHALL BE SAME SIZE AS DIFFUSER NECK IF NOT NOTED OTHERWISE.

17. SHEET METAL DUCTWORK SHOWN AS BEING INTERNALLY LINED SHALL BE LINED WITH 1" THICK, 3 LB/CUFT. DENSITY DUCT LINER, MINIMUM R-4 OR AS REQUIRED BY APPLICABLE ENERGY CODE, CERTAINTEED "TOUGHGARD" OR EQUAL BY JOHNS-MANVILLE OR KNAUF. LINE ALL DUCTWORK A MINIMUM OF 15'-0" DOWNSTREAM AND UPSTREAM (WHERE POSSIBLE) OF ALL AIR HANDLING UNITS, FAN COIL UNITS, AND TERMINAL UNITS. LEADING EDGE OF INSULATION SHALL HAVE SHEET METAL NOSING. DUCT THAT IS INTERNALLY INSULATED SHALL BE EXTERNALLY INSULATED AS WELL.

18. DUCTWORK DIMENSIONS SHOWN ON DRAWING ARE INSIDE CLEAR DIMENSIONS. CONRACTOR SHALL ADJUST TOTAL DUCT WORK DIMENSIONS TO ACHIEVE SHOWN INSIDE CLEAR DIMENSIONS.

19. DUCTWORK AND EQUIPMENT SHOWN IS DIAGRAMMATIC. COORDINATE AND ROUTE DUCTWORK TO MEET JOB REQUIREMENTS. LOCATION OF EQUIPMENT MUST BE COORDINATED WITH ALL DISCIPLINES BEFORE FINAL LOCATIONS ARE SELECTED. WEIGHTS OF EQUIPMENT MUST BE VERIFIED AND COORDINATED WITH STRUCTURAL SYSTEMS MANAGERS BEFORE EQUIPMENT CAN BE MOVED INTO LOCATION OR INSTALLED.

20. ALL CONDENSATE DRAIN LINES FROM HVAC EQUIPMENT LOCATED INSIDE THE BUILDING SHALL BE TRAPPED AND SHALL DRAIN INTO BUILDING FLOOR DRAINS, ROOF DRAINS, OR STORM DRAINS. CONDENSATE SHALL BE INSULATED SCHEDULE 40 PVC (EXCEPT INSULATED TYPE L COPPER IN HVAC PLENUMS). CONDENSTATE SHALL BE PUMPED AS REQUIRED.

21. ALL PIPING ABOVE GRADE SHALL BE SUPPORTED BY THE BUILDING STRUCTURE, AND SHALL NOT REST ON CEILING TILES OR CEILING STRUCTURE. PIPE HUNG FROM JOISTS SHALL BE HUNG FROM THE TOP CHORD OF JOISTS.

22. ALL PIPE AND DUCT PENETRATIONS OF FIRE AND/OR SMOKE RATED ASSEMBLIES SHALL BE FIRESTOPPED AS REQUIRED TO RESTORE ASSEMBLY TO ORIGINAL INTEGRITY. FIRE BARRIER PRODUCTS SHALL BE MANUFACTURED BY 3M COMPANY, CP25 CAULK, CP195 COMPOSITE PANEL, FS195 WRAP/STRIP, OR PSS 7900 SERIES SYTEMS AS RECOMMENDED BY MFG. FOR PARTICULAR APPLICATIONS, OR EQUIVALENT SYSTEM AS APPROVED BY LOCAL CODE OFFICIALS.

23. ANY WALL, FLOOR, OR CEILING SURFACE THAT IS DISTURBED DURING THE COURSE OF THIS WORK SHALL BE REPAIRED TO EXISTING OR LIKE-NEW CONDITION.

24. OUTSIDE HARDWARE FOR EXHAUST FANS SHALL BE PLACED IN A LOCATION SUITABLE TO OWNER. CONTRACTOR SHALL COORDINATE PLACEMENT WITH OWNER BEFORE FINAL INSTALLATION. OUTSIDE HARDWARE FOR EXHAUST FANS AND FRESH AIR INTAKES SHOULD BE CONSTRUCTED SO AS TO BE WEATHERTIGHT AND SHOULD INCLUDE INTEGRAL INSECT SCREENS.

25. CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ALL MECHANICAL EQUIPMENT, DUCTWORK, ETC. TO FIT WITHIN THE SPACE ALLOWED BY ARCHITECTURAL AND STRUCTURAL CONDITIONS. CUTTING OR OTHERWISE ALTERING ANY STRUCTURAL MEMBERS SHALL NOT BE PERMITTED WITHOUT WRITTEN PERMISSION FROM THE ARCHITECT.

HVAC LEGEND

SYMBOL – SINGLE LINE	SYMBOL – DOUBLE LINE	DESCRIPTION
BDD	BDD	BACKDRAFT DAMPER
		CELING DIFFUSER
		CEILING RETURN GRILLE
AR 200	AR 200	DIFFUSER TAG: TYPE "A", NECK SIZE 8", BALANCED FOR 200 CFM
EG=1 75	EG=1 75	GRILLE TAG: TYPE "EG-1", BALANCED FOR 75 CFM
D	D	DROP
16x12	16x12	DUCT SIZE – RECTANGULAR
10"ø	10"ø	DUCT SIZE – ROUND
		DUCT SMOKE DETECTOR
		DUCT TRANSITION
AHU 1	AHU 1	EQUIPMENT DESIGNATION
		FIRE DAMPER, HORIZONTAL
		FIRE DAMPER, VERTICAL
		FLEXIBLE DUCT
H	H	HUMIDISTAT
		LINED DUCT
	MVD	MANUAL VOLUME DAMPER
MOD	MOD	MOTOR OPERATED DAMPER
		RETURN AIR DUCT TURNED DOWN
		RETURN AIR DUCT TURNED UP
R	R	RISE
1	1	REVISION TAG (#1)
		SIDEWALL SUPPLY REGISTER OR GRILLE
		SIDEWALL RETURN REGISTER OR GRILLE
		SMOKE DAMPER
		SUPPLY AIR DUCT TURNED DOWN
		SUPPLY AIR DUCT TURNED UP
T	T	THERMOSTAT, WALL-MOUNTED
		RECT. ELBOW WITH TURNING VANES
1/4"	1/4"	UNDER CUT (DOOR) 1"
		WALL LOUVER INTAKE
		WALL LOUVER EXHAUST
FC	FC	FLEXIBLE EQUIPMENT CONNECTOR
C	C	CARBON DIOXIDE SENSOR

HVAC ABBREVIATIONS

SYMBOL	DESCRIPTION
MBH	1000 BTU/HR
A/C	ABOVE CEILING
A/F	ABOVE FLOOR
BOD	BOTTOM OF DUCT
CD	CONDENSATE DRAIN
EF	EXHAUST FAN
ESP	EXTERNAL STATIC PRESSURE (IN. W.C.)
HP	HEAT PUMP UNIT
OA	OUTSIDE AIR
WL	WALL LOUVER
FC	FLEXIBLE EQUIPMENT CONNECTOR
MSHP	MINI-SPLIT HEAT PUMP UNIT
MSFC	MINI-SPLIT FAN COIL UNIT

FLOYD RECYCLE VENTILATION SUMMARY

ODU/IDU-1						CFM
Room	AREA	PPL	Rp	Ra	EZ	IMC
TRAINING ROOM	963	34	10	0.12	0.8	566
					Total	566

Note: IAQ Procedure/Bi-polar ionization used for OA calcs on IDU-1.
250 CFM OA req'd for IDU-1.

ODU/IDU-2						CFM
Room	AREA	PPL	Rp	Ra	EZ	IMC
CONFERENCE RM.	444	22	5	0.06	0.8	172
BREAK RM.	202	10	5	0.06	0.8	78
HALLWAY	240	0	0	0.06	0.8	18
2 PERSON OFFICE	219	1	5	0.06	0.8	23
2 PERSON OFFICE	219	1	5	0.06	0.8	23
WOMEN TOILET	98	0	5	0.06	0.8	7
MEN TOILET	98	0	5	0.06	0.8	7
INMATE TOILET	49	1	5	0.06	0.8	10
LAUNDRY	43	1	5	0.06	0.8	9
					Total	348

ODU/IDU-3						CFM
Room	AREA	PPL	Rp	Ra	EZ	IMC
RECEPTION/LOBBY	384	12	7.5	0.06	0.8	137
RISER/ELEC.	260	0	0	0.06	0.8	20
					Total	156

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Rome, Georgia 30165

HVAC NOTES AND LEGENDS

PROJECT # **1715**
DESIGNER: JD

DATE: **04/31/2017**
REV. DATE:

M0.1

WALL EXHAUST FAN SCHEDULE

TAG	BASIS OF DESIGN	CFM	E.S.P.	WEIGHT (LBS)	SONES	OPER. HP	PWR	CONTROL	NOTES
WEF–1,2	GREENHECK SBE–3L54	25,000	0.25	819	29	5.64	208/3	MOTOR STARTER	1,2,3,4,5

NOTES

1. BASIS OF DESIGN IS GREENHECK. EQUALS BY COOK, PENBARRY ARE ALLOWED.
2. MOTOR ACCESSIBLE FROM INSIDE BLDG.
3. WALL COLLAR W/GRAVITY DAMPER BEHIND LOUVER AND OSHA MOTOR GUARD.
4. EXT. 45 DEGREE WEATHER HOOD
5. GREENHECK MOTOR STARTER, 1 PER FAN, WITH DRY CONTACTS FOR FIRE ALARM SYSTEM SHUTDOWN.

GENERAL/TOILET EXHAUST FAN SCHEDULE

TAG	BASIS OF DESIGN	CFM	E.S.P.	WEIGHT (LBS)	SONES	OPER. HP	PWR	CONTROL	NOTES
EF–1,2	GREENHECK SP–B200	140	0.25	12	< 2	172 W	115/1	INTERLOCK W/ LIGHTS	1,2,3,4,5
EF–3	GREENHECK SP–B110	70	0.25	12	< 2	80 W	115/1	INTERLOCK W/ LIGHTS	1,2,3,4,5
EF–4	GREENHECK SP–B110	70	0.25	12	< 2	80 W	115/1	WALL SWITCH	1,2,3,4,5

NOTES

1. BASIS OF DESIGN IS GREENHECK. EQUALS BY COOK, PENBARRY ARE ALLOWED.
2. OUTSIDE HARDWARE FOR EXHAUST FANS SHOULD BE CONSTRUCTED SO AS TO BE WEATHERTIGHT.
3. SPEED CONTROLLER
4. BACKDRAFT DAMPER
5. VIBRATION ISOLATORS

AIR DISTRIBUTION EQUIPMENT SCHEDULE

TAG	DESCRIPTION	NOTES
A	STEEL SQUARE CONE DIFFUSER, FIXED AIR PATTERN, 4–WAY THROW, ROUND NECK, SIZED AS SHOWN, WHITE, LAY–IN FRAME, INSULATED BACK, PRICE SCD.	1,2,3
B	STEEL DOUBLE DEFLECTION SUPPLY GRILLE, ADJUSTABLE PATTERN, 3/4" SPACING BETWEEN BLADES, SIZE AS SHOWN, FRONT BLADES PARALLEL TO SHORT DIMENSION, O.B. DAMPER WHEN DUCT MOUNTED, WHITE, PRICE 520.	1,2,3
C	1/2"X1/2"X1/2" ALUMINUM EGG CRATE RETURN GRILLE, LAY–IN FRAME, 24X12 OR 12X12 SIZE, PLENUM TYPE OR ROUND DUCT CONN. NECK AS SHOWN, PRICE 80.	1

NOTES

1. VERIFY MOUNTING TYPE WITH ARCHITECTURAL RCP.
2. SUPPLY DIFFUSERS AND GRILLES SHALL NOT COME SUPPLIED WITH VOLUME DAMPERS. MANUAL VOLUME DAMPERS SHALL BE INSTALLED AT BRANCH TAKE–OFFS NEAR TRUNK (SEE DETAIL SHEET).
3. BACK INSULATION SHALL BE INCLUDED ON ALL SUPPLY DIFFUSERS AND GRILLES.

GAS UNIT HEATER SCHEDULE

TAG	BASIS OF DESIGN	GAS MBH	GAS PIPE CONN. SIZE	THERMAL EFF. %	DISCHG. AIR TEMP. RISE (F)	FAN SECTION		ELEC.	OPER. WEIGHT	CONTROL	NOTES
		INPUT/OUTPUT				MOTOR HP	CFM				
GUH–1,6	REZNOR UDAP–100	105/87	1/2	83	60 F	1/20	1,347	115/1	96	THERMOSTAT	1,2,3
GUH–2,3,4,5	REZNOR UDAP–200	200/166	1/2	83	60 F	1/4	2,562	115/1	187	THERMOSTAT	1,2,3

NOTES:

1. VERTICAL CONCENTRIC VENT KIT
2. VERTICAL LOUVERS
3. BLOWER GUARD

WALL LOUVER SCHEDULE

TAG	BASIS OF DESIGN	CFM	WIDTH	HEIGHT	FREE AREA (SQFT)	COLOR	APPLICATION	NOTES
WL–1,2,3,4	GREENHECK EHH–601	12,000	99 IN.	51 IN.	17.2	MILL	INTAKE	1,2,3,4

NOTES

1. AMCA LICENSED PERFORMANCE DATA
2. BIRD SCREEN
3. 45 DEGREE WEATHER HOOD
4. 120 V MOTORIZED DAMPER, INTERLOCKED TO FAN STARTER SO THAT DAMPER OPENS IF THE OPPOSING WEF IS ENERGIZED.

MINI-SPLIT HVAC UNIT SCHEDULE

TAG	BASIS OF DESIGN	CFM	MIN. O.A. CFM	MAX. O.A. CFM	E.S.P. (IN. WG.)	SUPPLY FAN POWER	COIL CAPACITY, MBH TOTAL/SENSIBLE				(S)EER, HSPF	BASE UNIT WT. (LBS)	POWER	NOTES
							COOL	EAT	HEAT	EST/OAT				
ODU/IDU–4	MITSUBISHI PUZ–A24NHA6, PKA–A24KA6	570–700	–	–	–	56 W	24/18	80/67	24	70/47	17/10.8	165/46	208/1	1,2,3,4,5

NOTES:

1. BASIS OF DESIGN IS MITSUBISHI. EQUAL ALTERNATES BY DAIKIN, TRANE, FUJITSU ARE ACCEPTABLE.
2. EXTERNAL STATIC PRESSURE CALCULATION ACCOUNTS FOR DUCT SYSTEM AND GRILLES ONLY. IT DOES NOT ACCOUNT FOR FILTERS, COILS, HEAT EXCHANGERS, OR ELECTRIC HEATERS, OR OTHER EQUIPMENT INSIDE THE UNIT.
3. LOW AMBIENT CONTROL CAPABILITY.
4. HAIL GUARDS ON EXPOSED COILS.
5. 7–DAY PROGRAMMABLE THERMOSTAT WITH LED INTERFACE.

SPLIT SYSTEM HEAT PUMP UNIT SCHEDULE

TAG	BASIS OF DESIGN	SUPPLY AIR CFM	E.S.P. (IN. WG.)	MIN. OCC. OA CFM	MAX. OCC. OA CFM	UNOCC. OA CFM	SUPPLY FAN HP	COOLING COIL, MBH		MIN. (S)EER, HSPF	HEATING COIL, MBH		AUX. ELEC. HEAT, KW	ODU/IDU BASE UNIT WT. (LBS)	POWER	NOTES
								SEN./TOT.	EAT		47 F	EAT				
ODU/IDU–1	CARRIER 25HCE437/FB4CNP036	1,200	0.5	250	250	0	1/2	34/25	80/67	14/8.2	33	70	10	170/122	208/1	1,2,3,4,5,6
ODU/IDU–2	CARRIER 25HCE460/FX4DNB061	1,800	0.5	350	350	0	3/4	54/43	80/67	14/8.2	54	70	15	212/201	208/1	1,2,3,4,5
ODU/IDU–3	CARRIER 25HCE418/FB4CNP018	600	0.5	160	160	0	3/4	13/18	80/67	14/8.2	17	70	8	136/112	208/1	1,2,3,4,5

NOTES:

1. BASIS OF DESIGN IS CARRIER. EQUAL ALTERNATES BY DAIKIN, TRANE ARE ACCEPTABLE.
2. EXTERNAL STATIC PRESSURE CALCULATION ACCOUNTS FOR DUCT SYSTEM AND GRILLES ONLY. IT DOES NOT ACCOUNT FOR FILTERS, COILS, HEAT EXCHANGERS, OR ELECTRIC HEATERS, OR OTHER EQUIPMENT INSIDE THE UNIT. ELEC. HEATER WATTAGE SHOWN AT 208–1.
3. LOW AMBIENT COOLING CONTROL CAPABILITY.
4. 7–DAY PROGRAMMABLE WALL MOUNT THERMOSTAT WITH LCD DISPLAY.
5. ECM FAN MOTOR.
6. BI–POLAR IONIZATION UNIT IN AHU ON RETURN SIDE. 24V POWERED FROM AHU POWER.

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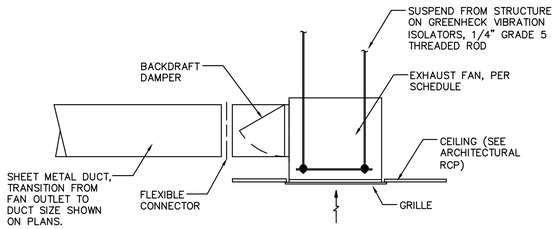
HVAC EQUIPMENT SCHEDULES

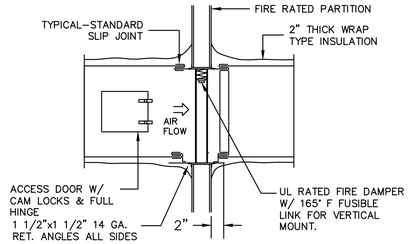
PROJECT # **1715**
DESIGNER: JD

DATE: **04/31/2017**
REV. DATE:

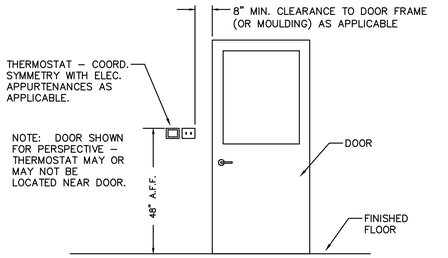
M0.2



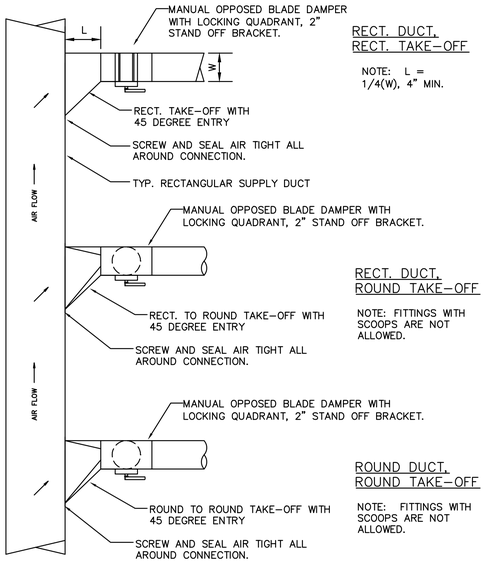
DE-7A CEILING MOUNT EXHAUST FAN DETAIL



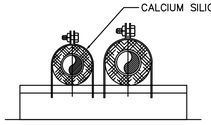
DD-7A VERTICAL FIRE DAMPER



DE-15 TYP. THERMOSTAT OR WALL SENSOR INSTALLATION DETAIL

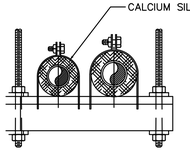


DD-2A BRANCH DUCT TAKE-OFF DETAILS



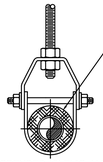
SURFACE MOUNT

NOTES:
1. SIZE STRUT TO ADEQUATELY SUPPORT LOAD (REFER TO MANUF. CATALOG)
2. SIZE CALCIUM SILICATE SHIELD TO FIT PIPE AND INSULATION THICKNESS.
3. SIZE CLAMP TO FIT CALCIUM SILICATE SHIELDS.
4. BOLT OR WELD STRUT TO STRUCTURE BELOW.



SUSPENDED TRAPEZE MOUNT

NOTES:
1. SIZE STRUT TO ADEQUATELY SUPPORT LOAD (REFER TO MANUF. CATALOG)
2. SIZE CALCIUM SILICATE SHIELD TO FIT PIPE AND INSULATION THICKNESS.
3. SIZE CLAMP TO FIT CALCIUM SILICATE SHIELDS.
4. AFFIX TO STRUCTURE ABOVE PER MANUF. RECOMMENDATIONS.



SUSPENDED CLEVIS HANGER

NOTES:
1. SIZE HANGER TO ADEQUATELY SUPPORT LOAD (REFER TO MANUF. CATALOG)
2. SIZE CALCIUM SILICATE SHIELD TO FIT PIPE AND INSULATION THICKNESS.
3. SIZE HANGER TO FIT CALCIUM SILICATE SHIELDS.
4. AFFIX TO STRUCTURE ABOVE PER MANUF. RECOMMENDATIONS.

ROOFTOP PIPES SHALL BE SUPPORTED BY ROOF TOP CLEVIS TYPE PIPE SUPPORT, MIRO 6-H OR EQUIVALENT.

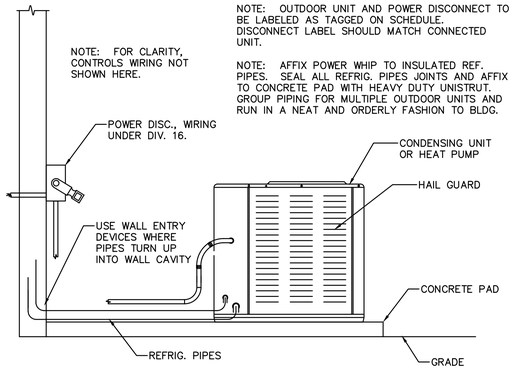
HANGER SPACING CHART

PIPE SIZE	ROD DIAM.	MAX. SPACING
1/2" - 1-1/4"	3/8"	7'
1-1/2"	3/8"	9'
2"	3/8"	10'
2-1/2"	1/2"	11'
3"	1/2"	12'
3-1/2"	1/2"	13'
4"	5/8"	14'
5"	5/8"	16'
6"	3/4"	17'
8"	3/4"	19'
10"	7/8"	22'
12"	7/8"	23'
14"	1"	25'
16"	1"	27'

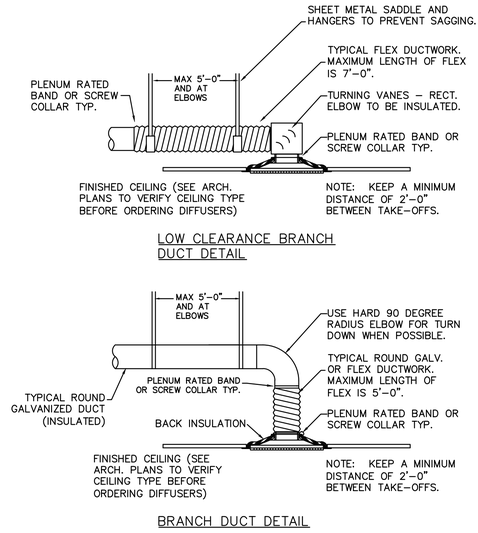
NOTE: ALL PIPE INSULATION SHALL BE CONTINUOUS THROUGH PIPE CLAMPS, AND SHALL BE PROTECTED BY 3" SHIELD INSIDE CLAMPS.

NOTE: ALL PIPE INSULATION LOCATED OUTSIDE OF BUILDING SHALL BE PROTECTED BY EMBOSSED METAL JACKETING.

DP-8 TYP. PIPE HANGER DETAILS



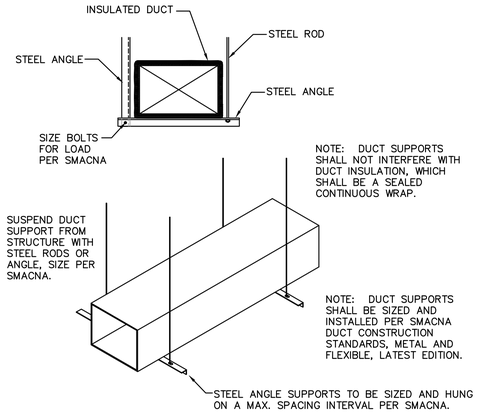
DE-17A TYP. GROUND MOUNT OUTDOOR CONDENSING UNIT DETAIL



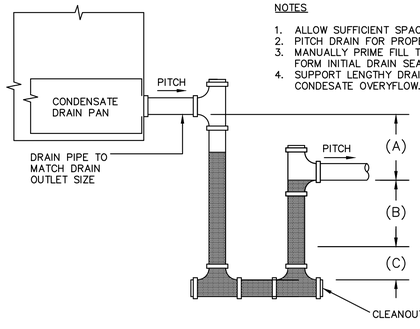
LOW CLEARANCE BRANCH DUCT DETAIL

BRANCH DUCT DETAIL

DD-3 BRANCH RUN-OUT DETAIL



DD-5A TYP. RECTANGULAR DUCT LOWER SUPPORT DETAILS



DP-1A DRAW THROUGH UNIT CONDENSATE TRAP DETAIL

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LAVENDER DRIVE
Rome, Georgia 30165

HVAC DETAILS

PROJECT # **1715**
DESIGNER: JD

DATE: **04/31/2017**
REV. DATE:

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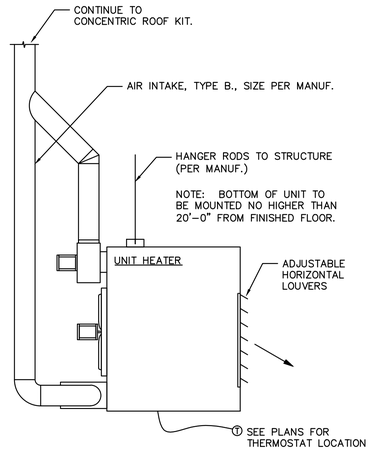
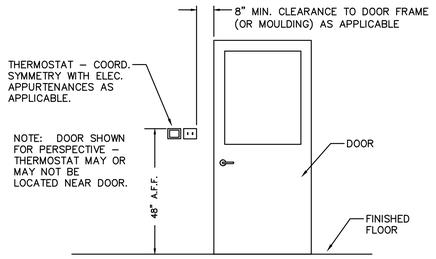
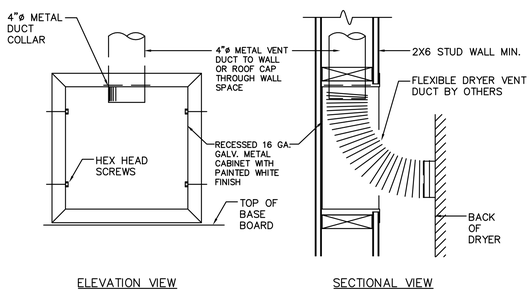


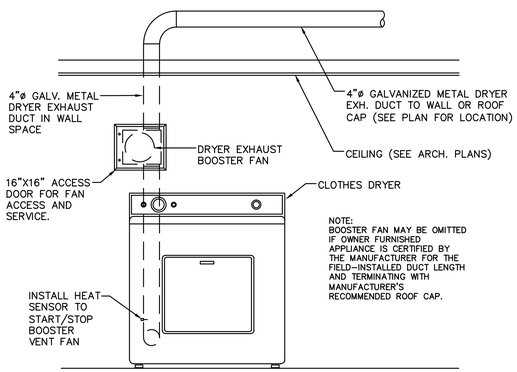
DE-5B CEILING MOUNT FORCED AIR GAS UNIT HEATER DETAIL



DE-15 TYP. THERMOSTAT OR WALL SENSOR INSTALLATION DETAIL



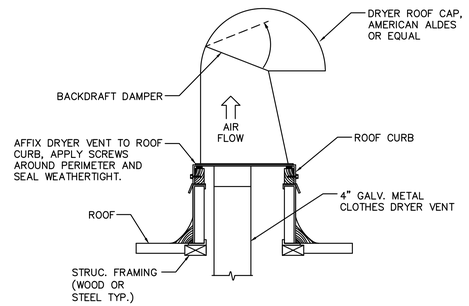
DD-6A TYP. CLOTHES DRYER WALL BOX DETAIL



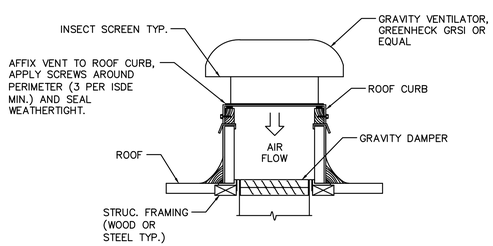
DD-6B TYP. CLOTHES DRYER EXHAUST DETAIL

NOTE: SIGN BACKGROUND SHALL BE BLACK WITH WHITE LETTERS. LETTERS SHALL BE A MINIMUM OF 1" TALL.

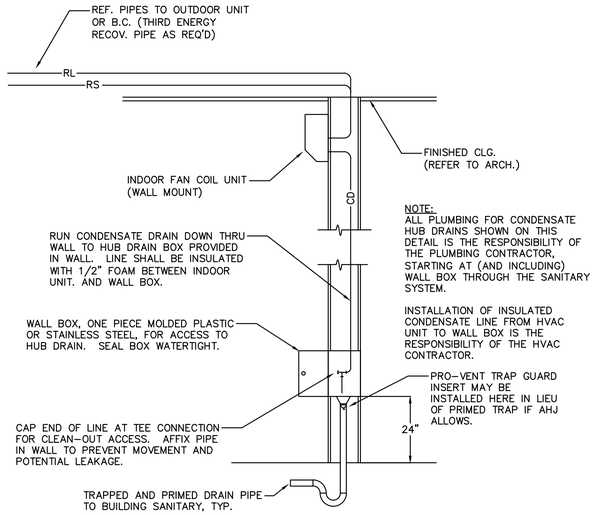
DE-19 DRYER VENT WARNING SIGN



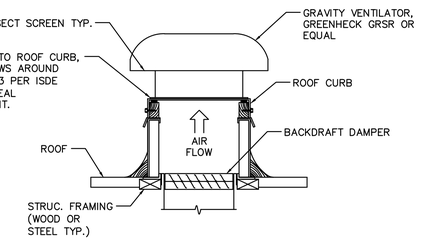
DE-9C TYP. CLOTHES DRYER ROOF CAP DETAIL



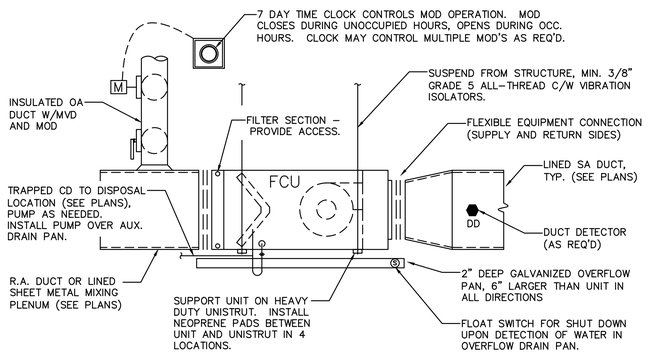
DE-9B GRAVITY TYPE ROOF VENTILATOR DETAIL – INTAKE



DE-16A MINI-SPLIT WALL MOUNT FAN COIL UNIT DETAIL

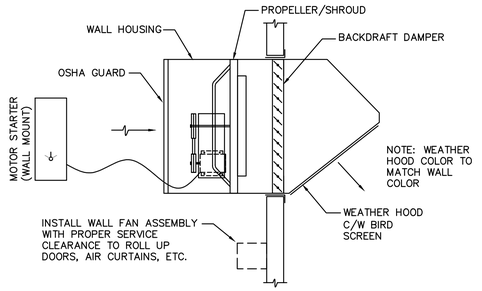


DE-9A GRAVITY TYPE ROOF VENTILATOR DETAIL – EXHAUST



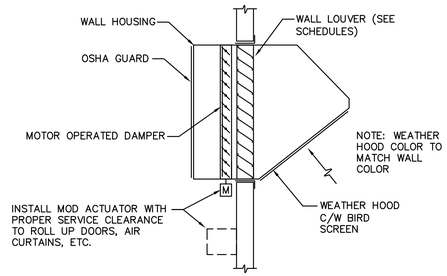
DE-14B TYP. HORIZONTAL FAN COIL OR AIR HANDLING UNIT DETAIL

FAN CONTROL NOTES:
EACH EXHAUST FAN SHALL BE CONTROLLED BY AN AUTOMATIC MOTOR STARTER. MOTOR STARTER SHALL HAVE HAND/OFF/AUTO FUNCTION WITH LED LIGHTS INDICATING OPERATION. STARTERS SHALL BE WIRED TO FIRE ALARM SYSTEM AND SHALL SHUT DOWN UPON RECEIPT OF SUCH SIGNAL FROM THE FIRE ALARM SYSTEM. STARTER SHALL BE COMPATIBLE WITH DDC SYSTEM FOR DDC CONTROL AS APPLICABLE.



DE-8A INDUSTRIAL WALL MOUNT PROPELLER EXHAUST FAN DETAIL

LOUVER CONTROL NOTES:
EACH MOTOR OPERATED DAMPER TO BE CONTROLLED TO OPEN WHEN ANY EXHAUST FAN IN THE SAME SPACE IS ENERGIZED, AND CLOSE WHEN NO FANS IN THE SAME SPACE ARE ENERGIZED.



DE-8B INDUSTRIAL INTAKE WALL LOUVER DETAIL

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HVAC DETAILS

PROJECT # **1715**
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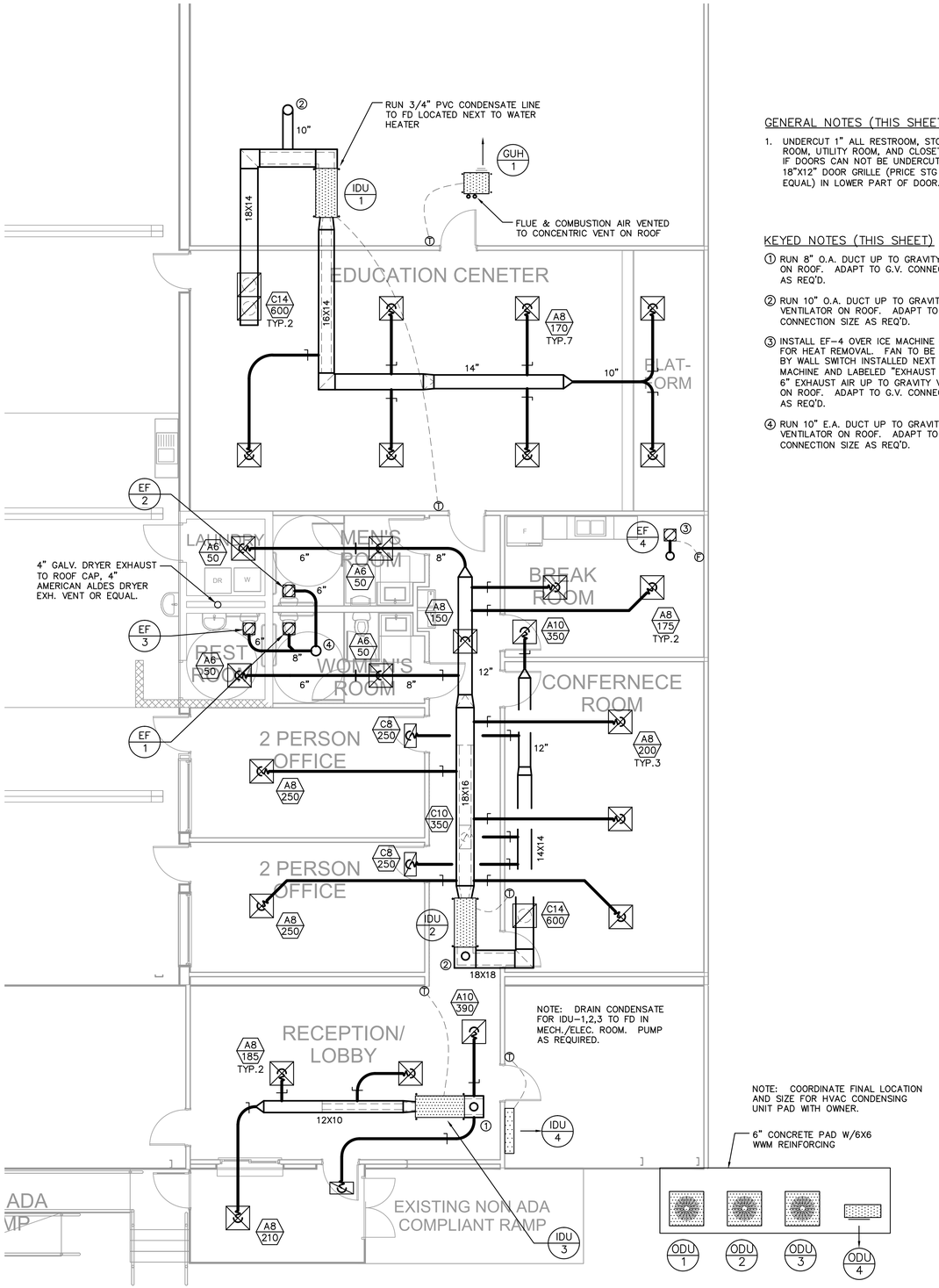

HVAC PLAN - OFFICES

SCALE : 3/16" = 1'-0"

GENERAL NOTES (THIS SHEET)

1. UNDERCUT 1" ALL RESTROOM, STORAGE ROOM, UTILITY ROOM, AND CLOSET DOORS. IF DOORS CAN NOT BE UNDERCUT, INSTALL 18"X12" DOOR GRILLE (PRICE STG OR EQUAL) IN LOWER PART OF DOOR.

KEYED NOTES (THIS SHEET)

① RUN 8" O.A. DUCT UP TO GRAVITY VENTILATOR ON ROOF. ADAPT TO G.V. CONNECTION SIZE AS REQ'D.

② RUN 10" O.A. DUCT UP TO GRAVITY VENTILATOR ON ROOF. ADAPT TO G.V. CONNECTION SIZE AS REQ'D.

③ INSTALL EF-4 OVER ICE MACHINE CONDENSER FOR HEAT REMOVAL. FAN TO BE CONTROLLED BY WALL SWITCH INSTALLED NEXT TO ICE MACHINE AND LABELED "EXHAUST FAN". RUN 6" EXHAUST AIR UP TO GRAVITY VENTILATOR ON ROOF. ADAPT TO G.V. CONNECTION SIZE AS REQ'D.

④ RUN 10" E.A. DUCT UP TO GRAVITY VENTILATOR ON ROOF. ADAPT TO G.V. CONNECTION SIZE AS REQ'D.

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HVAC PLAN – OFFICES

PROJECT # **1715**
DESIGNER: JD

DATE: **04/31/2017**
REV. DATE:

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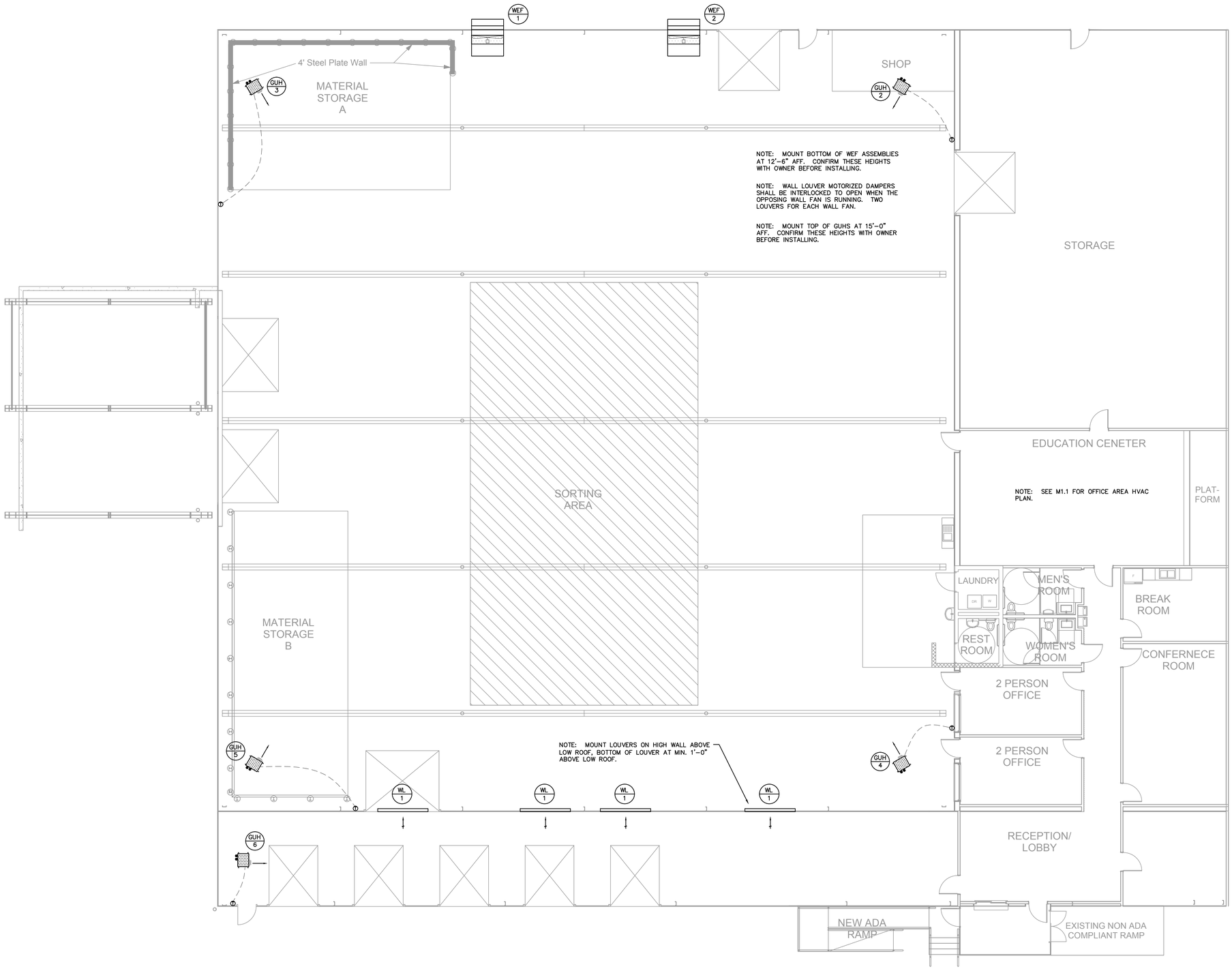

HVAC PLAN - WAREHOUSE

SCALE : 1/8" = 1'-0"

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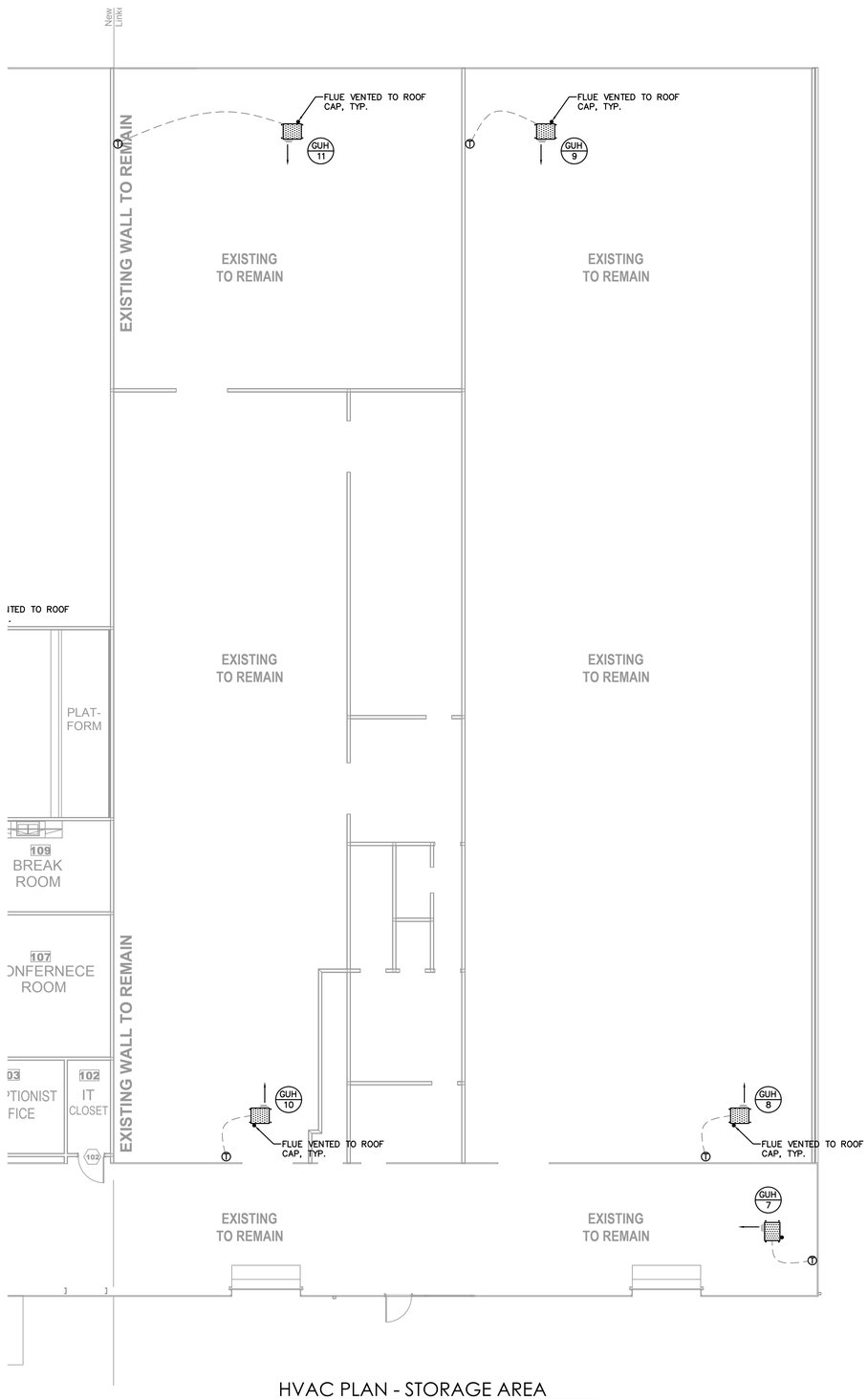
HVAC PLAN – WAREHOUSE

PROJECT # **1715**
DESIGNER: JD

DATE: **04/31/2017**
REV. DATE:

M1.2



HVAC PLAN - STORAGE AREA

SCALE : 1/8" = 1'-0"

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GEORGIA REGISTERED PROFESSIONAL ENGINEER JEFFREY A. DRINKARD PE031034

02/12/2018

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HVAC PLAN – STORAGE AREA

PROJECT # **1715**
DESIGNER: JD

DATE: **02/12/2018**
REV. DATE:

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SECTION 15010 – MECHANICAL GENERAL

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Specification: This specification is intended to cover all portions of this building.

B. Reference Codes: This installation shall comply with the following codes and regulations, along with all Georgia amendments.

1. Current Georgia State Minimum Standard Mechanical Code.
2. Current NFPA No. 90A Installation of Air Conditioning and Ventilation Systems.
3. Current Georgia State Minimum standard Plumbing Code.
4. Current Georgia State Minimum Standard Gas Code.
5. Current NFPA #54 National Fuel Gas Code.
6. Current Georgia State Minimum Standard Gas Code.
7. Current NFPA No.70, National Electric Code.
8. Current Georgia State Minimum Life Safety Code.
9. Current Georgia State Minimum Standard Fire Prevention Code.
10. Current Georgia State Energy Code for Buildings

C. Reference Standards: This installation shall comply with the following standards.

1. Manufacturers Standardization Society of the Valve and fittings Industry (1815 North Ft. Meyer Drive, Arlington, VA 22209). MSS-SP-58-2002, called MSS-SP-58. MSS-SP-69-2003, called MSS-SP-69.
2. American Society of Heating and Ventilating and Air Conditioning Engineers Guide, Fundamentals, 2009 Edition.
3. Sheet Metal and Air Conditioning Contractor National Association (SMACNA) HVAC Duct Construction Standards, Metal & Flexible, 2005 Edition. Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems. 1986 Edition. Seismic Restraint Manual Guidelines for Mechanical Systems, Second Edition.
4. American Society of Sanitary Engineers (ASSE) Standard, Latest Edition.
5. North American Insulation Manufacturers Association (NAIMA) Fibrous Glass Duct Construction Standards.

1.2 REGULATIONS

A. Attention is called to the fact that all work shall be done in accordance with all applicable City, County and State regulations, which regulations shall be considered as minimum requirements, and shall not alter the arrangement and pipe sizes indicated on the plans, except where they conflict.

B. Contractor is responsible for obtaining all permits and paying all fees required to complete the Work

1.3 DRAWINGS

A. The work is shown on the project drawings and specifications.

1.4 PROTECTION OF PUBLIC

A. If the contractor must operate any potentially dangerous devices before all specified safety valves controls and devices are installed, he shall notify the Architect in writing. He shall not operate such devices under these conditions until arrangements for supervision by competent operators have been instituted and Architect's written approval has been issued.

1.5 EXCAVATION, SHORING AND BRACING

A. Excavate and back-fill for the installation of all underground work.

B. Provide all shoring and bracing to prevent cave-ins during the construction period.

1.6 SHOP DRAWINGS

A. Shop drawings shall be submitted for but not limited to the following items:

1. All Scheduled Equipment
2. Ductwork & Accessories
3. Hangers
4. Piping & Accessories
5. Supports
6. Vibration Isolation
7. Fixtures
8. Roof Portals
9. Control System
10. Duct Systems
11. Equipment Curbs
12. Insulation
13. Filters
14. Access Panels
15. Louvers
16. Refrigerant Pipe Sizes

B. Provide with the submittal package the proposed Test & Balance Company's credentials as described in Section 15950. Include a latter from the Test & Balance company indicating that they have read Section 15950 and will perform testing and balancing of the mechanical systems as described in that Section.

C. Provide a complete list of all accessories and options (indicate factory or field installed) for all scheduled mechanical equipment, including air distribution devices. Provide manufacturer generated specifications and ratings sheets for each individual piece of air conditioning and heating equipment. Generic photocopies from manufacturers catalog will not be accepted.

D. In addition to cut sheets, provide a summary sheet indicating exactly what pipe material joining methods, valves, etc. will be provided in the various piping systems.

E. The Contractor shall produce ¼"scale CAD-generated ductwork and piping shop drawing for every area of the building. Contractor shall coordinate all new mechanical systems with other Divisions, specifically including piping, lights, the building structure, and ceiling heights. It shall be the Contractor's responsibility to ensure that the mechanical work is coordinated with all other trades. The shop drawings submitted shall reflect this coordination in its entirety, including location of piping 2"and larger, all ductwork (except runouts to diffusers), and all equipment by dimensions to column lines. Bottom of duct and bottom of pipe dimensions shall be taken from finished floor, and shall be recorded on the shop drawings for review. Any interferences or conflicts not resolved during normal shop drawing coordination between trades shall be specifically noted to the Architect for his instructions. Conflicts arising out of work installed (or ductwork already fabricated) without shop drawings or shop drawings that have no been completely coordinated, shall be the Contractor's responsibility and at his expense for any necessary changes.

F. The Contract Drawings are diagrammatic and indicated generally the size and location of ductwork and equipment. While duct sizes shall not be decreased, it is recognized that job site conditions may require re-routing or re-sizing of ductwork, and the Contractor shall be responsible for this coordination. Ductwork that has to be re-sized and/or re-routed as a result of this coordination effort shall be the Contractor's responsibility and at his expense. Ductwork re-sized shall be equivalent to that shown on the drawings.

G. Steel fabrication shop drawings shall be coordinated with all Division 15 equipment and roof openings. The resulting coordination shall be confirmed and verification shall be submitted with associated equipment and roof curbs.

H. Division 15 shall coordinate with structural steel contractors to insure where ductwork is required to be routed within joist space that an alternate to x bracing is installed. Failure to coordinate shall subject the Contractor to full cost incurred to meet the design intact on the contract documents.

1.7 MOTORS, WIRING AND ELECTRICAL EQUIPMENT

A. All motors required for this work shall be built in accordance with the latest standards of National Electrical Manufacturer's Association, and shall be especially designed for quiet operation. All motors shall be selected for operation within their nameplate amperage. Adjustable bases shall be provided with motors and equipment which have belt drives.

B. All electrical materials shall comply with requirements of the National Electric Code. All contactors, starters, relays and panels used in this work, which are included in Underwriters Label Service, shall be new and bear the National Board of Fire Underwriters inspection label. Material not included in Underwriters Label service shall be new and conform to NEMA or other applicable industry standard.

C. Division 16, ELECTRICAL, provides for the furnishing of conduit and wire from electrical source to electrical use, called "path of power," and for the installation of certain line voltage devices specified in Division 15 which lie in the "path of power," including but not limited to:

1. Manual switches.
2. Line voltage thermostats.
3. Solid state speed controllers.
4. Operators for operable dampers.
5. Aquastats for domestic hot water circulating pumps.
6. Alarms for Flow Switches and Valve Supervisor Switches.

D. The "path of power" terminates at contactors or control panels of the following listed items of equipment. These control panels contain starters/contactors for the motors or heaters installed on or within the unit and are specifies in Division 15. Any wiring past the point of termination described above is Division 15 work.

1. Packaged Rooftop Units.
2. Domestic Water Heaters.
3. Make-up Air Units.
4. Condensing and/or Heat Pump Units.
5. Fan Coil Units.
6. Ductless Split Systems.
7. Electric Heaters.

E. Division 16, ELECTRICAL, provides for electrical power to any given item of equipment at the voltage and phase required by the primary use only. If the item of equipment contains devices such as fans, thermostats, motorized dampers or other controls which require other than primary voltage for their proper function, then transformers shall be furnished under Division 15 for that purpose.

F. Voltage and phase for Division 15 equipment shall be as specified by Division 16. Division 15 Contractor shall submit a list of all mechanical equipment requiring electrical connections to the Contractor prior to release of any equipment, for coordination with the Division 16 contractor. A copy of this list that has been reviewed and approved by the General Contractor shall be submitted to the Architect with the submittal for mechanical equipment. Failure to include this list may result in the rejection of the entire mechanical equipment submittal.

G. The control power source (point of connection for control power) for major equipment except those single phase fans which are thermostatically controlled and those items listed in C above, are provided at the combination starters.

H. The automatic control of signal for STOP-START of major equipment is furnished and installed to and from combination starts as part of Division 15.

I. All other conduit and wire, not in "path of power" described above is included in Division 15.

J. If any Division's Contractor makes a change by submittal, by delivery, by wiring rearrangement or power requirements, which results in increased costs, the Contractor initiating the change shall bear all cost increases.

K. All motors that are 1 HP and larger shall be high efficiency motors with nominal and minimum full load efficiencies equal to or greater than those specified by the State Energy Code. Specifications shall be submitted for each motor furnished.

L. Starters or contractors shall be furnished in Division 15 for each motor.

1. Magnetic starters shall be NEMA standard sizes adequate for the load served, Size 00, 1, 2, 3, 4. Half sizes and/or quarter sizes are not acceptable.
2. Overload relays shall be unit constructed, hand reset melting alloy type, and shall be provided for all ungrounded legs.
3. Units shall have NEMA-1 enclosures, three thermal overloads in three-phase starts, HAND-OFF-AUTO switches as required by the "controls" specification section.
4. All fractional HP single-phase motors shall have internal thermal overload protection except where starters are scheduled.
5. All motor starters shall be of the same manufacturer and shall be General Electric Type CR-306, or equal by Square-D, Westinghouse, Allen-Bradley, Furnas, Siemens, or Cutler-Hammer subject to full compliance with all criteria.

M. Where power wiring to Division 15 equipment is not within the equipment curb, roof curb and boots shall be provided under Division 16. The portal location shall be coordinated with Division 15 equipment power inlet requirements, and located not to block access for equipment servicing.

1.8 ACCESS PANELS

A. Shall be provided to permit operation of concealed valves, dampers, or equipment. The following table lists types of Bilco access frames and doors. Panels of equivalent construction by Titus, Milcor, Hohmann, and Barnard or Zurn are acceptable.

B. Wall:

1. Sheetrock Style G
2. Plaster Style A
3. Masonry Style C

C. Ceiling:

1. Sheetrock Style G
2. Plaster Style A
3. Concealed spline Style D
4. Lay-in tile None

D. Fire Rated Wall or Ceiling Style F (U.L Listed)

E. Sizes shall be: Small valves – 12"x 12". Multiple valves and dampers – 24"x 24"

F. Access panels shall be insulated for sound barrier equal to wall in which it is installed.

G. Acoustical Tile: Coordinate with tile installed to provide a removal tile at access point. Install a colored thumb tack to mark the access panel of above ceiling equipment, control instrument, valves or relay.

1.9 WARRANTY

A. The Contractor shall operate the air conditioning, heating and ventilating systems and plumbing systems for a period of one week to the satisfaction of the Architect. Thereafter, the Contractor shall guarantee and be responsible for all materials and workmanship (parts and labor) for a period of one (1) year following the date of acceptance by the Architect.

B. The Contractor shall also provide maintenance for the one (1) year period by providing four (4) periodic inspections at approximately three-month intervals, which shall include the following.

1. Check all bearing, align and oil or grease.
2. Check belt tensions and pulley adjustment and adjust as necessary.
3. Check filters and advise Owner when change is necessary.
4. Check refrigerant charges and oil levels and replenish as necessary.
5. Check and re-calibrate controls as necessary.

C. Any required maintenance for the above shall be performed and materials needed shall be furnished by the Contractor. Not included in the materials to be furnished by the Contractor are fuel, electricity, water and filters. Provide the Owner with four (4) copies of the inspection reports indicating all items checked and adjustment or repairs performed.

D. Water heaters shall be guaranteed for five years; parts and labor.

E. All equipment compressors shall be guaranteed for five years; parts and labor.

1.10 CUTTING AND PATCHING

A. The Contractor shall set sleeves for pipes, ducts and equipment accurately before the concrete walls and floors are poured.

B. Should the contractor neglect to perform this preliminary work and should cutting and patching be required in order to install the piping, ductwork or equipment, then the expense of the cutting and restoring of surfaces to their original condition shall be borne by the Contractor.

1.11 BASIS OF DESIGN

A. When brand, trade or manufacturer's names are used for basis of design, they are used in the interest of brevity to describe the style, type, size, quality or arrangement of articles of equipment and are not intended to limit competition. If articles of equipment by manufacturers other than basis of design are submitted for installation, the Architect shall compare them with specified articles of equipment on basis of qualities mentioned. The size, weight and arrangement of other equipment shall be checked by the Contractor to ascertain that it can be installed, connected, operated, and serviced successfully, and that walking space and service space can be maintained without altering equipment space or enclosures or the work of other trades. Manufacturers not listed as "Acceptable Manufacturers" will not be considered.

B. If any Division's Contractor makes a change by submittal, by delivery or by wiring rearrangement which results in increased costs, the Contractor initiating the change shall bear all cost increases.

1.12 AS-BUILT DRAWINGS

A. Per the Georgia State energy Code, the Contractor shall produce and submit to the Architect, "As-Built" drawings, four (4) copies, as described below.

B. As work progresses, neatly and clearly record on four (4) sets of mechanical plans (in red) all changes and deviations from the contract drawings in size, locations, etc., of all piping, ductwork terminal units and other equipment. Record (in red) final location of piping, ductwork, starts, valves, thermostats, etc., by dimensions to adjacent walls and floors. Make sufficient measurement to accurately locate all equipment. Locate underground lines by dimension from building walls.

1.13 OPERATION AND MAINTENANCE MANUALS

A. Operation and Maintenance manuals (6 sets) shall be provided to the Owner or the Owners designated representative. Manuals shall be in accordance with the Georgia State Energy Code for Buildings.

1. Manuals shall include as a minimum the following:
   a. Final, corrected submittal data with equipment sizes and selected options for each piece of equipment, including Engineer's submittal review comments.
   b. Current manufacturer's published operation and maintenance manuals for each piece of equipment.
   c. Name, address and phone number of at least one LOCAL service agency.
   d. HVAC controls system maintenance and calibration information including wiring diagrams, schematics, and control drawings.
   e. Complete narrative of how each system is intended to operate, including suggested set-points.
   f. Copy of the final Test & Balance report.
   g. Copy of the final As-built drawings.
   h. Controls certification letter.
   i. Copy of Engineer's final punch list items, with each item checked off when completed or an explanation of why the item was not completed.

1.14 INTERFACES WITH OTHER WORK

A. There are many interfaces between the work involved with Division 15 and the work involved with other Sections and Divisions, particularly with Division 16. Contractor shall be aware of the requirements of these other Sections or Divisions and his responsibilities at the interfaces.

B. No mechanical equipment, piping, or ductwork shall be places within 42"of switchboards and/or panel boards.

C. No water piping (domestic, storm, sanitary, etc., except sprinkler piping when required) shall be located above electrical switchboards and/or panel boards. When sprinklers are required, shields must be provided over the panels.

1.15 EQUIPMENT IDENTIFICATION

A. Equipment Identification:

1. All mechanical equipment shall be labeled with Bakelite nameplates with 2"high white letters on a black background, securely affixed to equipment for outdoor or indoor service.
2. Equipment Identification numbers shall be the same as those scheduled on the design drawings. Identification shall be located where it can be conveniently read, and shall be located in the same relative position on like equipment.
3. In addition to the above ID tags, all scheduled equipment shall be provided with permanent factory installed engraved nameplate labels listing complete model and serial numbers, unit voltage, motor sizes, etc.
4. Identify all disconnect switches that are not directly attached to the equipment that they serve, with identical ID tags as specified above for the equipment.

1.16 PIPE IDENTIFICATION

A. All piping systems shall be identified.

1. All piping systems within the building except as noted herein shall be identified with clear block letters and number stenciled on the outside surface of the pipe or insulation, indicating the system contents by abbreviated letters and direction of the flow.
2. This identification marking shall be applied to the pipe systems where pipe enters or leaves a wall or floor, and item of equipment such as pumps, fan coil units and tanks, and at tees. Identification shall be applied no less than 50 feet apart on horizontal pipe; and one identification per floor on vertical pipe.
3. Letters and numbers shall be high on pipe 2"and smaller.
4. Letters and numbers shall be 1"high on pipe 3"and larger.
5. Directional arrows shall be 4"long and "wide.
6. Letters and numbers shall be black on white pipe or insulation.
7. Letters and number shall be white on dark pipe or insulation.
8. Pipe identification symbols shall be the same as shown on the drawings.
9. Soil, vent and refrigerant piping shall not be identified.

1.17 PERMITS AND INSPECTIONS

A. The Contractor shall secure and pay for all permits, fees, inspections, and utility connection costs.

B. BOILER TEST CERTIFICATES: It shall be the Contractor's responsibility to have each boiler, large (greater than 120 gallon capacity) water heater, and pressure vessel inspected by a State of Georgia certified inspector upon installation. Each inspection report shall be submitted to the Georgia Department of Labor, Safety Engineering Section, 1700 Century Circle, Atlanta, Georgia 30345 to the attention of Direction of Engineering, PLUS a copy of each report transmitted to the Architect. ONE additional copy of each report shall be included in EACH of the FOUR Close-Out Manuals.

1.18 EQUIPMENT & MATERIAL PROTECTION

A. All equipment and material shall be kept clean and free of debris as construction progresses. Closures shall be provided over duct, piping and major equipment openings during storage, erection and prior to connection. Material finishes shall be protected by covers to prevent impingement of corrosive, abrasive and disfiguring foreign matter. Accidental finish damage shall be repaired equivalent to original finish.

1.19 TEST, BALANCE AND REPORT

A. See Section 15950.

1.20 PROHIBITED MATERIALS

A. All products, materials or assemblies which contain asbestos or polychlorinated biphenyl (PCB) in any form or in any concentration whatsoever, are expressly forbidden from being used on this project.

1.21 SITE VISIT AND FAMILIARIZATION

A. Contractors proposing to undertake work under this Division shall visit the site of the work and fully inform themselves of all conditions that effect the work or cost thereof, examine the drawings and specifications as related to the site conditions, and acquaint themselves with the utility companies from whom services will be supplied; verify locations of utility services and determine requirements for connections.

B. Consideration will not be granted for any alleged misunderstanding of the amount of work to be performed. Tender of proposal shall convey full agreement to all items and conditions specified, indicated on the drawings, and/or required by nature of the site.

C. Attention is called to the fact that this scope of work includes renovation to an existed facility and/or an addition to an existing building. When the work is finished, the mechanical systems shall be complete in every respect, and completely integrated with all affected mechanical and control systems.

D. Existing mechanical systems in the existing facility shall not be interrupted without prior approval of the Owner or Architect.

1.22 DISINFECTION AND TESTING OF WATER SYSTEM

A. Sanitize plumbing potable water systems after cleaning and pressure tests, with chlorinated potable water solution to 200 ppm chlorine residual after 24-hours minimum, then flushed with fresh potable water until effluent chlorine content does not exceed make-up. Water samples shall be sent to Local Health Department (LHP) for testing. A letter of approval must be obtained from the LHD before the system is put into service.

B. All domestic water piping shall be disinfected with chlorine before it is placed into operation. The chlorinating material shall be liquid chlorine conforming to Federal Specification BB-C-120 and shall be introduced to the system by experienced operators only. The chlorine solution applied to the piping sections or system shall contain at least fifty (50) parts per million of available chlorine and shall remain in the sections or system for a period of not less than sixteen (16) hours. During the disinfection period all valves shall be opened and closed at least four (4) times. After the disinfection period, the chlorinated water shall be flushed from the system with clear water until the residual chlorine content is not greater than two-tenths parts per million (0.2PPM). Submit certification to the Architect and Owner that the system was disinfected.

END OF SECTION

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HVAC SPECIFICATIONS

PROJECT # **1715**
DESIGNER: JD

DATE: **04/31/2017**
REV. DATE:

M2.1

SECTION 15850 – AIR DISTRIBUTION

PART 1 GENERAL

1.1 GENERAL

A. Section 15010 is applicable.

1.2 BASIS OF DESIGN

A. Acceptable manufacturers for products specified under this section are listed below.
   1. Flexible duct: Thermaflex, Flexmaster, Clecon
   2. Flexible equipment connections: Durodyne, Ventafabrics
   3. Volume control dampers: Ruskin, Greenheck, Nailor, United, Price
   4. Fire/Smoke dampers: Ruskin, Greenheck, Nailor, United
   5. Air diffusers and grilles: Price, Titus, Nailor, Metalaire

1.3 PRESSURE

A. All new supply, return, outdoor air, and exhaust air ducts are to be STD, 1" static pressure type, class "A" seal, ASHRAE/SMACNA.

PART 2 PRODUCTS

2.1 METAL DUCTWORK

A. Duct work shall be rectangular, oval, or round as shown on plans, and shall be fabricated from ASTM A653/A653M galvanized steel sheet, lock–forming quality. All fasteners shall be galvanized steel.

B. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

C. Fabricate and support round ducts with longitudinal seams in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible (Round Duct Construction Standards). Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
   1. Construct T's, bends, and elbows with minimum radius 1–1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide turning vanes. Where acoustical lining is indicated, furnish turning vanes of perforated metal with glass fiber insulation.
   2. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
   3. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
   4. Provide standard 45–degree branch takeoffs per plans. When space does not allow 45–degree lateral wye takeoff, use 90–degree conical tee connections.
   5. Seal ducts to ASHRAE/SMACNA Class A standard. No cloth duct tape will be allowed.

2.2 FLEXIBLE DUCTWORK

A. Flex ducts connections are for connecting round galvanized duct to air distribution devices. Maximum allowed length of any flex duct section shall be 5'–0". Flex duct shall be two ply vinyl film supported by helical wound spring steel wire; fiberglass insulation; vapor barrier film. Minimum R–6, max velocity 4000 fpm, pressure rating 10 iwg positive and 1 iwg negative. Temperature rating –20 degrees F to 200 degrees F. Basis of design is Thermaflex MK–E.

2.3 FLEXIBLE EQUIPMENT CONNECTIONS

A. Flexible connections shall be used for all duct connections to HVAC equipment and fans. Flexible connections shall be per SMACNA chapter 7, Figure 7–7 and 7–8. Flexible material for indoor installation shall be airtight heavy glass fabric, double coated with neoprene.

2.4 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible, and as indicated on Drawings.

B. Fabricate splitter dampers of material matching duct gage to 24 inches size in each direction, and two gages heavier for larger sizes. Secure with continuous hinge or rod. Operate with minimum 1/4 inch diameter rod.

C. Fabricate single blade dampers for duct sizes to 12 x 30 inch. Fabricate multi–blade damper of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

D. Furnish locking, indicating quadrant regulators on single and multi–blade dampers with 2" standoff brackets. Where width exceeds 30 inches, furnish regulator at both ends.

2.5 FIRE DAMPERS

A. Damper shall be UL 555 listed and labeled as a 1–1/2 hour static fire damper. UL approved for dual directional air flow. Integral Sleeve Frame: Minimum 20 gage by 12 inches roll formed, galvanized steel. Apply factory sealant to dampers in HVAC systems with pressures to maximum 4 inches wg. Mill galvanized finish.
   1. Blades:
      a. Style: Curtain type, out of airstream.
      b. Action: Spring or gravity closure upon fusible link release.
      c. Orientation: Horizontal or vertical as indicated on plans.
      d. Material: Minimum 24 gage roll formed, galvanized steel.
   2. Closure Springs: Type 301 stainless steel, constant force type, if required.
   3. Temperature Release Device: fusible link, 165 degrees F.

B. Type "B" fire dampers shall have no less than 90% free area, shall have 160 degree F fusible link, and integral 12" long 20 gauge integral sleeve and preformed picture frame mounting angles. Basis of design is Ruskin IBD2 Style B.

C. For applications where damper is in wall without interconnecting duct, or where noted as such, damper frame shall be size shown on drawing and shall be type A.

D. For applications where damper is in wall with a grille on both sides or on one side, use thin line type A damper, Ruskin IBDT or approved manufacturer listed above.

E. Provide hinged, insulated access panels with part turn latches in ductwork to all fire dampers where access is not otherwise possible. Duct access panels shall be insulated and stenciled "F.D." with 2" high black letters on light surfaces, light letters on dark surfaces.

F. Picture Frame Mounting Angles:
   1. One–piece, roll formed retaining angles 1–1/2 x 1–1/2 inches.
   2. Factory matched and shipped attached to damper.

2.6 TURNING DEVICES AND EXTRACTORS

A. Multi–blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

B. Multi–blade device with radius blades attached to pivoting frame and bracket, steel or aluminum construction, with push–pull operator strap.

2.7 INSPECTION PANELS

A. Inspection panels shall be installed in plenums and ductwork in order to facilitate inspection of filters, fans, dampers, and coils. Panels into spaces large enough for a person to enter shall be 24"x24" minimum. Panels into smaller spaces shall be 12"x12" minimum. Panels in insulated metal duct shall be 22 gauge galvanized frame with 24 gauge galvanized steel door panel and shall be gasketed, double wall insulated with 1" fiberglass insulation. Panels shall be piano hinged on one side with galvanized cam lock on the other. Inspection panels with sheet metal screw fasteners are not acceptable.

2.8 AIR OUTLETS AND INLETS

A. Air diffusers and grilles are scheduled on the plans. No on–board dampers shall be allowed for ceiling mounted diffusers and grilles. Dampers should be purchased and installed separately at the point of each branch take–off from trunk ducts.

2.9 FILTERS

A. Normal operating filters for all systems shall be disposable pleated media type filter of a size standard for the unit(s) installed.

B. Construction phase filters shall be dry fiberglass media, double wall box panel type, of a size standard for the unit(s) installed. Only construction phase filters shall be used during construction, and normal operating filters shall be installed by contractor after final punch–out. Construction phase filters shall be checked regularly as the project progresses and changed as needed. Units shall not be run without filters.

C. For projects with DDC systems, dirty filter switches shall be installed on equipment filters to indicate, through the DDC, when these filters are dirty.

2.10 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Electrical characteristics of powered equipment are shown on the Div. 16 plans.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify sizes of equipment connections before fabricating transitions.

B. Verify rated walls are ready for fire damper installation.

C. Verify ducts and equipment are ready for installation and accessories.

D. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.2 FIRE DAMPERS

A. Install fire dampers at locations shown on drawings. Installation of fire dampers shall comply with SMACNA Fire, Smoke, and Radiation Damper Installation Guide for HVAC systems.

1.	Basic installation	Figure 1
2.	Breakaway connections	Figure 2
3.	Specific Installation	Figure 5
4.	Damper out of wall	Figure 12
5.	Opening protection	Figure 15

B. Fire damper openings in metal stud walls shall be internally framed on four sides from vertical members for rigid support of opening with internal gypsum board liner per SMACNA installation guide or manufacturer's guidelines for installation in metal stud walls.

3.3 METAL DUCTS

A. Install in accordance with SMACNA Duct Construction Standards – Metal and Flexible, for pressures and seal as specified herein.

B. During construction install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

3.4 FLEXIBLE DUCTS

A. Flex duct connections shall be made with a band on inner liner and another band to secure vapor jacket. Max length of any flexible duct section is 5'–0". Tape all loose ends with foil tape, no cloth duct tape is allowed.

3.5 FLEXIBLE EQUIPMENT CONNECTIONS

A. Install on inlets and outlets of all powered equipment prior to any duct hangers. Manufacturer shall provide with equipment where option is available. Install connecting duct in a straight line with equipment connection, and prevent flexible connection from being in tension while equipment is running.

3.6 DUCT SMOKE DETECTORS

A. Shall be provided and wired by Division 16, installed in duct by Division 15.

3.7 FILTERS

A. Prevent passage of unfiltered air around filters by installing felt, rubber, or neoprene gaskets.

B. Install filter gage static pressure tips upstream and downstream of filters. Mount filter gages on outside of filter housing or filter plenum, in accessible position. Adjust and level.

3.8 INSPECTION PANELS

A. Install inspection panels at the following locations and as indicated on drawings:
   1. Before and after each automatic control damper.
   2. Before and after each fire, smoke, and/or combination fire and smoke damper.

B. Access Door Sizes: Install minimum 12 x 12 inch size for hand access, 18 x 18 in. size for shoulder access. Review locations prior to fabrication.
   1. Mark access doors for fire and smoke dampers on outside surface, with minimum 2 in. high letters reading: FIRE/SMOKE DAMPER, SMOKE DAMPER, OR FIRE DAMPER.

3.9 AIR DIFFUSERS AND GRILLES

A. Install balancing dampers for diffusers and grilles at branch take–off from main trunk, no dampers allowed on–board diffusers or grilles unless explicitly specified on plans. Do not install manual volume dampers next to grilles unless required by field conditions.

B. Do not locate air registers, diffusers or grilles in floors of toilet or bathing rooms.

C. Paint ductwork, cans, and plenums visible behind air outlets and inlets matte black.

D. Install safety screen where fan inlet or outlet is exposed.

END OF SECTION

SECTION 15700 – HVAC INSULATION

PART 1 GENERAL

1.1 GENERAL

A. Section 15010 applies.

PART 2 PRODUCTS

2.1 BASIS OF DESIGN

A. Manufacturers shown below as Basis of Design
   1. Acceptable Manufacturers for Glass Fiber and Mineral Fiber Insulation Products: CertainTeed, Knauf, Johns Manville, Owens–Corning.
   2. Acceptable Manufacturers for Closed Cell Elastomeric Insulation Products: Aeroflex Aerocell, Armacell Armaflex, Nomaco K–flex.

2.2 DUCT INSULATION

A. Supply, Return, Exhaust, and Outdoor Ventilation Ducts
   1. Duct liner: ASTM C1071, Type I, flexible, glass fiber duct liner with 100% coated air side. Minimum density 1.5 lb/ft3.
   2. Externally insulated: All sheet metal supply, return, and outdoor ventilation ducts shall be insulated on the outside with a Formaldehyde–free, flexible glass fiber blanket. Insulation shall have a minimum installed R–value of R–6 and have a Type 75 facing. Insulation shall be provided with a factory–applied facing with a composite UL HFC rating of 25/50. Basis of Design: Johns–Manville Microlite XG Formaldehyde–free Fiber Glass Duct Wrap.
   3. All supply, return, and outdoor ventilation air ducts shall be completely insulated on the outside.
   4. Exhaust ducts shall be insulated within 10 feet of exterior openings.
   5. Duct shown as internally lined shall be also externally insulated as needed to bring total R–value to required level.

2.3 PIPE INSULATION

A. Condensate Piping
   1. ASTM C534, Type I, flexible, closed cell elastomeric insulation, tubular.
   2. Thermal Conductivity: 0.27 at 75 degrees F.
   3. Operating Temperature Range: Range: Minus 70 to 180 degrees F.
   4. Thickness: 1/2" thickness for all pipe sizes.

B. Refrigerant Piping
   1. Suction piping shall be insulated with Johns–Manville Aerotube II pipe insulation slid over tubing without cutting, min. R–3. All joints and seams shall be sealed with mastic.

PART 3 EXECUTION

3.1 INSTALLATION – DUCT SYSTEMS

A. Verify all surfaces are clean and dry before applying insulation.

B. Butt joints of insulation together to obtain total coverage. Do not compress the insulation. Tape all joints.

C. Mechanical fasteners: weld or adhesive applied pins shall be used to secure insulation to bottom of ducts 20" wide or wider. Install 18" on centers, both directions.

D. Place holding washers over weld pins firmly, do not compress insulation, clip of excessive length of pin, cover with 4" length of tape.

E. Where 2" flaps are provided, use adhesive to obtain full 2" coverage in lieu of tape.

F. Repair breaks, holes, and perforations to full thickness flush with adjoining surface, with new sections if large, with tape on small areas so that 2" of tape or replacement foil–kraft project away from the imperfection.

G. Insulation on round ducts may be wired in place with soft monel wire, 12" O.C., with joints taped and vapor sealed.

H. Cover flexible equipment connections on air conditioning units with specified supply/return duct insulation. Lap connection 6" and secure 2" edge flap with adhesive.

3.2 INSTALLATION – PIPING SYSTEMS

A. Verify piping has been tested before applying insulation materials. Verify surfaces are clean and dry, with foreign material removed. Piping Exposed to View in Finished Spaces: Locate insulation and cover seams in least visible locations.

B. Continue insulation through penetrations of building assemblies or portions of assemblies having fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions.

C. Piping Systems Conveying Fluids Below Ambient Temperature:
   1. Insulate entire piping system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
   2. Furnish factory–applied or field–applied vapor retarder jackets. Secure factory–applied jackets with pressure sensitive adhesive self–sealing longitudinal laps and butt strips. Secure field–applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
   3. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive or PVC fitting covers.

D. Inserts and Shields:
   1. Piping 1–1/2 inches Diameter and Smaller: Install steel shield between pipe hanger and insulation.
   2. Piping 2 inches Diameter and Larger: Install insert between support shield and piping and under finish jacket.
      a. Insert Configuration: Minimum 6 inches long, of thickness and contour matching adjoining insulation; may be factory fabricated.
      b. Insert Material: Compression resistant insulating material suitable for planned temperature range and service.
   3. Piping Supported by Roller Type Pipe Hangers: Install galvanized steel shield between roller and inserts.

E. Condensate Piping: Insulate entire piping system and components inside the building space to prevent condensation.

F. Closed Cell Elastomeric Insulation:
   1. Push insulation on to piping, miter joints at elbows.
   2. Seal seams and butt joints with manufacturer's recommended adhesive.
   3. When application requires multiple layers, apply with joints staggered.
   4. Insulate fittings and valves with insulation of like material and thickness as adjacent pipe.

G. Refrigeration suction piping shall be insulated through pipe clamps and hangers, provide insulation shields when insulation passes through clamps and hangers.

H. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces: Finish with PVC jacket and fitting covers. Labels on exterior covers should be oriented so as to be easily readable and shall have directional flow arrows.

I. Buried Piping: Insulate only where insulation manufacturer recommends insulation product may be installed in trench, tunnel or direct buried. Install factory fabricated assembly with inner all–purpose service jacket with self–sealing lap, and asphalt impregnated open mesh glass fabric, with 1 mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with polyester film.

END OF SECTION

SECTION 15950 – TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Testing, adjusting, and balancing of air systems.

B. The Contractor shall obtain the services of an independent test, adjustment, and balance (TAB) agency to test, adjust, and balance:
   1. Each supply, return, exhaust, relief, and outdoor air distribution systems.

C. The Contractor and the TAB Agency shall review the proposed system installations and determine all measuring and balancing devices required for proper test and balance of the systems. These shall include, but not be limited to, manual air volume balancing dampers, etc. The Contractor shall be responsible for providing these in the locations recommended by the TAB Agency, in addition to any shown on the drawings. These devices shall be provided under the Contract.

D. Instruments used for testing and balancing shall have been calibrated within a period of six months of the time of the testing and balancing and such instruments shall be checked for accuracy prior to the start of the work. Submit verification for certification to the Architect and the Owner.

E. Perform Work in accordance with AABC National Standards, latest addition. TAB shall include all equipment and distribution systems and shall be reported, as a minimum, on forms as published by the AABC, NEBB, or approved equal. Report shall include a diagram(s) of each system showing all devices in the system.

F. The TAB Agency shall, unless approved by the Owner, be an AABC or NEBB member and the work shall be done by an AABC or NEBB certified TAB Technician and Commissioning Agent.

G. All corrections required by the report shall be executed by the Contractor to the satisfaction of the Owner, Architect, Engineer, and TAB agency. All costs associated with testing and balancing, as well as costs of any necessary re–testing, shall be borne by the Contractor.

H. Testing and Balancing Agency shall be kept informed of any major changes made to the systems during construction, and shall be provided with a complete set of contract documents, as–built drawings, approved submittals, applicable specification sections, addenda and change orders.

1.2 SUBMITTALS

A. Draft Reports: Submit for review prior to final acceptance of Project.

B. Test Reports: Submit prior to final acceptance of Project and for inclusion in operating and maintenance manuals. Assemble in soft cover, letter size, 3–ring binder, with table of contents page and tabs, and cover identification. Include reduced scale drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

PART 2 EXECUTION

2.1 EXAMINATION

A. Before starting work, verify systems are complete and operable.

B. The TAB Agency shall check refrigerant superheat settings.

C. The TAB Agency shall test drain pans for proper drainage under operating conditions.

D. Report defects, deficiencies, or abnormal conditions in mechanical systems preventing system balance to Owner, Architect, and Engineer.

E. Beginning of work means acceptance of existing conditions.

2.2 INSTALLATION TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust to within plus or minus 10 percent of design.

2.3 AIR SYSTEM PROCEDURE

A. Examine all air handling systems to see that they are free from obstructions that may prevent proper balancing of system.

B. Ensure that all dampers, grilles, and registers are open or in normal positions, that moving equipment is lubricated, filters are installed and clean, and perform other inspection and maintenance activities to ensure that the operation of the system is as specified.

C. Adjust air handling and distribution systems to deliver design supply, return, and exhaust air quantities within previously stated tolerances.

D. Make air quantity measurements in ducts by traverse of entire cross sectional area of duct.

E. Measure air quantities at air inlets and outlets.

F. Use volume control devices to regulate air quantities only to extent those adjustments do not create objectionable air motion or sound levels. Change volume using dampers mounted in ducts, not dampers on ceiling diffusers. Leave dampers on ceiling diffusers open for seasonal adjustment by Owner.

G. Vary total system air quantities by adjustment of fan speeds. Vary branch air quantities by damper regulation.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across fan. Allow for pressure drop equivalent to 50 percent loading of filters.

I. Adjust automatic outside air, return air, and exhaust air dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust air dampers to check leakage.

K. At modulating damper locations, take measurements and balance at extreme conditions.

L. The TAB Agency shall check all the systems operating together to ensure that the air conditioning spaces are under an overall positive pressure.

2.4 FIELD QUALITY CONTROL

A. Verify recorded data represents actually measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices. Set and lock memory stops.

END OF SECTION

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HVAC
SPECIFICATIONS

PROJECT # **1715**
DESIGNER: JD

DATE: **04/31/2017**
REV. DATE:

M2.2

SECTION 15061 – HANGERS AND SUPPORTS FOR MECH. PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Pipe hangers and supports, Hanger rods, Inserts, Flashing, Equipment curbs, Sleeves, Mechanical sleeve seals, Formed steel channel, Firestopping relating to HVAC work, Firestopping accessories, Equipment bases and supports.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B31.1 – Power Piping.
2. ASME B31.5 – Refrigeration Piping.
3. ASME B31.9 – Building Services Piping.

B. ASTM International:
1. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
2. ASTM E814 – Standard Test Method for Fire Tests of Through Penetration Fire Stops.
3. ASTM F708 – Standard Practice for Design and Installation of Rigid Pipe Hangers.
4. ASTM E1966 – Standard Test Method for Fire–Resistive Joint Systems.

C. American Welding Society:
1. AWS D1.1 – Structural Welding Code – Steel.

D. FM Global:
1. FM – Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

E. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 – Pipe Hangers and Supports – Materials, Design and Manufacturer.
2. MSS SP 69 – Pipe Hangers and Supports – Selection and Application.
3. MSS SP 89 – Pipe Hangers and Supports – Fabrication and Installation Practices.

F. Underwriters Laboratories Inc.:
1. UL 263 – Fire Tests of Building Construction and Materials.
2. UL 723 – Tests for Surface Burning Characteristics of Building Materials.
3. UL 1479 – Fire Tests of Through–Penetration Firestops.
4. UL 2079 – Tests for Fire Resistance of Building Joint Systems.
5. UL – Fire Resistance Directory.

G. Intertek Testing Services (Warnock Hersey Listed):
1. WH – Certification Listings.

1.3 DEFINITIONS

A. Firestopping (Through–Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SYSTEM DESCRIPTION

A. Firestopping Materials: ASTM E119, ASTM E814, UL 263, UL 1479 to achieve fire ratings as noted on architectural drawings for adjacent construction, but not less than 1 hour fire rating.

B. Firestop interruptions to fire rated assemblies, materials, and components.

1.5 PERFORMANCE REQUIREMENTS

A. Firestopping: Conform to applicable code and UL listings for fire resistance ratings and surface burning characteristics.

1.6 QUALITY ASSURANCE

A. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10 inch water gage minimum positive pressure differential to achieve fire F–Ratings and temperature T–Ratings as indicated on Drawings, but not less than 1–hour.
1. Wall Penetrations: Fire F–Ratings as indicated on Drawings, but not less than 1–hour.
2. Floor and Roof Penetrations: Fire F–Ratings and temperature T–Ratings as indicated on Drawings, but not less than 1–hour.
a. Floor Penetrations Within Wall Cavities: T–Rating is not required.

B. Through Penetration Firestopping of Non–Fire Rated Floor and Roof Assemblies: Materials to resist free passage of flame and products of combustion.
1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.

C. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.

D. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.

E. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

F. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Acceptable Manufacturers: Carpenter & Paterson, Creative Systems, Flex–Weld, Globe Pipe Hanger Products, Michigan Hanger, Superior Valve Co.

B. Piping – Inside Building:
1. Conform to ASME B31.9, ASTM F708, NFPA 54.
2. Hangers for Pipe Sizes 1/2 to 1–1/2 inch: Malleable iron or carbon steel, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hooks.
6. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Copper–plated, carbon steel ring.

2.2 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.3 INSERTS

A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

A. Metal Flashing: 26 gage thick galvanized steel.

B. Metal Counterflashing: 22 gage thick galvanized steel.

C. Lead Flashing:
1. Waterproofing: 5 lb./sq. ft sheet lead.
2. Soundproofing: 1 lb./sq. ft sheet lead.

D. Flexible Flashing: 47 mil thick sheet; compatible with roofing.

E. Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

2.5 EQUIPMENT CURBS

A. Fabrication: Welded 18 gage galvanized steel shell and base, mitered 3 inch cant, variable step to match roof insulation, 1–1/2 inch thick insulation, factory installed wood nailer.

2.6 SLEEVES

A. Sleeves for Pipes Through Non–fire Rated Floors: 18 gage thick galvanized steel.

B. Sleeves for Pipes Through Non–fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

C. Sleeves for Round Ductwork: Galvanized steel.

D. Sleeves for Rectangular Ductwork: Galvanized steel or wood.

E. Sealant: Acrylic.

2.7 MECHANICAL SLEEVE SEALS

A. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.8 FORMED STEEL CHANNEL

A. Acceptable Manufacturers: Allied Tube & Conduit Corp., B–Line Systems, Midland Ross Corporation, Unistrut Corp.

B. Product Description: Galvanized 12 gage thick steel. With holes 1–1/2 inches on center.

2.9 FIRESTOPPING

A. Acceptable Manufacturers: Dow Corning Corp., Fire Trak Corp., Hilti Corp., International Protective Coating Corp., 3M Fire Protection Products, Specified Technology Inc.

B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
1. Silicone Firestopping Elastomeric Firestopping: Single or Multiple component silicone elastomeric compound and compatible silicone sealant.
2. Foam Firestopping Compounds: Single or Multiple component foam compound.
3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non–asbestos fibers.
4. Fiber Stuffing and Sealant Firestopping: Composite of mineral or ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
7. Firestop Pillows: Formed mineral fiber pillows.

2.10 FIRESTOPPING ACCESSORIES

A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

B. Dam Material: Permanent Mineral fiberboard or fiber matting, sheet metal, plywood or alumina silicate fire board.

C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

D. General:
1. Furnish UL listed products.
2. Select products with rating not less than rating of wall or floor being penetrated.

E. Non–Rated Surfaces:
1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where piping is exposed.
2. For exterior wall openings below grade, furnish mechanical sealing device to continuously fill annular space between piping and cored opening or water–stop type wall sleeve.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify openings are ready to receive sleeves.

C. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install damming materials to arrest liquid material leakage.

D. Do not drill or cut structural members.

3.3 INSTALLATION – INSERTS

A. Install inserts for placement in concrete forms.

B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.

D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

E. Where inserts are omitted, drill through concrete slab from below and provide through–bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.4 INSTALLATION – PIPE HANGERS AND SUPPORTS

A. Install in accordance with ASME B31.1, ASME B31.5, ASME 31.9, ASTM F708, NFPA 54.

B. Support horizontal piping as scheduled.

C. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.

D. Place hangers within 12 inches of each horizontal elbow.

E. Use hangers with 1–1/2 inch minimum vertical adjustment.

F. Support vertical piping at every floor.

G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Provide copper plated hangers and supports for copper piping.

J. Design hangers for pipe movement without disengagement of supported pipe.

K. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

L. Provide clearance in hangers and from structure and other equipment for installation of insulation.

3.5 INSTALLATION – EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, minimum 3–1/2 inches thick and extending 6 inches beyond supported equipment.

B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct supports of steel members, formed steel channel, steel pipe and fittings. Brace and fasten with flanges bolted to structure.

3.6 INSTALLATION – FLASHING

A. Provide flexible flashing and metal counter–flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms for sound control.

C. Provide curbs for roof installations 14 inches minimum high above roofing surface. Flash and counter–flash with sheet metal; seal watertight. Attach counter–flashing to equipment and lap base flashing on roof curbs. Flatten and solder joints.

D. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.7 INSTALLATION – SLEEVES

A. Exterior watertight entries: Seal with mechanical sleeve seals.

B. Set sleeves in position in forms. Provide reinforcing around sleeves.

C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

D. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

E. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with stuffing insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

F. Install chrome plated steel escutcheons at finished surfaces.

3.8 INSTALLATION – FIRESTOPPING

A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, and other items, requiring firestopping.

B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.

D. Fire Rated Surface:
1. Seal opening at floor, wall, partition, ceiling, and roof as follows:
a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
c. Pack void with backing material.
d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.
2. Where cable tray, conduit, wireway, and piping penetrates fire rated surface, install firestopping product in accordance with manufacturer's instructions.

E. Non–Rated Surfaces:
1. Seal opening through non–fire rated wall, partition floor, ceiling, and roof opening as follows:
a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
c. Install type of firestopping material recommended by manufacturer.
2. Install escutcheons, floor plates, or ceiling plates where conduit or piping, penetrates non–fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
3. Exterior wall openings below grade: Assemble rubber links of mechanical sealing device to size of piping and tighten in place, in accordance with manufacturer's instructions.
4. Interior partitions: Seal pipe penetrations at locations where partitions run to structure. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

END OF SECTION

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HVAC SPECIFICATIONS

PROJECT # **1715**
DESIGNER: JD

DATE: **04/31/2017**
REV. DATE:

M2.3

SECTION 15750 – MAJOR HVAC EQUIPMENT

PART 1 GENERAL

1.1 GENERAL

A. Section 15010 applies.

1.2 BASIS OF DESIGN

A. Acceptable manufacturers for products specified under this section are listed below.
   1. Exhaust Fans: Greenheck, Cook, Penbarry

PART 2 PRODUCTS

2.1 EXHAUST FANS (EF)

A. General
   1. Fans are scheduled on the drawings.
   2. All fans shall bear the AMCA Certified Performance Rating seal and UL label. Sone ratings shall be in accordance with AMCA Bulletin 300. Fans shall have published ratings certified by AMCA Standard 210 and Class established by AMCA 240S–69. Fan BHP and RPM shall be selected to produce specified capacity when installed in system with accessories as indicated. Fan wheels shall be statically and dynamically balanced.
   3. Belt drive fan motors shall have bases which permit adjustment of belt tension, belt guards with tachometer hole for fan shaft, and variable pitch diameter sheaves.
   4. Bearings for fan shafts, other than propeller type, shall have an average service life of 100,000 hours. Bearings shall be factory lubricated and shall have grease fittings for lubrication as recommended by bearing manufacturer. Grease lines shall extended to outside of casing where fittings are inaccessible during fan run time.
   5. Solid state speed controllers for direct drive fans shall be provided and wired under Division 15 for initial balancing of fan air quantity.
   6. Motors shall be provided as specified in Section 15010 and shall be readily accessible. Motors 1 hp and larger shall be premium efficiency type.

B. Centrifugal Roof Mounted Exhaust Fan
   1. Fans shall be centrifugal belt or direct dive type. Housing shall be constructed of heavy duty aluminum mounted on a rigid frame. Shroud shall have a rolled bead and internal structural members for added strength. Install on 12" weathertight curb. Curb assembly shall be water spray tested and proven leak–free to the satisfaction of the Owner.
   2. Fan shall be backward curved centrifugal type with spun inlet venturi. Motors and centrifugal wheels shall be mounted on vibration isolators. Motors shall be isolated from the exhaust air stream – cooling air shall be provided from a location free of contaminants. Motors shall be readily accessible for maintenance.
   3. A NEMA disconnect switch shall be factory installed and wired from the motor to the disconnect junction box. A conduit chase shall be provided for running electrical wiring from the curb cap into the power junction box.
   4. Provide backdraft damper within roof curb unless a MOD is noted otherwise.

C. Ceiling/Cabinet Type
   1. Housing shall be reinforced phosphatized steel. Wheels shall be true centrifugal, forward curved in design, and shall be statically and dynamically balanced.
   2. Where grilles are required, they shall be aluminum with white baked enamel symmetrically finished appearance. Interior of housings shall be lined with dark acoustical insulation permanently attached in place. Interior of installed unit shall not be visible when grille is installed.
   3. Motors shall be shaded pole type with sleeve bearings supported by one piece die formed steel suspension brackets with rubber isolation dampers.
   4. Terminal box shall be mounted in the housing with receptacle, plug and cord inside of the cabinet. All motors shall be suitably grounded. Motor and fan assembly shall be removable from installed ceiling ventilator.
   5. Where duct flanges are required on one or both ends of the fan, they shall be pre–assembled to housings.
   6. Backdraft dampers shall be of integral design with aluminum damper on steel spring and foam rubber seal to eliminate chatter.
   7. A speed controller on direct drive fans shall be shall be mounted at the fan and factory wired or field wired under Division 15 between the fan and fan energizer.

PART 3 EXECUTION

3.1 INSTALLATION

A. Field coordinate power requirements with Division 16 contractor before ordering any equipment.

B. Do not place equipment on roof before roof curbs are installed. All roof–mounted equipment shall be mounted on curbs. Install roof mounted units on roof curb providing watertight enclosure to protect ductwork and utility services. Install roof curb and equipment level.

C. Install components furnished loose for field mounting.

D. Install electrical devices downstream of contactors furnished loose for field mounting. Division 16 contractor is responsible for providing remote disconnects for all mechanical equipment under this contract. Division 16 contractor is responsible for providing and installing power wiring to terminals on all mechanical equipment.

E. Furnish initial start–up and shutdown during first year of operation, including routine servicing and checkout.

END OF SECTION

SECTION 15730 – SPLIT SYSTEM HEAT PUMPS

PART 1 GENERAL

1.1 GENERAL

A. Section 15010 applies.

1.2 BASIS OF DESIGN

A. Acceptable manufacturers for products specified under this section are listed below.
   1. Split System Heat Pumps: Carrier, Trane, Daikin
   2. Mini–split Heat Pumps: Mitsubishi, Daikin, Trane, Carrier

PART 2 PRODUCTS

2.1 DUCTED SPLIT SYSTEM HEAT PUMPS

A. Equipment is scheduled on the drawings.

B. Configuration: as inidicated on the drawings.

C. General: Factory assembled and tested air cooled condensing units and heat pumps, consisting of casing, compressors, condensers, coils, condenser fans and motors, and unit controls.

D. Unit Casings: Exposed casing surfaces constructed of galvanized steel, bonderized, and coated with manufacturer's powder coat paint. Designed for outdoor installation and complete with weather protection for components and controls, and complete with removable panels for required access to compressors, controls, condenser fans, motors, and drives.

E. Compressor: Single and dual refrigeration circuits (per plans) with compressors, resiliently mounted, with positive lubrication, and internal motor overload protection.

F. Condenser Coil: Constructed of copper tubing mechanically bonded to aluminum fins, factory leak and pressure tested.

G. Furnish operating and safety controls including high and low pressure cutouts. Control transformer. Furnish magnetic contactors for compressor and condenser fan motors.

H. Condenser Fans and Drives: Direct drive propeller fans statically and dynamically balanced. Wired to operate with compressor. Permanently lubricated ball bearing type motors with built–in thermal overload protection. Furnish high efficiency fan motors.

I. Condensing Unit Accessories:
   1. Controls to provide low ambient cooling, time delay relay, anti–short cycle timer, vibration isolators on all equipment supported by structure or upper floor slabs, condenser coil guard, suction and discharge pressure gauge connections.

J. Refrigeration specialties: Furnish the following for each circuit:
   1. Charge of compressor oil, Holding charge of refrigerant, Replaceable core type filter drier, liquid line sight glass and moisture indicator, shut–off valves on suction and liquid piping, liquid line solenoid valve, charging valve, oil level sight glass, crankcase heater, hot gas muffler, pressure relief device, P–traps (as needed).

K. Refrigerant: Furnish full charge of refrigerant R–410A.

L. Air Handling Unit Cabinet:
   1. Panels: Constructed of galvanized steel with baked enamel finish. Access Panels: Located on both sides of unit. Furnish with duct collars on inlets and outlets.
   2. Insulation: Factory applied to each surface to insulate entire cabinet. One inch thick aluminum foil faced glass fiber with edges protected from erosion.

E. Evaporator Fan: Forward curved centrifugal type, resiliently mounted with adjustable belt drive (for belt drive units) and high efficiency motor. Motor permanently lubricated with built–in thermal overload protection.

F. Evaporator Coil: Constructed of copper tubes expanded onto aluminum fins. Factory leak tested under water. Removable, PVC construction, double–sloped drain pan with piping connections on both sides.

G. Refrigeration System: Single and dual refrigeration circuits, as per plans, controlled by factory installed thermal expansion valve.

H. Electric Heating Coil: Helical nickel–chrome resistance wire coil heating elements with refractory ceramic support bushings easily accessible with automatic reset thermal cut–out, built–in contactors, galvanized steel frame, manual reset thermal cut–out, air flow proving device, load fuses.

I. Air Filters: 1 inch thick glass fiber disposable media in metal frames. 25 to 30 percent efficiency based on ASHRAE 52.1.

J. Air Handling Unit Accessories:
   1. Discharge Plenum: with construction and finish matching unit casing.
   2. Mounting Sub–base with construction and finish matching unit casing.
   3. Vibration Isolators: Neoprene–in–shear type.

2.2 MINI–SPLIT SYSTEM HEAT PUMPS

A. Equipment is scheduled on the drawings.

B. Air cooled split system outdoor section shall be suitable for ground or rooftop installation. Unit shall consist of a hermitic reciprocating scroll or rotary compressor, an air cooled coil, propeller type blow thru outdoor fans, reversing valve, accumulator, refrigerant charge, heating mode metering device, and control box. Unit shall discharge air horizontally. Unit construction shall comply with ANSI/ASHRAE 15 and NEC. Units shall be constructed in accordance with U.L. standards. Air cooled condenser coils shall be leak tested at 350 psig air pressure. Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a baked enamel finish. Outdoor fans shall be direct drive propeller type, and shall discharge air horizontally. Outdoor fan motors shall be totally enclosed, single phase motors with Class B insulation and permanently lubricated sleeve bearings, and shall be protected by internal thermal overload protection. Fan blades shall be corrosion–resistant and shall be statically and dynamically balanced. Outdoor fan openings shall be equipped with PVC coated protection grille over fan and coil. Compressor shall be equipped with oil system, operating oil charge, and motor. Internal overloads shall protect the compressor from over–temperature and over–current. Scroll compressors shall also have high discharge gas temperature protection if required. Reciprocating compressors shall be equipped with crankcase heaters. Compressor assembly shall be installed on rubber vibration isolators and shall have internal spring isolation. Coil shall be constructed of aluminum fins mechanically bonded to internally enhanced, seamless copper tubes. Refrigerant circuit components shall include brass external liquid line service valve with service gage port connections, suction line service valve with service gage connection port service gage port connections on compressor suction and discharge lines with Schrader type fittings with brass caps, accumulator, bi–fold filter drier, and pressure relief.

C. Outdoor unit operating controls and safeties shall be factory selected, assembled, and tested. The minimum control functions shall include time delay restart, automatic restart on power failure, safety lockout, a time delay control sequence, high pressure and liquid line low pressure switches, and start capacitor and relay on single phase units without scroll compressors. Safeties shall include: System diagnostics, compressor motor current and temperature overload protection, high pressure relief and outdoor fan failure protection. Unit electrical power shall be single point connection. Unit shall have high and low voltage terminal block connections. Liquid solenoid valve shall be included on heat pumps where required for excessive heights where recommended by manufacturer.

D. Indoor direct expansion fan coil units shall be complete with cooling/heating coil, fan, fan motor, piping connectors, electrical controls, microprocessor control system, and integral wall mounting bracket, mounting hardware, and thermistor interconnection cable. The unit shall be matched with outdoor unit as scheduled on drawings. Cabinet discharge and inlet grilles shall be attractively styled, high impact polystyrene. Cabinet shall be fully insulated for improved thermal and acoustic performance. Fans shall be tangential direct drive blower type with air intake and discharge. Vertical and horizontal air sweep shall be provided. Coil shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins shall be bonded to the tubes by mechanical expansion. A drip pan under the coil shall have a drain connection. Condensate pan shall have internal trap and auxiliary drip pan under coil header. The units shall use Accurater piston refrigerant metering device in the indoor unit and outdoor unit liquid line service valve. Unit shall have filter track with factory supplied cleanable filters. Motors shall be open drip proof, permanently lubricated ball bearing with inherent overload protection. Fan motors shall be 3–speed. Controls shall consist of a microprocessor based control system which shall control space temperature, determine optimum fan speed, and run self diagnostics. Controls shall include a minimum of the following features: an automatic restart, timer function, temperature sensing controls, high discharge temperature shutdown, fan speed control, time delay to prevent compressor restart in less than 3 minutes, automatic heating to cooling changeover and demand defrost. Indoor coil high temperature protection shall be provided to detect excessive indoor discharge temperature when unit is in heat pump mode. All units shall have rotatable refrigerant lines for penetration through the wall using flare connections. All units shall have flare connections and line–hide devices. Units shall be provided with a condensate pump as scheduled on the drawings.

E. Control or safety devices furnished for field installation shall be installed and wired under Section 15900.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify roof curbs are installed and dimensions are as shown on shop drawings.

3.2 INSTALLATION

A. Install Work in accordance with state and local Building Inspection Department's standards.

B. Do not place units on roof before roof curbs or mounting rails are installed.

C. Install roof mounted units on roof curb or mounting rails providing watertight enclosure to protect ductwork and utility services. Install roof curb level.

D. Install remote panels and control wiring between remote control locations and unit. Install in accordance with Section 15900.

E. Install components furnished loose for field mounting.

F. Install electrical devices downstream of contactors furnished loose for field mounting. Division 16 contractor is responsible for providing remote disconnects for all mechanical equipment under this contract. Division 16 contractor is responsible for providing and installing power wiring to terminals on all mechanical equipment.

G. Install flexible connections at supply and return ductwork connections.

H. Install condensate drain piping from drain pan to nearest floor drain or to condensate drainage system provided.

I. Furnish units fully charged with refrigerant and filled with oil.

J. Furnish initial start–up and shutdown during first year of operation, including routine servicing and checkout.

END OF SECTION

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FLOYD COUNTY
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LAVENDER DRIVE
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HVAC
SPECIFICATIONS

PROJECT # **1715**
DESIGNER: JD

DATE: **02/12/2018**
REV. DATE:

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