METAL DUCT SYSTEMS SCHEDULE

(THIS IS A SCHEDULE OF STANDARD SYSTEMS, ALL SYSTEMS MAY NOT APPEAR ON THIS PROJECT)

LOCATION	SERVICE	PRESSURE, SEAL & LEAKAGE CLASS				JOINING METHOD		MATERIAL					INSULATION				
		2-INCH WG	SEAL CLASS	LEAKAGE CLASS (RECTANGULAR)	LEAKAGE CLASS (ROUND)	SMACNA TRANSVERSE JOINT REINFORCEMENT	WELDED	GALVANIZED SHEET STEEL (0" - 30") (SEE NOTE 1)	GALVANIZED SHEET STEEL (25" - 42") (SEE NOTE 1)	GALVANIZED SHEET STEEL (43" - 48") (SEE NOTE 1)	CARBON SHEET STEEL	STAINLESS STEEL	MINERAL-FIBER BLANKET	MINERAL-FIBER BOARD	MINERAL-FIBER BOARD W/FIELD APPLIED JACKET	FIRE RATED BLANKET OR BOARD
CONCEALED (CONDITIONED)	SUPPLY	X	C	12	6	NOTE 2		26GA.	24GA.	22GA.			1-½"			
	RETURN	X	C	12	6			26GA.	24GA.	22GA.			1-½"			
	EXHAUST	X	B	12	6			26GA.	24GA.	22GA.			–			
	OUTDOOR AIR	X	C	12	6			26GA.	24GA.	22GA.			1-½"			
CONCEALED (UNCONDITIONED)	SUPPLY	X	B	12	6			26GA.	24GA.	22GA.			1-½"			
	RETURN	X	B	12	6			26GA.	24GA.	22GA.			1-½"			
	EXHAUST	X	C	12	6			26GA.	24GA.	22GA.			–			
	OUTDOOR AIR	X	C	12	6			26GA.	24GA.	22GA.			1-½"			
EXPOSED (CONDITIONED)	SUPPLY	X	C	12	6			26GA.	24GA.	22GA.				1-½"		
	RETURN	X	C	12	6			26GA.	24GA.	22GA.				1-½"		
	EXHAUST	X	B	12	6			26GA.	24GA.	22GA.				–		
	OUTDOOR AIR	X	C	12	6			26GA.	24GA.	22GA.				1-½"		
EXPOSED (UNCONDITIONED)	SUPPLY	X	B	12	6			26GA.	24GA.	22GA.				1-½"		
	RETURN	X	B	12	6			26GA.	24GA.	22GA.				1-½"		
	EXHAUST	X	C	12	6			26GA.	24GA.	22GA.				–		
	OUTDOOR AIR	X	C	12	6			26GA.	24GA.	22GA.				1-½"		
OUTDOORS	SUPPLY	X	A	12	6			26GA.	24GA.	22GA.					2"	
	RETURN	X	C	12	6			26GA.	24GA.	22GA.					2"	
	EXHAUST	X	C	12	6			26GA.	24GA.	22GA.					2"	
	OUTDOOR AIR	X	C	12	6		▼	26GA.	24GA.	22GA.					2"	
UNDERGROUND	SEE NOTE 2															

NOTES:

1. SHEET METAL GAUGES ARE BASED ON THE CONTRACTOR PROVIDING SMACNA DESIGNATED TRANSVERSE JOINT REINFORCEMENT CONNECTIONS USING A MAXIMUM OF 4 FOOT DUCT LENGTHS. DEVIATIONS ARE PERMITTED PROVIDED THE DUCTWORK MEETS MINIMUM SMACNA STANDARDS.

2. CONCRETE ENCASED PVC-COATED GALVANIZED SHEET STEEL WITH THICKER COATING ON DUCT EXTERIOR.

HVAC PIPING SYSTEMS SCHEDULE

(THIS IS A SCHEDULE OF STANDARD SYSTEMS. SOME SYSTEMS MAY NOT APPEAR ON THIS PROJECT)

SYSTEM	PIPE SIZE OR SERVICE	PIPE MATERIAL				CONNECTION						FITTINGS			INSULATION				
		TYPE C1220 PHOSPHOROUS DEOXIDIZED SEAMLESS COPPER	COPPER (TYPE)	PVC (SCH)		THREAD AND COUPLE	WELD	SOLDER	NEOPRENE GASKET	SOLVENT WELD		PRESSURE CLASS (PSIG)	WROUGHT COPPER	PVC	THICKNESS	GLASS FIBER	CLOSED CELLULAR FOAM	KRAFT VP JACKET (ASJ)	KEYED NOTES
COOLING SYSTEMS REFRIGERANT PIPING	LIQUID		L					X				535	X		1"		X		
	SUCTION		L					X				535	X		1"		X		
	HOT-GAS		L					X				535	X		1"		X		
VRF REFRIGERANT PIPING	LIQUID, GAS & DISCHARGE (ALL SIZES)	X						X							1"		X		
CONDENSATE DRAIN PIPING	ALL SIZES		L	40				X		X				DWV	1"		X		1

MECHANICAL SPECIFICATIONS

GENERAL

A. DESCRIPTION OF THE WORK – The scope of work indicated on these drawings shall include fully functioning mechanical systems, adjusted, tested, balanced and ready for use. Provide all items necessary to complete the systems. Examine the drawings of other trades (including but not limited too architectural, structural, electrical, plumbing, etc.) to become familiar with all aspects of those designs. Coordinate work with that to be performed by others, and that affecting mechanical systems, to determine the extent of mechanical work required. It shall be the responsibility of the mechanical sub-contractor to obtain all drawings of all trades.

CODES AND STANDARDS

A. Provide work conforming in all respects to the latest applicable codes of the Authority Having Jurisdiction and all applicable rules, regulations, laws and ordinances of Local Authorities. Install all equipment in compliance with accepted industry standards and manufacturer's recommendations.

B. The referenced codes shall include any and all supplements, addenda, memoranda, information bulletins and any other changes and additions effective prior to the permit issue date by adoption of the local Authority Having Jurisdiction.

C. Make any and all modifications required by the Authorities Having Jurisdiction without additional charge to the Owner.

D. Where alterations to and/or deviations from the Contract Documents are required by the Authorities, report the requirements to the Architect and secure approval before starting the alterations.

E. All work shall comply with the following codes:
2015 INTERNATIONAL BUILDING CODE
2015 INTERNATIONAL Energy Conservation Code
2015 INTERNATIONAL Mechanical Code (IMC)
2015 INTERNATIONAL Plumbing Code (IPC)
2015 NFPA 101 LIFE SAFETY CODE
2014 National Electric Code (NEC)
2015 INTERNATIONAL Existing Building Code (IEBC)

All work shall comply with the following standards:
American Society of Mechanical Engineers (ASME).
Air Conditioning and Refrigeration Institute (ARI).
American National Standards Institute (ANSI).
Air Diffusion Council (ADC).
American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE).
American Society for Testing and Materials (ASTM).
National Fire Protection Association (NFPA).
Air Moving and Conditioning Association (AMCA).
Underwriters Laboratories (UL).
National Electric Manufacturer's Association (NEMA).
Sheet Metal and Air Conditioning Contractor's National Association "Duct Construction Standards"(SMACNA).
Manufacturer's Standardization Society of the Valves and Fittings Industry, Inc. (MSS).
Associated Air Balance Council (AABC).
National Environmental Balancing Bureau (NEBB).

PERMITS

A. Obtain and pay for all permits, licenses and inspection certificates required for all work in accordance with the provisions of the Contract Documents.

GUARANTEE

A. Guarantee in form satisfactory to the Owner, that all Work installed is free from defects in workmanship and/or materials. Guarantee that all apparatus will develop capacities and characteristics specified for a period of one year, to include one full heating and one full cooling season, from the date of final acceptance by the Owner or certification of substantial completion, whichever occurs later.

B. During the guarantee period, remedy, without cost to the Owner, defective workmanship, materials, and apparatus performance. Remedial work shall be completed within a reasonable time specified by the Owner. In default thereof, the Owner may have such work done and charge all costs to the Contractor.

COMPLETE PERFORMANCE OF WORK

A. Execute work in strict accordance with the best practice of the trades in a thorough, substantial, workmanlike manner by competent workmen.

B. Provide labor, materials, apparatus, and appliances essential to the complete functioning of the systems described and indicated, or which may be reasonably implied as essential whether mentioned in the Contract Documents or not.

C. In cases of doubt as to the Work intended, or in the event of need for explanation thereof, request supplementary instructions from the Architect.

GENERAL CONTRACTOR COORDINATION OF ALL TRADES

A. It is the GC's responsibility to coordinate all trades. Where the work of various trades will be installed in close proximity to one another, or where there is evidence that the work of one trade will interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment. If one trade installs his work before coordinating with work of other trades, make necessary changes to correct the condition without extra charge.

DRAWINGS

A. These drawings are diagrammatic and indicate the general location of systems and components. Provide all items necessary for a properly working system at no additional cost, even if not specifically shown or mentioned on the drawings.

SUBMITTALS

A. After the Contract is awarded, but prior to proceeding with the Work, obtain complete submittals from the manufacturers, suppliers, vendors, subcontractors, for all materials and equipment shown or specified on these drawings and submit data and details of such materials and equipment to the Architect and Engineer.

B. Prior to forwarding submittals to the Architect and Engineer, review and certify that the equipment, materials, methods, etc. represented by the submittals are in compliance with the Contract Documents.

C. Check all materials and equipment after their arrival on the job site and verify their compliance with the Contract Documents.

D. Approval of product data shall not relieve the Contractor of the responsibility for errors that may be contained therein, or for deviations from requirements in the Contract Documents. It shall be clearly understood that the Architect or Engineer noting some errors but overlooking others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the product data the Contract Documents shall govern the work and are neither waived nor superseded in any way by submittal review.

ELECTRICAL EQUIPMENT PRECAUTIONS

A. Do not install ductwork or piping for heating, refrigeration, plumbing, fire protection, process piping, or any piping systems not included as part of the electrical work, above any electric equipment, transformer, or telephone and electrical equipment.

ACCESSIBILITY

A. Locate all equipment which must be serviced, operated, or maintained in fully accessible position. Equipment shall include, but not be limited to, valves, traps, cleanouts, motors, controllers, drain points, etc. If required for better accessibility, furnish access doors (minimum of 18"x18") for this purpose. Minor deviations from the Contract Documents may be made to allow for better accessibility. Submit any desired change to the Architect for approval prior to performing the work.

B. Wherever access is required through walls or ceilings to equipment, valves, fire dampers, or other concealed equipment installed under this Division, provide a hinged access door and frame.

EQUIPMENT NOISE AND VIBRATION

A. Provide equipment and systems that, as defined herein, are quiet and free of apparent vibration in operation.

B. It is intended that vibration shall not be apparent to the senses in occupied areas of the building. To this end, provide both the balancing of rotating machinery and vibration isolation devices at various locations.

OPERATING INSTRUCTIONS

A. Provide the services of a factory trained specialist to supervise the start-up of all equipment shown and/or specified on these drawings and to instruct the Owner's operators on the operation of the mechanical system.

OPERATING AND MAINTENANCE MANUALS

A. Provide three (3) copies of operating instructions and maintenance data manuals for each specific item of equipment and materials.

RECORD DRAWINGS (REFER TO OWNER'S DIVISION 1 REQUIREMENTS)

A. Maintain a complete set of "Record Drawings" reflecting an accurate as-built record of all Work. In addition, mark the "Record Drawings" to show the precise location of hidden-from-view work and equipment, including air distribution equipment above ceilings, concealed or embedded piping, valves, and all changes and deviations in the Work from that shown on the Contract Documents. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or work without definite instructions from the Owner.

TESTING, ADJUSTING AND BALANCING

A. Provide an independent testing, adjusting and balancing (TAB) agency to perform all tests and adjustments necessary to accomplish complete balancing of the HVAC system. The TAB agency shall perform all tests and make all adjustments necessary to ensure that water and air systems are balanced to within +10%, -5% of the specified quantities. The TAB agency shall submit reports of all work conducted for approval. The TAB agency shall be an AABC member in good standing, or a firm certified by NEBB.

IDENTIFICATION FOR HVAC DUCTWORK, PIPING AND EQUIPMENT

A. Install plastic laminated, permanent self-adhesive duct labels on air ducts as follows:
Blue – For cold-air supply ducts.
Yellow – for hot-air supply ducts.
Green – for exhaust, outside, relief, return and mixed air ducts.

B. Label refrigerant piping (liquid, suction, hot-gas, discharge) with black letters on white background.

INSULATION

A. MATERIALS

i. FOAMED PLASTIC PIPE INSULATION
Closed-cell synthetic foam in continuous lengths with a maximum K-factor of 0.27 per inch of thickness at 75 degrees F mean temperature. Where piping is located outside of the building, wrap piping insulation with weather-resistant jacketing. Basis of Design: Armstrong "AP Armaflex". Foamed plastic insulation, regardless of fire hazard classification, shall not be used in contact with HVAC air streams.

ii. BLANKET DUCT INSULATION
Flexible glass fiber type of a density which produces a maximum K-factor of 0.26 per inch of thickness at 75 degrees F mean temperature. Jacket shall be aluminum foil reinforced with fiberglass scrim laminated to kraft paper. Provide UL label. Basis of Design: Manville "Microlite" with FSKL facing.

B. APPLICATION

i. PIPING THERMAL INSULATION
Insulate the following piping systems with 1/2-inch thick heat resistant polyethylene foam. Foamed plastic tubing shall not be installed in plenum ceilings, air shafts, or any other air passageways; utilize 1/2-inch thick glass fiber insulation with flame-retardant, vapor barrier jacket in these cases.
- Condensate drain lines and auxiliary drain pans
- Refrigerant piping (all refrigerant pipes shall be insulated: suction gas, discharge gas and liquid.

ii. DUCTWORK BLANKET THERMAL INSULATION
All ducts shall be insulated as follows unless specified otherwise:
- Concealed Rectangular: Insulate with 1-1/2-inch thick blanket type insulation adhered to ductwork with 4-inch wide bands of duct insulation adhesive applied on 12-inch centers and fastened with metal clips on 18-inch centers. Joints, seams and stick-clip penetrations shall be sealed with vapor barrier sealer and tape of same type as facing.
- Round Ducts: Insulate with 1-1/2-inch thick blanket type insulation adhered to ducts with 4-inch wide bands of insulation adhesive applied every 90 degrees around duct as a minimum, or on 12-inch longitudinal centers as a maximum and bound with cord or wire half-hitched on 8-inch centers. Joints, seams, and penetrations shall be sealed with vapor barrier sealer and 4-inch wide adhered strips of same type as facing.
- Transitions from Round to Rectangular: Insulate with 1-1/2-inch thick blanket as specified for round duct.

AIR DISTRIBUTION

A. DUCTWORK

i. Provide constant air volume ductwork fabricated of galvanized sheet steel suitable for 2-inch static pressure class with duct transverse joint reinforcement and intermediate reinforcement as specified in the SMACNA duct construction standards. Ductwork seal and leakage classes shall be as specified in the "Mechanical Duct Systems Schedule" on this sheet.

ii. All ductwork shall be constructed and erected in a workmanlike manner. Ducts shall be straight and smooth on the inside with neatly finished joints, airtight, and shall be free from vibration under all conditions of operation. The internal ends of slip joints shall be made in the direction of air flow. The ducts shall be securely attached to the building construction in an approved manner. Changes in dimensions and shape of ducts shall be gradual and made using transitions detailed in SMACNA figure 2-9. All duct sizes shall fall within the limiting dimensions indicated on the Drawings, unless otherwise approved. Radius elbows, unless otherwise specified on the Drawings, shall have centerline radius equal to 1-1/2 times the width of the duct. Air turns shall be installed in all 90 degree elbows and shall permit the air to make the turns without appreciable turbulence. Provide double thickness turning vanes for ducts 31 inches or wider. Single thickness turning vanes may be used for ducts between 13 and 30 inches wide.

iii. Support all ducts from building structure in a neat, secure manner and, wherever possible, group parallel runs of horizontal ducts together on trapeze hangers. Support vertical riser ducts at the floor line with steel angles to the floor construction. Hanging ducts from other pipes or ducts will not be permitted. Support ducts in accordance with SMACNA.

iv. All round flex duct taps shall be made using conical spin-in fittings; straight dovetail round fittings will not be acceptable. All flex duct taps on spiral ductwork shall be factory-fabricated. When the depth of tapped ductwork will not accept a round fitting, a factory-fabricated oval dovetail fitting of equivalent free area shall be used. Oval dovetail fittings shall have liquid sealant applied all around.

v. Sheet metal ductwork Drawings shall be made after actual job measurements are obtained. Sheet metal ductwork drawings shall indicate the coordination by the Contractor with sprinkler piping, other mechanical and electrical services installed under Divisions 23 and 26, and the Structural and Architectural requirements.

vi. The interior of all ductwork, casings, grilles, registers, diffusers, etc. shall be thoroughly cleaned. Dust/dirt marks at air distribution devices shall necessitate system disassembly as required for proper cleaning of component interiors. No equipment shall be operated until the air conveying systems are clean.

vii. All ductwork shall be installed tight to and supported from the structure above unless indicated otherwise on the Drawings.

viii. Flex duct – No flex duct is allowed.

ix. Duct insulation shall not be continuous through fire and combination fire/smoke dampers. Provide insulation on all sleeves at fire and combination fire/smoke dampers in insulated or sound lined ductwork.

iix. Sealant on exposed metal ductwork shall be limited to the surfaces within the metal joints and not on the surface of the ductwork. Exposed ductwork with visible sealant on the surface of the metal will be rejected and replaced.

B. FLEXIBLE CONNECTIONS
Provide sound isolating flexible connections at ductwork connections (supply & return) of all equipment with rotating machinery (including, but not limited to, air handlers, fans, energy recovery ventilators and where shown on the Drawings. Flexible connections shall be fire, water, and weather resistant canvas "Ventglas." Flexible connections shall be installed with a minimum of one inch slack and a minimum of two inch uniform gap between adjoining metal. The fabric shall be folded in with the metal or attached with metal collar frames at each end to prevent air leakage.

MECHANICAL SYMBOLS LIST

(THIS IS A LIST OF STANDARD SYMBOLS, ALL SYMBOLS MAY NOT APPEAR ON THIS PROJECT)

- 26x12 — RECTANGULAR DUCT (INCHES) – FIRST DIMENSION VISIBLE SIDE
- 10# — NEW ROUND DUCT (INCHES)
- 26x12 — EXISTING RECTANGULAR DUCT (INCHES) – FIRST DIMENSION VISIBLE SIDE
- 26x12 — DUCT TO BE REMOVED (INCHES) – FIRST DIMENSION VISIBLE SIDE
- 26x12 — DUCT WITH INTERNAL INSULATION OR ACOUSTICAL LINING. DUCT SIZE IS SHEETMETAL SIZE REQUIRED.
- 26x12 — DUCT WITH OUTER TREATMENT (OTHER THAN INSULATION)
- SUPPLY AIR DUCT TURNING DOWN
- SUPPLY AIR DUCT TURNING UP
- RETURN AIR DUCT TURNING DOWN
- RETURN AIR DUCT TURNING UP
- R — DUCT RISING UP
- D — DUCT DROPPING DOWN
- 26x12 / 12x12 — ECCENTRIC TRANSITION
- 26x12 / 12x12 — CONCENTRIC TRANSITION
- FDT — TRANSITION (FOT = FLAT ON TOP; FOB = FLAT ON BOTTOM)
- VD — FLEX DUCT (SINGLE LINE) AND SPIN-IN CONNECTION WITH VOLUME DAMPER
- VD — FLEX DUCT (DOUBLE LINE) AND SPIN-IN CONNECTION WITH VOLUME DAMPER
- FLEXIBLE CONNECTION
- MITERED ELBOW WITH TURNING VANES
- RADIUS ELBOW
- FD — FIRE DAMPER
- MOD — MOTORIZED DAMPER
- SFD — COMBINATION MOTORIZED SMOKE/FIRE DAMPER
- VD — VOLUME DAMPER
- SCREENED OPENING
- AIR FLOW (OUT OF DEVICE/OPENING)
- AIR FLOW (INTO DEVICE/OPENING)
- 4-WAY BLOW LOUVERED FACE CEILING DIFFUSER WITH ROUND NECK
- 4-WAY BLOW PERFORATED FACE DIFFUSER
- T — THERMOSTAT

- UC — DOOR UNDER CUT (SEE ARCH.)
- DL — DOOR LOUVER (SEE ARCH.)
- DIRECTION OF FLOW
- 2 — PITCH IN DIRECTION SHOWN
- PIPE TURNING DOWN
- PIPE TURNING UP
- TOP TAKE OFF
- BOTTOM TAKE OFF
- GATE VALVE
- BALL VALVE
- GLOBE VALVE
- CHECK VALVE
- DEZURIK SHUT-OFF AND BALANCING VALVE
- UNION
- FLEXIBLE COUPLING
- STRAINER
- TWO WAY CONTROL VALVE
- BUTTERFLY VALVE
- THREE WAY CONTROL VALVE
- FS — FLOW SWITCH
- PRESSURE GAUGE
- D — CONDENSATE DRAIN
- G — GAS
- R — REFRIGERANT PIPING
- ⅝"X1-⅛"X⅞" — VRF HEAT RECOVERY REFRIGERANT PIPE SIZES (LIQUID,GAS, DISCHARGE)
- ⅛"X ½" — VRF NON-HEAT RECOVERY REFRIGERANT PIPE SIZES (LIQUID, GAS)
- F — FIRE SPRINKLER PIPING
- NEW TO EXISTING
- LIMIT OF DEMOLITION
- 1 — SHEET NOTE TAG
- F-# — EQUIPMENT DESIGNATIONS
  - F FAN
  - P PUMP
  - H HEATER
  - AHU AIR HANDLING UNIT
  - CU CONDENSING UNIT
  - RTU ROOF TOP UNIT
  - IU INDOOR UNIT
  - OU OUTDOOR UNIT
- A / M-3 — SECTION MARKER
  - SHEET WHERE SECTION IS SHOWN
- 1 / M-2 — DETAIL MARKER
  - SHEET WHERE DETAIL IS SHOWN
- C / 55 — DESIGNATION
  - SUPPLY AIR DIFFUSER ID TAG
  - CFM

ABBREVIATIONS

(THIS IS A LIST OF STANDARD ABBREVIATIONS, ALL ABBREVIATIONS MAY NOT APPEAR ON THIS PROJECT)

ABV.	ABOVE	EXH	EXHAUST	S.C.S.	SMOKE CONTROL SYSTEM
A/C	AIR CONDITIONING	EXIST.	EXISTING	S.F.	SQUARE FEET
ADJ	ADJUSTABLE	F.D.	FIRE DAMPER	S.F.D.	COMBINATION SMOKE/FIRE DAMPER
A.F.F.	ABOVE FINISHED FLOOR	FL	FLOOR	SHT	SHEET
ARCH.	ARCHITECTURAL	FLEX	FLEXIBLE	S.L.	ACOUSTICAL SOUND LINING
@	AT	F.P.S.	FIRE PRESSURIZATION SYSTEM	S.O.	SCREENED OPENING
B.D.	BACK DRAFT DAMPER (GRAVITY)	GA.	GAUGE	SPEC.	PROJECT SPECIFICATIONS
		HC	HEATING COIL (DUCT)	S.R.	SUPPLY REGISTER
BLDG.	BUILDING	HP	HORSEPOWER	S.R.O.	SCREENED RETURN OPENING
BLW	BELOW	2-HR	2-HOUR RATED DUCT ENCLOSURE	STAT.	THERMOSTAT
B.S.	BIRD SCREEN	L.D.	LINEAR DIFFUSER	STRUCT.	STRUCTURAL
CAP.	CAPACITY	L.F.	LINEAR FOOT	T.G.	TRANSFER GRILLE
CAV	CONSTANT AIR VOLUME	MAX.	MAXIMUM	TRAN.	TRANSITION
C.D.	CEILING DIFFUSER	MIN	MINIMUM	TYP.	TYPICAL
CFM	CUBIC FEET PER MINUTE	M.O.D.	MOTOR OPERATED DAMPER	U.H.	UNIT HEATER
C.G.	CEILING GRILLE	N.C.	NORMALLY IN CLOSED POSITION	U.T.R.	UP THRU ROOF
CLG.	CEILING	NK	NECK	VAV	VARIABLE AIR VOLUME
CONN.	CONNECTION	N.O.	NORMALLY IN OPEN POSITION	V.D.	MANUAL VOLUME DAMPER
CONT.	CONTINUATION	O.A.	OUTSIDE AIR	VERT.	VERTICAL
C.R.	CEILING REGISTER	O.A.I.L.	OUTSIDE AIR INTAKE LOUVER	W/	WITH
DN.	DOWN	R.A.	RETURN AIR	W/O	WITHOUT
D.	CONDENSATE DRAIN	R.G.	RETURN GRILLE		
DTL.	DETAIL	RM.	ROOM		
DWG. NO.	DRAWING NUMBER	R.R.	RETURN REGISTER		
EA.	EACH	S.A.	SUPPLY AIR		
E.A.	EXHAUST AIR				
E.G.	EXHAUST GRILLE				
E.R.	EXHAUST REGISTER				
E.S.P.	EXTERNAL STATIC PRESSURE				

NORTH (building)

Shepherdstown Opera House RENOVATIONS

131 W. German St. Shepherdstown West Virginia

Owner

131 West German Street, LLC

Mech/Elect Engineer

FHC Engineering, PC
4 Weems Lane #277
Winchester, VA 22601
540 247-2939

Structural Engineer

Ruckman Engineering, PLC
22-B Ricketts Drive
Winchester, VA 22601

GDA Architecture Planning Interiors Landscape
Grove & Dall'Olio Architects pllc AIA, LEED AP
Matthew W. Grove matthew@GDAaia.com • GDAaia.com
325 Migration Lane Gerrardstown, WV 25420 304-267-2120
18 West Boscawen Street Winchester, VA 22601 540-773-2328

Issue/Revision	Seal
REVISION #1 10.23.20	
FOR CONSTRUCTION 10.23.20	
REDESIGN REVISIONS 02.23.21	
FOR CONSTRUCTION 10.23.20	

ALAN W. JOHNSTON REGISTERED 11939 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER 06/04/2020

Drawing Title

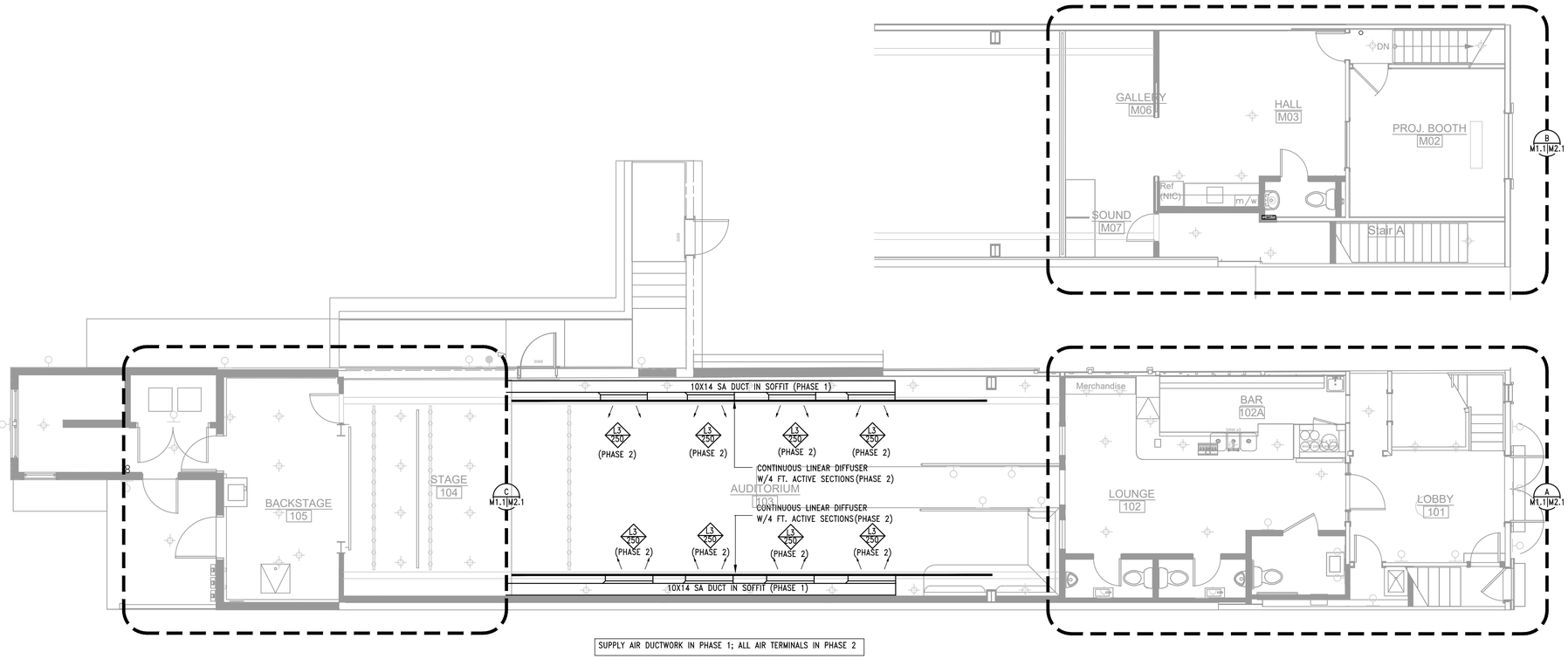
GENERAL NOTES & SYMBOLS

Date OCTOBER 23, 2020

Scale As Noted Project Number 19820

Drawing Number

M0.1



SUPPLY AIR DUCTWORK IN PHASE 1; ALL AIR TERMINALS IN PHASE 2

MAIN LEVEL AND MEZZANINE FLOOR PLANS

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

NORTH (building)

Shepherdstown Opera House

RENOVATIONS

131 W. German St.
Shepherdstown
West Virginia

Owner

131 West German Street, LLC

Mech/Elect Engineer

FHC Engineering, PC
4 Weems Lane #277
Winchester, VA 22601
540 247-2939

Structural Engineer

Ruckman Engineering, PLC
22-B Ricketts Drive
Winchester, VA 22601

GDA Architecture Planning Interiors Landscape
Grove & Dall'Olio Architects pllc AIA, LEED AP
Matthew W. Grove matthew@GDAaia.com • GDAaia.com
325 Migration Lane, Gerrardstown, WV 25420, 304-267-2120
18 West Boscawen Street, Winchester, VA 22601, 540-773-2328

Issue/Revision	Seal
REVISION #1 10.23.20	
FOR CONSTRUCTION 10.23.20	
REDESIGN REVISIONS 02.23.21	
FOR CONSTRUCTION 10.23.20	

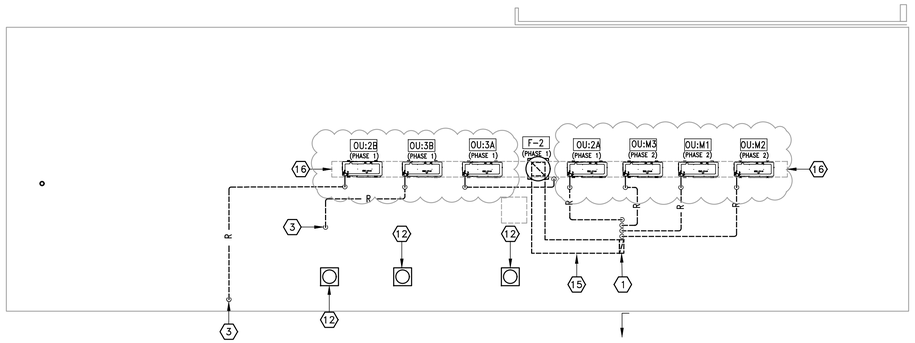
ALAN W. JOHNSTON REGISTERED 11939 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

Drawing Title

MAIN LEVEL AND MEZZANINE FLOOR PLANS

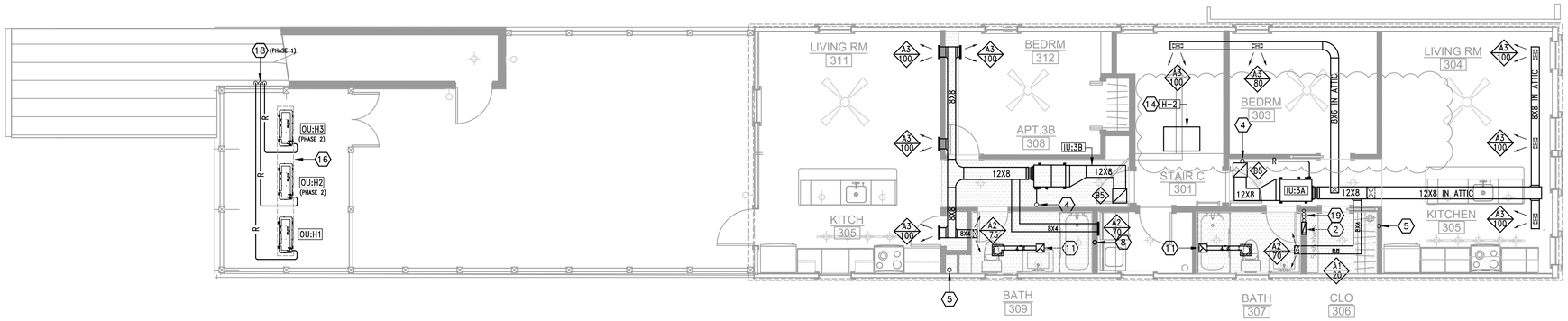
Date OCTOBER 23, 2020
Scale As Noted Project Number 19820
Drawing Number

M1.1



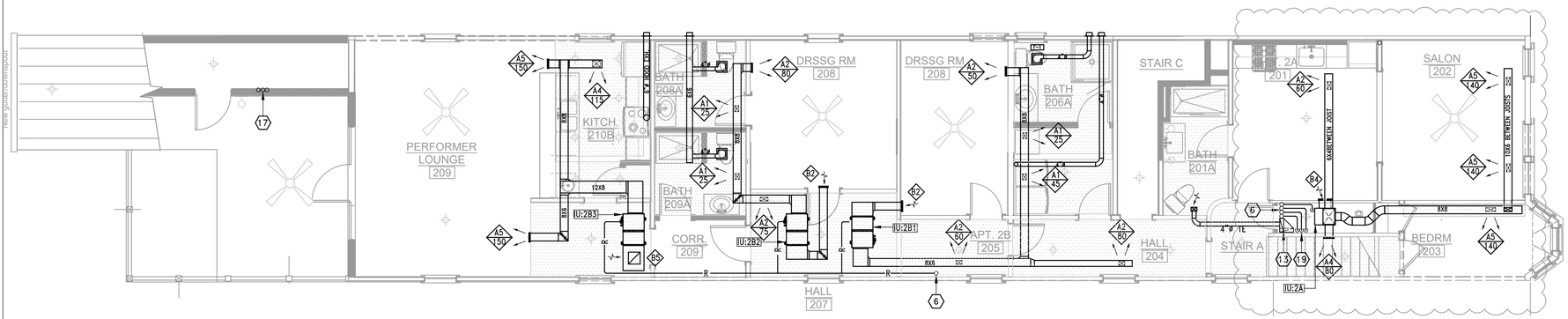
ROOF PLAN

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



THIRD FLOOR PLAN

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



SECOND FLOOR PLAN

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

KEYED SHEET NOTES

1. 12"X4" TOILET EXHAUST DUCT DOWN.
2. 12"X4" UP TO ATTIC AND DOWN TO 2ND FLOOR.
3. REFRIGERANT LINES DOWN THROUGH ATTIC FLOOR
4. REFRIGERANT LINES UP TO ATTIC SPACE
5. REFRIGERANT LINES UP TO TO ATTIC AND DOWN TO 2ND FLOOR
6. REFRIGERANT LINES UP TO 3RD FLOOR
7. REFRIGERANT LINES IN ATTIC (TYPICAL)
8. 4" DRYER VENT UP THROUGH ROOF TO ROOF CAP.
9. NOT USED.
10. NOT USED
11. 8"X8" TOILET EXHAUST DUCT UP TO ROOF CAP.
12. EXHAUST ROOF CAP – PENN VENTILATOR MODEL WCC06 MOUNTED ON COMPATIBLE 12" HIGH ROOF CURB (TYPICAL OF 3).
13. 14"x4" TOILET EXHAUST DUCT UP AND DOWN.
14. LOCATED IN ATTIC
15. 12"X4" TOILET EXHAUST DUCT IN ATTIC
16. MOUNT CONDENSING UNITS ON FIELD FABRICATED RACK (FABRICATED FROM STEEL ANGLES OR TREATED WOOD – CONTRACTOR TO SUBMIT RACK DETAILS AS A SUBMITTAL FOR REVIEW BY AE TEAM.
17. THREE SETS OF REFRIGERANT LINES UP AND DOWN – REFER TO M3.1 FOR SIZING.
18. THREES SETS OF REFRIGERANT LINES DOWN – REFER TO M3.1 FOR SIZING.
19. REFRIGERANT PIPE RISERS DOWN – FOR IU:M1/OU:M1 & IU:M2/OU:M2 IN PHASE 1.

PHASING NOTES

1. OU:M1 IN PHASE 2; REFRIGERANT PIPE RISER IN PHASE 1.
2. OU:M2 IN PHASE 2; REFRIGERANT PIPE RISER IN PHASE 1.
3. OU:H2 IN PHASE 2; REFRIGERANT PIPE RISER IN PHASE 1.
4. OU:H3 IN PHASE 2; REFRIGERANT PIPE RISER IN PHASE 1.

NORTH (building)

Shepherdstown Opera House RENOVATIONS

131 W. German St.
Shepherdstown
West Virginia

Owner

131 West German Street, LLC

Mech/Elect Engineer

FHC Engineering, PC
4 Weems Lane #277
Winchester, VA 22601
540 247–2939

Structural Engineer

Ruckman Engineering, PLC
22–B Ricketts Drive
Winchester, VA 22601

GDA Architecture Planning Interiors Landscape
Grove & Dall'Olio Architects pllc AIA, LEED AP
Matthew W. Grove matthew@GDAaia.com • GDAaia.com
325 Migration Lane, Gerrardstown, WV 25420, 304-267-2120
18 West Boscawen Street, Winchester, VA 22601, 540-773-2328

Issue/Revision	Seal
REVISION #1 10.23.20	
FOR CONSTRUCTION 10.23.20	
REDESIGN REVISIONS 02.23.21	
FOR CONSTRUCTION 10.23.20	

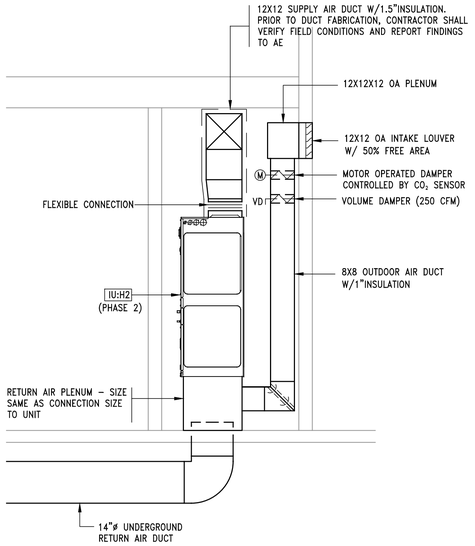
ALAN N. JOHNSTON REGISTERED 11939 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER 10/23/20

Drawing Title

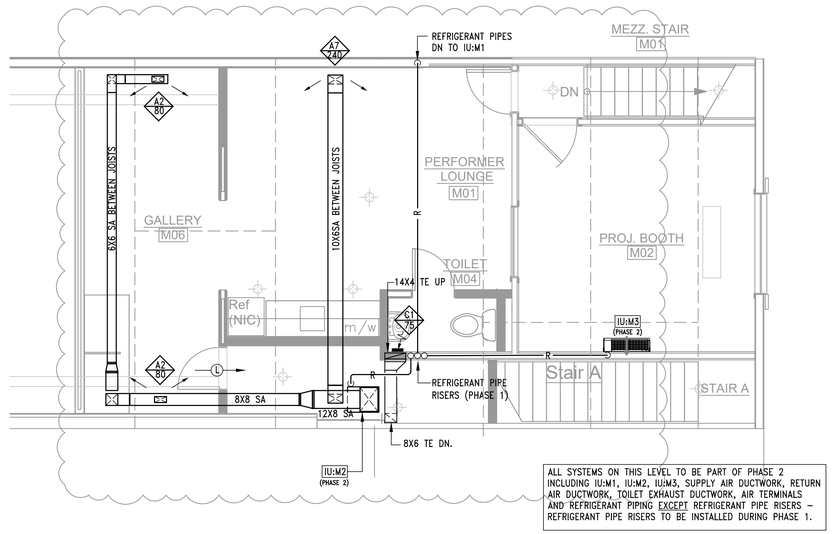
2ND & 3RD FLOOR PLANS

Date OCTOBER 23, 2020
Scale As Noted Project Number 19820
Drawing Number

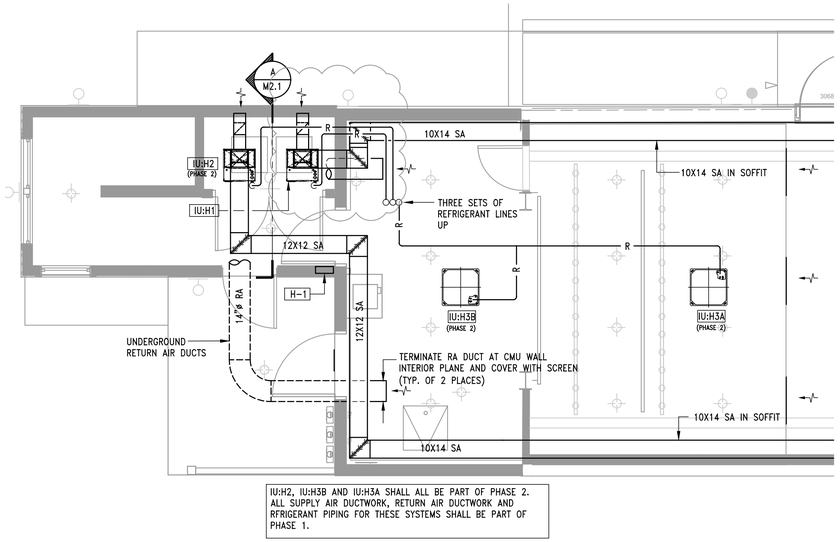
M1.2



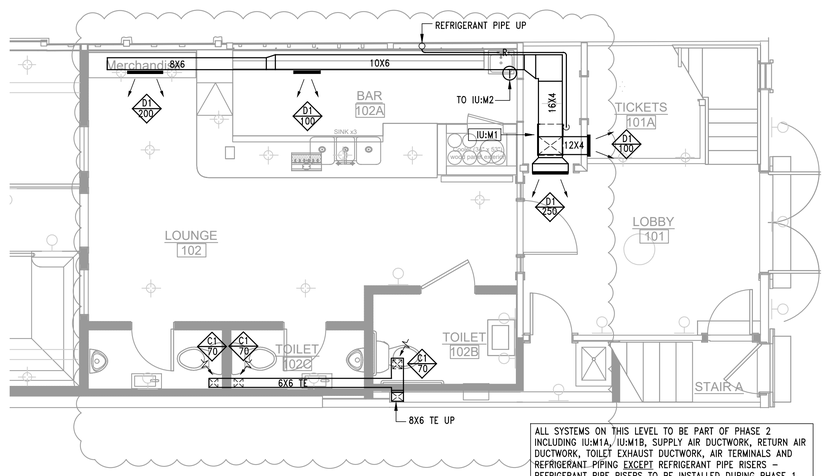
A M2.1|M2.1 **SECTION**
SCALE: 1/2"=1'-0"



B M1.1|M2.1 **MEZZANINE PLAN**
SCALE: 1/4" = 1'-0"



C M1.1|M2.1 **PARTIAL 1ST FLOOR PLAN**
SCALE: 1/4" = 1'-0"



A M1.1|M2.1 **PARTIAL 1ST FLOOR PLAN**
SCALE: 1/4" = 1'-0"

NORTH (building)

Shepherdstown Opera House

RENOVATIONS

131 W. German St.
Shepherdstown
West Virginia

Owner

131 West German Street, LLC

Mech/Elect Engineer

FHC Engineering, PC
4 Weems Lane #277
Winchester, VA 22601
540 247-2939

Structural Engineer

Ruckman Engineering, PLC
22-B Ricketts Drive
Winchester, VA 22601

GDA Architecture Planning Interiors Landscape
Grove & Dall'Olio Architects pllc AIA, LEED AP
Matthew W. Grove matthew@GDAaia.com • GDAaia.com
325 Migration Lane, Gerrardstown, WV 25420, 304-267-2120
18 West Boscawen Street, Winchester, VA 22601, 540-773-2328

Issue/Revision	Seal
REVISION #1 10.23.20	
FOR CONSTRUCTION 10.23.20	
REDESIGN REVISIONS 02.23.21	
FOR CONSTRUCTION 10.23.20	

ALAN W. JOHNSTON REGISTERED 11939 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER 06/04/2020

Drawing Title

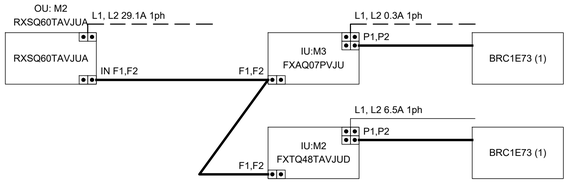
ENLARGED PARTIAL PLANS

Date OCTOBER 23, 2020
Scale As Noted Project Number 19820
Drawing Number

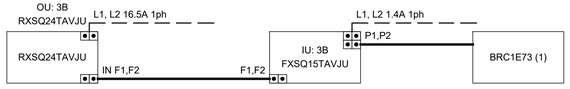
M2.1

FIRST FLOOR & MEZZANINE (PHASE 2)

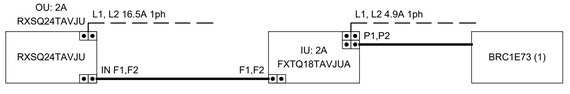
APARTMENT 3A



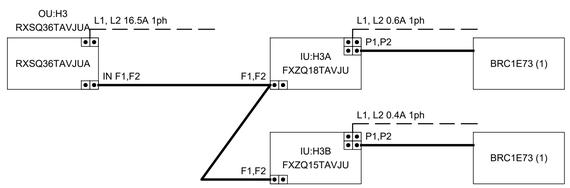
FIRST FLOOR & MEZZANINE (PHASE 2)



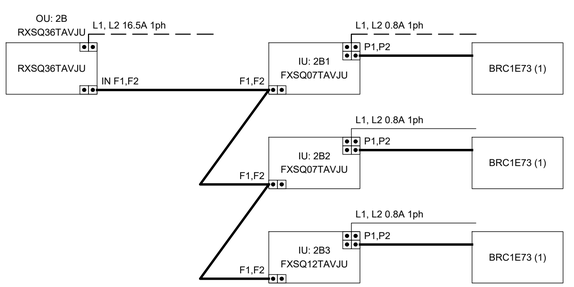
APARTMENT 3B



APARTMENT 2A



STAGE / BACKSTAGE SYSTEM (PHASE 2)



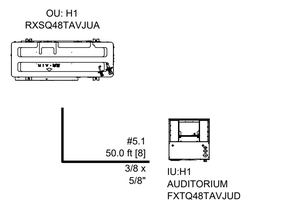
APARTMENT 2B

AUDITORIUM SYSTEM #1

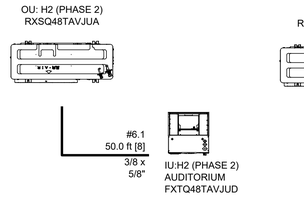
AUDITORIUM SYSTEM #2 (PHASE 2)

VRV WIRING DIAGRAMS

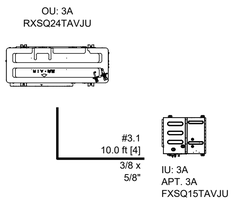
SCALE: NONE



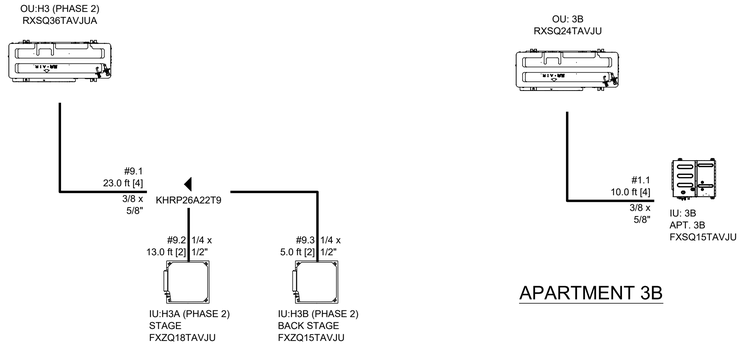
AUDITORIUM SYSTEM #1



AUDITORIUM SYSTEM #2

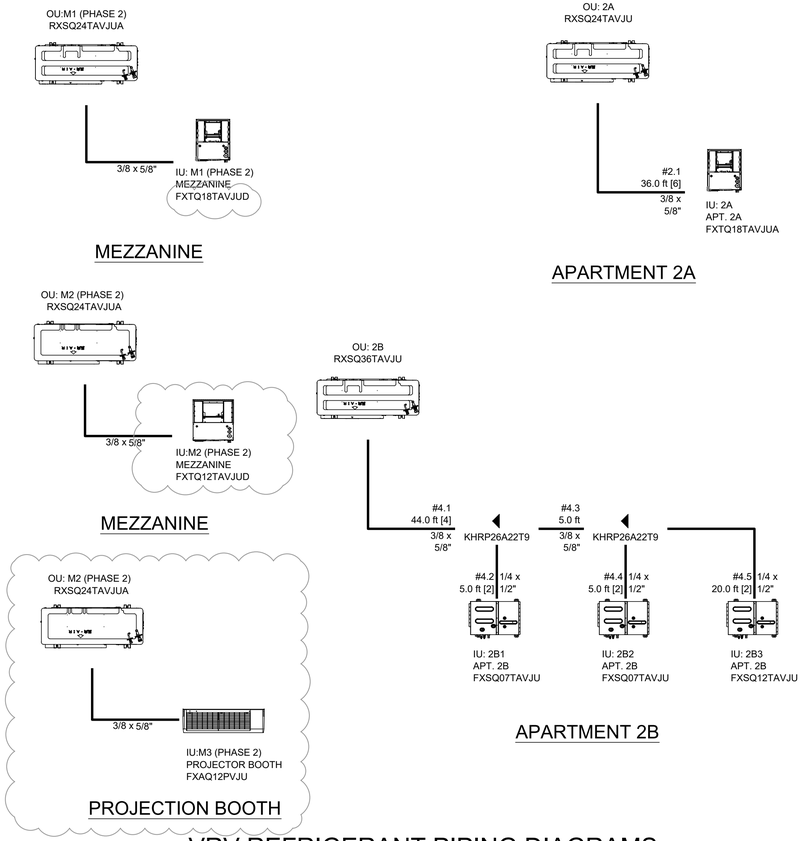


APARTMENT 3A



STAGE/BACK STAGE

APARTMENT 3B



VRV REFRIGERANT PIPING DIAGRAMS

SCALE: NONE

NORTH (building)

Shepherdstown Opera House

RENOVATIONS

131 W. German St.
Shepherdstown
West Virginia

Owner

131 West German Street, LLC

Mech/Elect Engineer

FHC Engineering, PC
4 Weems Lane #277
Winchester, VA 22601
540 247-2939

Structural Engineer

Ruckman Engineering, PLC
22-B Ricketts Drive
Winchester, VA 22601

GDA Architecture Planning Interiors Landscape
Grove & Dall'Olio Architects plic AIA, LEED AP
Matthew W. Grove matthew@GDAaia.com • GDAaia.com
325 Migration Lane, Gerrardstown, WV 25420, 304-267-2120
18 West Boscawen Street, Winchester, VA 22601, 540-773-2328

Issue/Revision	Seal
REVISION #1 10.23.20	
FOR CONSTRUCTION 10.23.20	
REDESIGN REVISIONS 02.23.21	
FOR CONSTRUCTION 10.23.20	

ALAN W. JOHNSTON REGISTERED 11939 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

Drawing Title

VRV PIPE & WIRING DIAGRAMS

Date OCTOBER 23, 2020
Scale As Noted Project Number 19820
Drawing Number

M3.1

VARIABLE REFRIGERANT VOLUME - AIR-COOLED CONDENSING UNIT SCHEDULE

TAG: ROOM	BASIS OF DESIGN (DAIKIN)	NOMINAL TONNAGE	DESCRIPTION	COOLING CAPACITY		HEATING CAPACITY		REFRIGERANT CHARGE		CONNECTION RATIO (%)	ELECTRICAL				DIMENSIONS	WEIGHT (lbs)	EFFICIENCY (NonDucted/Ducted)				
				BTU/h	AMBIENT DESIGN (°F DB)	BTU/h	AMBIENT DESIGN (°F DB / WB)	Factory Charge (lbs)	Add'l Refrigerant (lbs)		VOLTAGE-PHASE	MIN CIRCUIT AMPS (MCA)	MAX OVERCURRENT PROTECTION (MOP)	RUNNING CURRENT(RLA)	(WxHxD) (inch)		EER	IEER	COP 47	COP17	SCHE
OU: 3B	RXSQ24TAVJU	2	Air cooled heat pump (1)	20,745	95.0	25,527	6.0 / 5.5	6.4	0.4	62.5	208-230V 1ph	16.5	25.0	15.3	37.0 x 39.0 x 12.6	172.0	14.3/11	18/15.7	n/a/3.69	n/a/2.54	n/a/n/a
OU: 2A	RXSQ24TAVJU	2	Air cooled heat pump (1)	20,578	95.0	25,389	6.0 / 5.5	6.4	1.4	75.0	208-230V 1ph	16.5	25.0	15.3	37.0 x 39.0 x 12.6	172.0	14.3/11	18/15.7	n/a/3.69	n/a/2.54	n/a/n/a
OU: 3A	RXSQ24TAVJU	2	Air cooled heat pump (1)	20,745	95.0	25,514	6.0 / 5.5	6.4	0.4	62.5	208-230V 1ph	16.5	25.0	15.3	37.0 x 39.0 x 12.6	172.0	14.3/11	18/15.7	n/a/3.69	n/a/2.54	n/a/n/a
OU: 2B	RXSQ36TAVJU	3	Air cooled heat pump (1)	33,935	95.0	30,412	6.0 / 5.5	6.4	2.4	75.0	208-230V 1ph	16.5	25.0	15.3	37.0 x 39.0 x 12.6	172.0	12/10	18/16	n/a/3.75	n/a/2.7	n/a/n/a
OU: H1	RXSQ48TAVJUA	4	Air cooled heat pump (1)	41,846	95.0	37,845	6.0 / 5.5	7.5	2.0	100.0	208-230V 1ph	29.1	35.0	19.0	37.0 x 39.0 x 12.6	176.4	10.3/9.4	18/16	n/a/3.8	n/a/2.82	n/a/n/a
OU: H2	RXSQ48TAVJUA	4	Air cooled heat pump (1)	41,846	95.0	37,845	6.0 / 5.5	7.5	2.0	100.0	208-230V 1ph	29.1	35.0	19.0	37.0 x 39.0 x 12.6	176.4	10.3/9.4	18/16	n/a/3.8	n/a/2.82	n/a/n/a
OU:M1	RXSQ24TAVJUA	2	Air cooled heat pump (1)	20,710	95.0	24,707	6.0 / 5.5	6.4	1.4	75	208-230V 1ph	16.5	25.0	15.3	37.0 x 39.0 x 12.6	172.0	14.3/11	18/15.7	n/a/3.69	n/a/2.54	n/a/n/a
OU: M2	RXSQ24TAVJUA	2	Air cooled heat pump (1)	20,710	95.0	24,707	6.0 / 5.5	6.4	1.4	50	208-230V 1ph	16.5	25.0	15.3	35.4 x 53.0 x 12.6	172	14.3/11	18/15.7	n/a/3.69	n/a/2.54	n/a/n/a
OU: M3	RXSQ24TAVJUA	2	Air cooled heat pump (1)	20,170	95	24,707	6.0/5.5	6.4	1.4	50	208-230V 1ph	16.5	25.0	15.3	35.4 x 53.0 x 12.7	173	14.3/12	18/15.8	n/a/3.70	n/a/2.55	n/a/n/a
OU:H3	RXSQ36TAVJUA	3	Air cooled heat pump (1)	30,023	95.0	30,729	6.0 / 5.5	6.4	1.2	91.7	208-230V 1ph	16.5	25.0	15.3	37.0 x 39.0 x 12.6	172.0	12/10	18/16	n/a/3.75	n/a/2.7	n/a/n/a

Schedule Notes:

Manufacturer must be certified, listed, and labeled per AHRI 1230.
System rating data based on design ambient conditions for cooling and for heating.
Manufacturer must provide 10 years parts warranty on all FCUs and Condensing Units. Warranty conditions must be clarified during submittal phase.
Submitted performance data must be fully de-rated for all components and accessories, including but not limited to, line length, vertical separation, connection ratio, design conditions, condenser coil coating.
Condensing units must have fully modulating INVERTER compressors.
Condensing units must have auto changeover functions
Demand limiting relay contact must be provided.
EEV actuators must be removable from valve body without disturbing the refrigerant system.
FCU thermostats must provide +/- 1 degree dead-band set-point and control capability.
Manufacturers submittal must include refrigerant piping diagram with pipe diameters, lengths, and refrigerant volume.
Substitute manufacturer shall be responsible for additional piping and refrigerant.
Contractor to verify piping dimensions.
Installing contractor must have successfully completed manufacturers certified installation class within past 36 months.
Contractor to furnish and install insulation on refrigerant piping.
Manufacturers Representative must have local stock of parts and factory certified technician on staff.
Manufacturers Representative shall provide proof of ongoing installation training at their local facility for at least the past 5 years.

VARIABLE REFRIGERANT VOLUME - INDOOR UNIT SCHEDULE

TAG	ROOM	BASIS OF DESIGN (DAIKIN)	NOMINAL TONNAGE	TYPE	CONNECTED TO:		SUPPLY FAN	COOLING CAPACITY			HEATING CAPACITY		ELECTRICAL			DIMENSIONS	WEIGHT	Options and Accessories
					CONDENSING UNIT	ZONE CHANGEOVER DEVICE	AIR FLOW RATE cfm	TOTAL BTU/h	SENSIBLE BTU/h	ENTERING AIR °F DB / °F WB	TOTAL BTU/h	ENTERING AIR °Fdb	POWER SUPPLY	Min Circuit Amps	Max Overcurrent Protection	WxHxD	Net	
													Voltage - Phase	MCA	MOP	inch	lbs	
IU: 3B	APT. 3B	FXSQ15TAVJU	1.3	MSP Concealed Ducted Unit	OU: 3B	No	530	12,779	10,228	75.0 62.4	17,067	70.0	208-230V 1ph	1.4	15.0	27.6 x 9.7 x 31.5	60.0	BRC1E73 (1)
IU: 2A	APT. 2A	FXTQ18TAVJUA	1.5	Multi Position Air Handler	OU: 2A	No	600	14,960	11,206	75.0 62.2	19,999	70.0	208-230V 1ph	4.9	15.0	17.5 x 45.0 x 21.0	115.0	BRC1E73 (1)
IU: 3A	APT. 3A	FXSQ15TAVJU	1.3	MSP Concealed Ducted Unit	OU: 3A	No	530	12,779	10,228	75.0 62.4	17,060	70.0	208-230V 1ph	1.4	15.0	27.6 x 9.7 x 31.5	60.0	BRC1E73 (1)
IU: 2B1	APT. 2B	FXSQ07TAVJU	0.6	MSP Concealed Ducted Unit	OU: 2B	No	281	7,179	5,484	78.8 65.5	8,530	70.0	208-230V 1ph	0.8	15.0	21.7 x 9.7 x 31.5	55.0	BRC1E73 (1)
IU: 2B2	APT. 2B	FXSQ07TAVJU	0.6	MSP Concealed Ducted Unit	OU: 2B	No	281	7,179	5,484	78.8 65.5	8,530	70.0	208-230V 1ph	0.8	15.0	21.7 x 9.7 x 31.5	55.0	BRC1E73 (1)
IU: 2B3	APT. 2B	FXSQ12TAVJU	1.0	MSP Concealed Ducted Unit	OU: 2B	No	335	11,458	9,237	78.8 65.5	13,648	70.0	208-230V 1ph	0.8	15.0	21.7 x 9.7 x 31.5	55.0	BRC1E73 (1)
IU:H1	AUDITORIUM	FXTQ48TAVJUD	4.0	Multi Position Air Handler (Factory Disconnect)	OU: H1	No	1,520	40,448	29,054	75.0 62.5	53,998	70.0	208-230V 1ph	6.5	15.0	21.0 x 53.4 x 21.0	149.9	BRC1E73 (1)
IU:H2	AUDITORIUM	FXTQ48TAVJUD	4.0	Multi Position Air Handler (Factory Disconnect)	OU: H2	No	1,520	40,448	29,054	75.0 62.5	53,998	70.0	208-230V 1ph	6.5	15.0	21.0 x 53.4 x 21.0	149.9	BRC1E73 (1)
IU: M1	MEZZANINE	FXTQ18TAVJUD	1.5	Multi Position Air Handler (Factory Disconnect)	OU:M1	No	600	15,086	8,700	75.0 62.4	19,000	70.0	208-230V 1ph	4.9	15.0	17.5 x 45.0 x 21.0	115.0	BRC1E73 (1)
IU:M3	PROJECTOR BOOTH	FXAQ12PVJU	1	Wall Mounted Unit	OU: M3	No	290	8,000	6,000	75.0 62.4	8,500	70.0	208-230V 1ph	0.4	15.0	31.3 x 11.4 x 9.3	26.5	BRC1E73 (1)
IU:M2	MEZZANINE	FXTQ12TAVJUA	1	Multi Position Air Handler (Factory Disconnect)	OU: M2	No	400	10,060	8,732	75.0 62.4	13,400	70.0	208-230V 1ph	6.5	15.0	21.0 x 53.4 x 21.0	149.9	BRC1E73 (1)
IU:H3A	STAGE	FXZQ18TAVJU	1.5	4-Way Discharge Ceiling Cassette (2' x 2')	OU:H3	No	511	15,127	11,496	75.0 62.4	20,121	70.0	208-230V 1ph	0.6	15.0	22.6 x 10.2 x 22.6	41.9	BRC1E73 (1), BYFQ60C3V
IU:H3B	BACK STAGE	FXZQ15TAVJU	1.3	4-Way Discharge Ceiling Cassette (2' x 2')	OU:H3	No	405	12,738	9,565	75.0 62.4	17,057	70.0	208-230V 1ph	0.4	15.0	22.6 x 10.2 x 22.6	36.4	BRC1E73 (1), BYFQ60C3V

Schedule Notes:

1. Standard Limited Warranty: 10-year warranty on compressor and all parts
2. **Provide IU:H1 AND IU:H2 with Global Plasma Solutions Bipolar Ionization System Model GPS-FC24-AC**
3. **Provide IU:H1 and IU:H2 with Merv 13 Hepa filters.**

COMMERCIAL RETURN /EXHAUST GRILLE SCHEDULE

DESIG.	TYPE	CFM RANGE	NECK SIZE	MAX P.D. (IN. W.C.)	MAX. VEL. (FPM)	MAX NC	DEF./BLOW	BASIS OF DESIGN (TITUS)
C1	EXHAUST	0 - 133	6"X6"	<0.10	600	<30	3/4"BLADE SPACING, 35° DEFLECTION	350RL
C2	EXHAUST	134 - 222	8"X8"	<0.10	600	<30	3/4"BLADE SPACING, 35° DEFLECTION	350RL
C3	EXHAUST	223 - 355	10"X10"	<0.10	600	<30	3/4"BLADE SPACING, 35° DEFLECTION	350RL
C4	EXHAUST	356 - 528	12"X12"	<0.10	600	<30	3/4"BLADE SPACING, 35° DEFLECTION	350RL

LINEAR BAR GRILLE SCHEDULE

DESIG.	TYPE	CFM RANGE	DEPTH	MAX P.D. (IN. W.C.)	MAX. VEL. (FPM)	MAX NC	DEF./BLOW	BASIS OF DESIGN (TITUS)
D1	SUPPLY	1 - 175 CFM/LF	4"	<0.10	600	<30	1/8" BAR THICKNESS, 1/4" SPACING, 0° DEFLECTION	CT-480

ELECTRIC HEATER SCHEDULE

DESIG.	DESCRIPTION	AREA SERVED	CFM	CAPACITY		TEMP. RISE	ELECTRICAL DATA			BASIS OF DESIGN (QMARK)	NOTES
				KW	MBH	(°F)	AMP	VOLT	PH		
H-1	WALL HEATER	STAIR	200	6.00	20.5	45	13.4	240	1	EFQ6008-EFQSM	INTEGRAL T-STAT
H-2	CABINET HEATER	ATTIC	350	5.00	17.1	45	13.4	240	1	CU935	INTEGRAL T-STAT

FAN SCHEDULE

DESIG. F-	SERVICE	CFM	E.S.P. ("$H_2$0)	RPM	VOLTS	PHASE	HP (FLA)	ACCESSORIES	WEIGHT (LBS.)	BASIS OF DESIGN
1	TOILET EXH.	50	0.125	1700	115	1	55 WATTS	BDD	-	PENN ZEPHR Z1
2	TOILET EXH.	200	0.375	1700	115	1	1/6 hp	ROOF CURB,BDD	-	LOREN COOK 120 ACEB

RESIDENTIAL 2-WAY SUPPLY REGISTER SCHEDULE

DESIG.	TYPE	CFM RANGE	NECK SIZE	MAX P.D. (IN. W.C.)	MAX. VEL. (FPM)	MAX NC	DEF./BLOW	BASIS OF DESIGN (HART & COOLEY)
A1	2-WAY	0 - 55	6"X4"	0.03	700	<30	1/3" SPACED FINS, SET AT 20°	661
A2	2-WAY	56 - 75	8"X4"	0.03	700	<31	1/3" SPACED FINS, SET AT 20°	661
A3	2-WAY	76 - 100	10"X4"	0.03	700	<32	1/3" SPACED FINS, SET AT 20°	661
A4	2-WAY	101 - 125	8"X6"	0.03	700	<33	1/3" SPACED FINS, SET AT 20°	661
A5	2-WAY	126 - 170	10"X6"	0.03	700	<34	1/3" SPACED FINS, SET AT 20°	661
A6	2-WAY	171 - 205	12"X6"	0.03	700	<35	1/3" SPACED FINS, SET AT 20°	661
A7	2-WAY	206 - 240	10"X8"	0.03	700	<36	1/3" SPACED FINS, SET AT 20°	661

RESIDENTIAL FILTER RETURN GRILLE SCHEDULE

DESIG.	TYPE	CFM RANGE	NECK SIZE	MAX P.D. (IN. W.C.)	MAX. VEL. (FPM)	MAX NC	DEF./BLOW	BASIS OF DESIGN (HART & COOLEY)
B1	RETURN	0 -101	6"X6"	<.10	600	<30	1/2" SPACED FINS, SET AT 20°	673
B2	RETURN	102 - 178	8"X8"	<.11	600	<30	1/3" SPACED FINS, SET AT 20°	673
B3	RETURN	178 - 276	10"X10"	<.12	600	<30	1/3" SPACED FINS, SET AT 20°	673
B4	RETURN	277 - 395	12"X12"	<.13	600	<30	1/3" SPACED FINS, SET AT 20°	673
B5	RETURN	395 - 535	14"X14"	<.14	600	<30	1/3" SPACED FINS, SET AT 20°	673

CONTINUOUS LINEAR DIFFUSER SCHEDULE

DESIG.	# OF 3/4" SLOTS	MAX. AIRFLOW (CFM/FT)	MAX P.D. (IN. W.C.)	MAX NC	DUCT SIZE	BORDER TYPE	BASIS OF DESIGN (TITUS)	COMMENTS
L1	1	31	<0.10	30	1- 5/8"	15	ML-38	1. BLANK NON-ACTIVE SECTIONS
L2	2	62	<0.10	30	3-1/8"	15	ML-38	1. BLANK NON-ACTIVE SECTIONS
L3	3	93	<0.10	30	4-5/8"	15	ML-38	1. BLANK NON-ACTIVE SECTIONS
L4	4	124	<0.10	30	6-1/8"	15	ML-38	1. BLANK NON-ACTIVE SECTIONS
L5	5	155	<0.10	30	7-5/8"	15	ML-38	1. BLANK NON-ACTIVE SECTIONS
L6	6	186	<0.10	30	9-1/8"	15	ML-38	1. BLANK NON-ACTIVE SECTIONS

NORTH (building)

Shepherdstown Opera House RENOVATIONS

131 W. German St.
Shepherdstown
West Virginia

Owner

131 West German Street, LLC

Mech/Elect Engineer

FHC Engineering, PC
4 Weems Lane #277
Winchester, VA 22601
540 247–2939

Structural Engineer

Ruckman Engineering, PLC
22–B Ricketts Drive
Winchester, VA 22601

GDA Architecture Planning Interiors Landscape
Grove & Dall'Olio Architects pllc AIA, LEED AP
Matthew W. Grove matthew@GDAaia.com • GDAaia.com
325 Migration Lane, Gerrardstown, WV 25420, 304-267-2120
18 West Boscawen Street, Winchester, VA 22601, 540-773-2328

Issue/Revision	Seal
REVISION #1 10.23.20	
FOR CONSTRUCTION 10.23.20	
REDESIGN REVISIONS 02.23.21	
FOR CONSTRUCTION 10.23.20	

ALAN W. JOHNSON REGISTERED 11939 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER 06/04/2020

Drawing Title

EQUIPMENT SCHEDULES

Date OCTOBER 23, 2020
Scale As Noted Project Number 19820
Drawing Number

M4.1