



DESIGN DAY MECHANICALS INC

THE PROJECT MANAGER FOR THIS PROJECT IS NOTED BELOW: PLEASE REFER ALL QUESTIONS, SUBMITTALS AND CORRESPONDENCE TO THE PROJECT MANAGER.

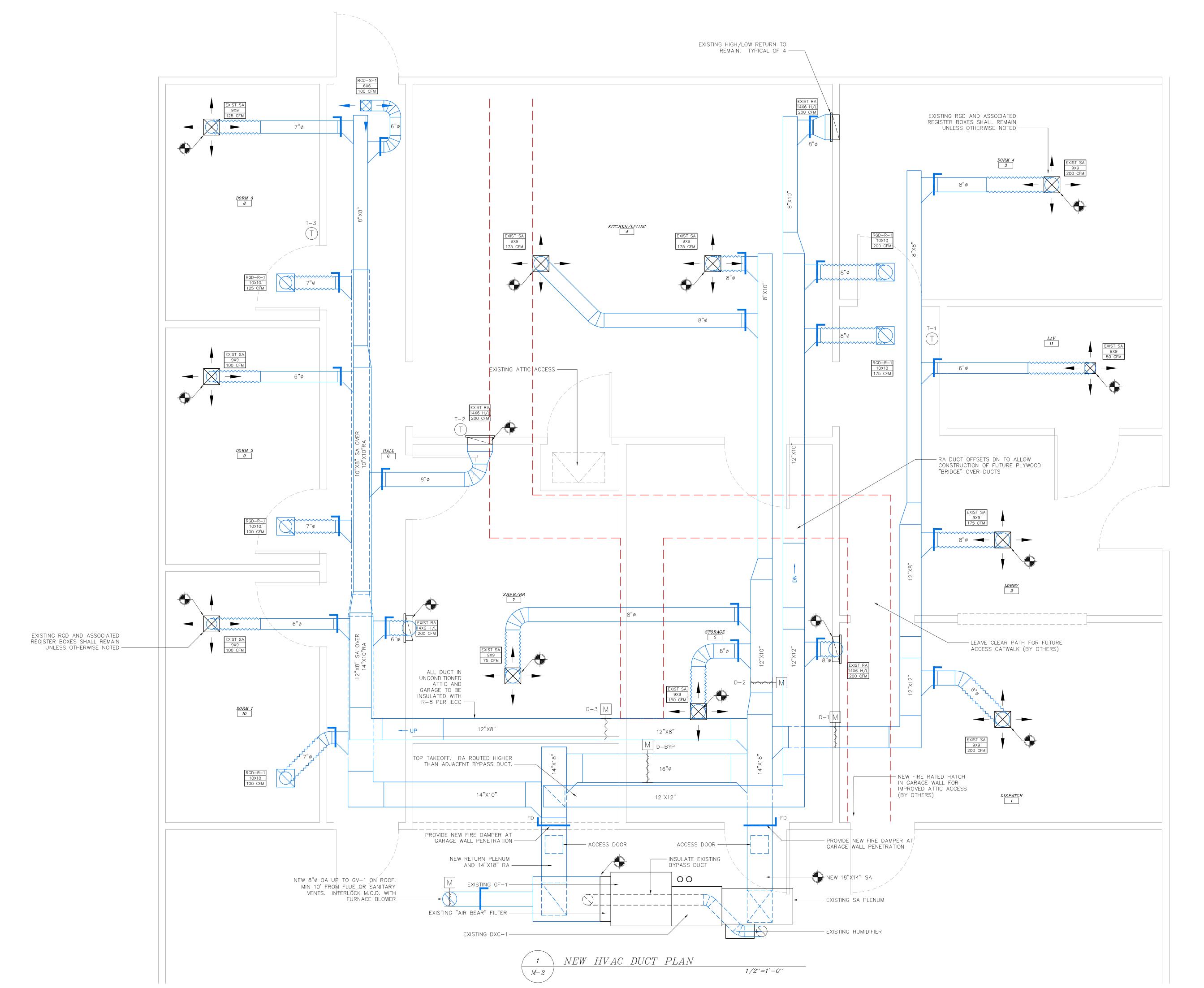
DAVID C. MAGNUSON EMAIL: DAVE@DMDRAFTING.COM PHONE: (603) 463-1086 ADDRESS: 65 OLD CENTER RD, DEERFIELD, NH 03037

DERRY FIRE DEPT. ISLAND POND WARNER HILL RD

> HVAC DUCT DEMOLITION PLAN

> > 17154 AS NOTED

SHEET I OF 4





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HVAC PROJECT MANAGER:

DAVID C. MAGNUSON
EMAIL: DAVE@DMDRAFTING.COM
PHONE: (603) 463-1086
ADDRESS: 65 OLD CENTER RD, DEERFIELD, NH 03037

PROJECT:

DERRY FIRE DEPT.
ISLAND POND
STATION
WARNER HILL RD
DERRY, NH

TOWN OF

DERRY, NH

NEW HVAC

**REVISIONS:** 

DESIGNED BY: DRAWN BY: CHECKED BY:

DDM JOB #: SCALE: 17154 AS NOTED

DCM MRM

DATE: 11/02/2017

SHEET 2 OF 4

GAS FURNAC	CE SCHEDULE (G	F)																	
MARK	MAKE	MODEL	SUPPLY (CFM)	ESP (IN. WC)	MIN OA (CFM)	ORIENTATION	INPUT (MBH)	OUTPUT (MBH)	EFFICIENCY	FUEL	EAT	LAT	ВНР	МНР	VOLT/PH	MCA	МОСР	FILTER	NOTES
GF-1	RUUD	UGTA07E4BGS	1,625	0.50	125	HORIZONTAL	75.0	69.0	92.3	LP	61.4	126.4		3/4	120/1		20	AIR BEAR	1,2
NOTES:																			

1. EXISTING FURNACE TO REMAIN. REPLACE FILTER, CLEAN, INSPECT AND PERFORM ROUTINE MAINTENANCE. CLEAN INSPECT AND PROVIDE NEW FILTER MEDIA FOR APRILAIRE HUMIDIFIER. INSPECT & REPLACE CONDENSATE NEUTRALIZER IF REQ'D

2. PROVIDE NEW OUTSIDE AIR DUCT AND NEW ZONE DAMPER SYSTEM

DX COOLING	COIL SCHEDU	JLE (DXC-1)												
MARK	SERVES	MAKE	MODEL	TONS	SUPPLY (CFM)	SP (IN. WC)	TOTAL (MBH)	SENSIBLE (MBH)	EDB	EWB	LDB	LWB	REFRIG	NOTES
DXC-1	GF-1	RUUD	RCQD4821AS	4.0	1,600	0.32	48.0		76.2	63.2	55.0	55.0	R-410A	1
NOTES:														

1. EXISTING COIL TO REMAIN. CLEAN COIL, CONDENSATE PAN, PUMP, ETC

MARK	MAKE	MODEL	SIZE (IN.) W x H	CFM	VELOCITY (FPM)	APD (IN WC)	PURPOSE	MATERIAL	NOTES
D-1	ZONEX	STCD	12X12	625	625	0.04	ZONE CONTROL	STEEL	1,3
D-2	ZONEX	STCD	12X10	575	480	0.04	ZONE CONTROL	STEEL	1,3
D-3	ZONEX	STCD	12X8	425	285	0.04	ZONE CONTROL	STEEL	1,3
D-BYP	ZONEX	STBP	16 DIA	VARIES		0.04	BYPASS	STEEL	2,3

1. PROVIDE 7-DAY PROGRAMMABLE THERMOSTAT

2. MODULATING DAMPER WITH INTEGRAL PRESSURE SWITCH

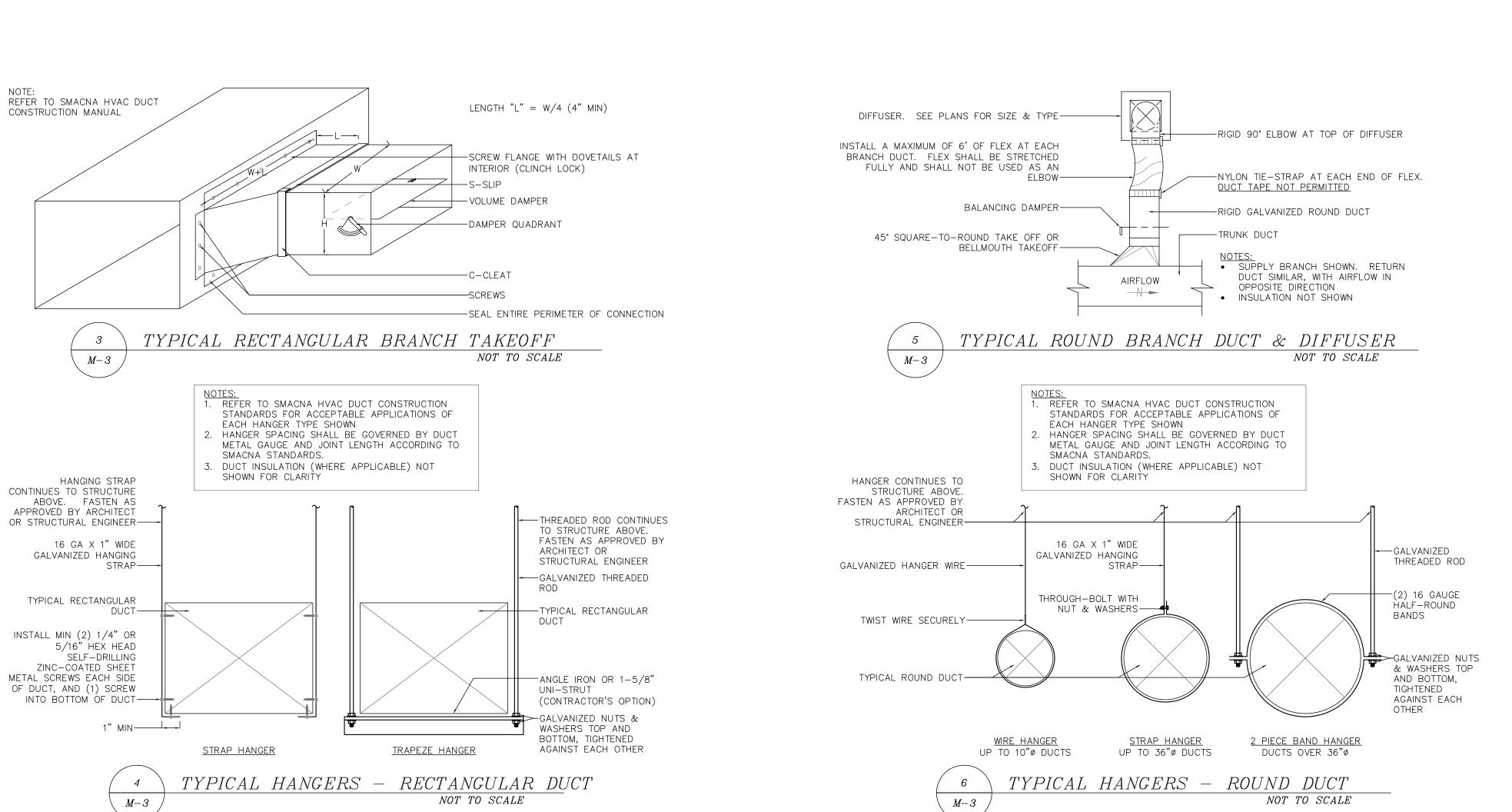
3. PROVIDE ZONEX GEN-II CONTROL PANEL OR EQUIVALENT

REGISTER GRILLE DIFFUSER SCHEDULE (RGD)												
MARK	MAKE	MODEL	DAMPER	PATTERN	NECK SIZE	FRAME STYLE	MATERIAL	DESCRIPTION	NOTES			
RGD-S-1	PRICE	SMD	YES	SEE DWGS	SEE DWGS	AS NEEDED	STEEL	SUPPLY	1			
RGD-R-1	PRICE	530	YES	45° FIXED	SEE DWGS	AS NEEDED	STEEL	RETURN	1			
RGD-E-1	PRICE	530	YES	45° FIXED	SEE DWGS	AS NEEDED	STEEL	EXHAUST	1			
NOTES:												

1. RGD MOUNTED DAMPERS ARE TO BE USED FOR TRIM ONLY. PRIMARY VOLUME DAMPERS ARE TO BE INSTALLED IN THE DUCTS.

(	GRAVITY V	ENTILATOR SCHE	DULE (GV)					
	MARK	MAKE	MODEL	CFM	SP (IN. WC)	THROAT SIZE	PURPOSE	NOTES
	GV-1	GREENHECK	GSRI-8	125	0.03	8	INTAKE	1
N	IOTES:							
1	115V M	OD, 14" ROOF C	URB, INSECT S	CREEN				

DFD-Island F	Pond Station-Derry, NH	Per 2009 IMC Chapter 4 & ASHRAE 62.1-2007														
Ventilation (	Calculations & Airflows															
			IMC Requirements Supply													
		Occupancy	Rp	Pz	Rp*Pz	Ra	Az	Ra*Az	Vbz		Voz	Vpz		Return	Exhaust	
Room #	Room Name	Classification	cfm/p	# Occ	cfm	cfm/sf	Ft2	cfm	cfm	Ez	cfm	cfm	Zp	cfm	cfm	Notes:
1	Lobby / Dispatch	Lobby	5.0	3	15	0.06	298	18	33	0.8	41	375	0.11	375		Zone 1
2	Lavatory	Restroom					57					50			75	Zone 1
3	Dorm 4	Dwelling Unit	5.0	1	5	0.06	150	9	14	0.8	18	200	0.09	200		Zone 1
4	Kitchen/Living	Multipurpose	5.0	4	20	0.06	320	19	39	0.8	49	350	0.14	400		Zone 2
5	Storage	Storage	5.0	1	5	0.06	169	10	15	0.8	19	150	0.13			Zone 2
6	Hall	Corridor				0.06	126	8	8	0.8	9	100	0.09	200		Zone 3
7	Shower Room	Restroom					160					75			150	Zone 2
8	Dorm 3	Dwelling Unit	5.0	1	5	0.06	80	5	10	0.8	12	125	0.10	125		Zone 3
9	Dorm 2	Dwelling Unit	5.0	1	5	0.06	80	5	10	0.8	12	100	0.12	100		Zone 3
10	Dorm 1	Dwelling Unit	5.0	1	5	0.06	84	5	10	0.8	13	100	0.13	100		Zone 3
·		Existing AHU Total		12	60		1,524	64		0.8	136	1,625	0.14	1,500	225	
	Actual Total People At Any		ne Time	5			IMC Requ	uirements			Actual	tual				
						Ev	D	Vou	Vot		Min OA					
						1.0	0.42	111	111		125					





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PROJECT:

DERRY FIRE DEPT.
ISLAND POND
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WARNER HILL RD
DERRY, NH

FOR:

TOWN OF DERRY DERRY, NH

SCHEDULES
DETAILS
AND
VENTILATION CALCS

REVISIONS:

DESIGNED BY: DCM
DRAWN BY: MRM
CHECKED BY: AW

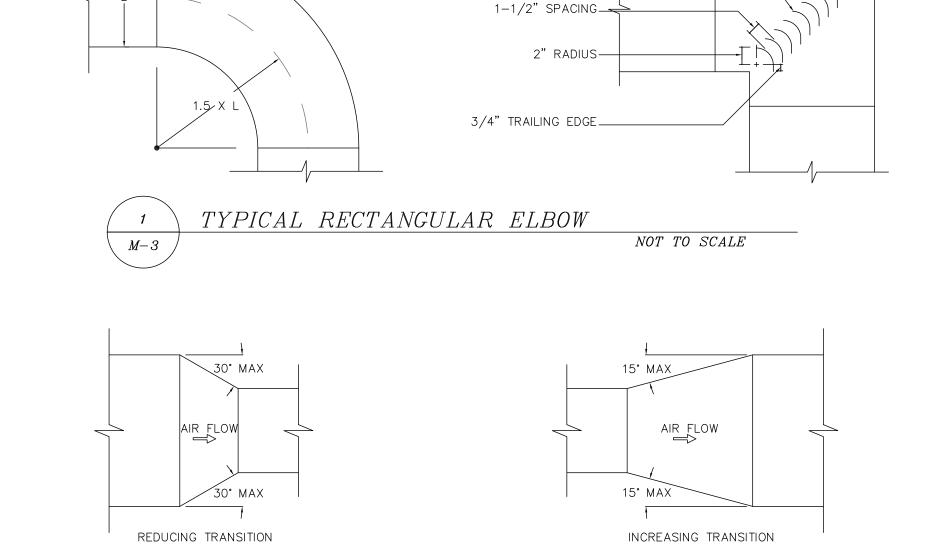
DDM JOB #: 17154

AS NOTED

DATE: II/O2/2017

SCALE:

SHEET 3 OF 4



TYPICAL DUCT TRANSITION

M-3

RADIUS BACK ELBOWS ARE PREFERRED. USE SQUARE ELBOW WITH VANES ONLY WHEN A RADIUS BACK ELBOW WILL

TURNING VANES-

AIR FLOW ⇒

NOT TO SCALE

### SECTION 15500 - HVAC SPECIFICATIONS

### I) <u>GENERAL</u>

### A) WORK INCLUDED:

- 1)THESE SPECIFICATIONS INCLUDE GENERAL REQUIREMENTS FOR ALL WORK REPRESENTED ON THESE DRAWINGS. NOT ALL SYSTEMS OR SYSTEM COMPONENTS DESCRIBED IN THESE SPECIFICATIONS ARE NECESSARILY INCLUDED AS A PART OF THIS PROJECT.
- 2) THE HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) CONTRACTOR SHALL HEREAFTER BE DESCRIBED AS "THE CONTRACTOR" IN THIS HVAC SPECIFICATION. THE CONTRACTOR SHALL PROVIDE, INSTALL, PIPE, DUCT, AND WIRE, AS REQUIRED, HVAC SYSTEMS AS DESCRIBED BELOW, AND SHOWN OR DESCRIBED ON THESE PLANS AND SPECIFICATIONS.

### B) QUALITY ASSURANCE

- 1)THE INTERNATIONAL MECHANICAL CODE (IMC) 2009, AND THE INTERNATIONAL ENERGY CONSERVATION CODE (IEEC) 2009 ARE THE GOVERNING CODES FOR ALL HVAC WORK. THE CODES AND STANDARDS REFERENCED IN THE MECHANICAL CODE SHALL BE CONSIDERED A PART OF THE REQUIREMENTS OF CODE TO THE PRESCRIBED EXTENT OF EACH SUCH REFERENCE. WHERE DIFFERENCES OCCUR BETWEEN PROVISIONS OF THE CODE AND THE REFERENCED STANDARDS, THE PROVISIONS OF THE CODE SHALL APPLY. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BE FAMILIAR WITH THE REQUIREMENTS OF ALL CODES AS THEY HAVE BEEN ADOPTED BY THE STATE AND LOCAL JURISDICTIONS
- 2) EXCEPT AS SPECIFICALLY DESCRIBED OTHERWISE IN THESE SPECIFICATIONS, ALL COMPONENTS ALLOWED WITHIN THE ABOVE REFERENCED CODES SHALL BE ALLOWED AS A PART OF THE WORK.
- 3) THE WORKMANSHIP AND MATERIALS COVERED BY THESE SPECIFICATIONS SHALL CONFORM TO ALL ORDINANCES AND REGULATIONS OF ALL AUTHORITIES HAVING JURISDICTION, INCLUDING BUT NOT LIMITED TO, ALL APPLICABLE REGULATIONS OF THE CITY, COUNTY, AND STATE.
- 4) THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND PAYING FOR HVAC PERMITS, INVESTMENT FEES, TAXES, CONNECTION AND INSPECTION FEES AS REQUIRED FOR THE COMPLETE INSTALLATION OF THE HVAC SYSTEM. THE CONTRACTOR SHALL PROVIDE TO THE OWNER ALL CERTIFICATES OF INSPECTION ISSUED BY THE JURISDICTION.
- 5) THE CONTRACTOR SHALL VISIT THE SITE AND EXAMINE ALL CONDITIONS AFFECTING THE PROPER EXECUTION OF THE CONTRACT, VERIFY ALL EXISTING CONDITIONS IN THE FIELD AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK.
- 6) DURING THE PROGRESS OF THE WORK, THE CONTRACTOR SHALL MAINTAIN AN ACCURATE RECORD OF ALL CHANGES MADE IN THE HVAC INSTALLATION FROM THE LAYOUT AND MATERIALS CONTAINED IN THE APPROVED DRAWINGS AND SPECIFICATIONS.
- 7) DRAWINGS AND CATALOG CUTS, SHOWING ALL HVAC EQUIPMENT AND SYSTEM COMPONENTS, SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. FIELD MEASURE AND COORDINATE WITH ARCHITECTURAL AND STRUCTURAL DRAWINGS AND ALL OTHER TRADES THE PROPOSED LOCATIONS FOR NEW EQUIPMENT AND COMPONENTS BEFORE PRODUCING SUBMITTALS. NO ITEMS SHALL BE PURCHASED OR ORDERED BEFORE APPROVAL IS GIVEN BY THE ENGINEER IN WRITING.
- 8) THE CONTRACTOR SHALL COORDINATE HIS WORK WITH ALL OTHER TRADES.

### C) RELATED DOCUMENTS:

- 1)THE GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTAL GENERAL CONDITIONS OF THE CONTRACT AND DIVISION 1 SPECIFICATION SECTIONS PROVIDED BY THE ARCHITECT, AND ALL OTHER DRAWINGS AND SPECIFICATIONS PROVIDED AS A PART OF THIS PROJECT, APPLY TO THIS DIVISION 15 AND TO ALL CONTRACTORS, SUBCONTRACTORS, OR OTHER PERSONS SUPPLYING MATERIALS AND/OR LABOR, ENTERING INTO THE PROJECT SITE AND/OR PREMISES, DIRECTLY OR INDIRECTLY.
- 2) THE SPECIFICATIONS AND DRAWINGS ARE INTENDED TO BE COMPLEMENTARY. A PARTICULAR SECTION, PARAGRAPH OR HEADING IN A DIVISION MAY NOT DESCRIBE EACH AND EVERY DETAIL CONCERNING WORK TO BE DONE AND MATERIALS TO BE FURNISHED. THE DRAWINGS ARE DIAGRAMMATIC AND MAY NOT SHOW ALL OF THE WORK REQUIRED OR ALL CONSTRUCTION DETAILS. DIMENSIONS ARE SHOWN FOR CRITICAL AREAS ONLY AS AN AID TO THE CONTRACTOR; ALL DIMENSIONS AND ACTUAL PLACEMENTS ARE TO BE VERIFIED IN THE FIELD. IT IS TO BE UNDERSTOOD THAT THE BEST TRADE PRACTICES OF THE DIVISION WILL PREVAIL.
- ALL TRADE SUBCONTRACTORS ARE TO NOTE THAT THE ORGANIZATION OF SPECIFICAT INTO DIVISIONS, AND LIKEWISE THE ARRANGEMENT OF THE DRAWINGS, IS SET UP FOR THE CONVENIENCE OF UNDERSTANDING THE SCOPE OF THE WORK ONLY. THIS STRUCTURING SHALL NOT CONTROL THE GENERAL CONTRACTOR IN DIVIDING THE WORK AMONG TRADE SUBCONTRACTORS OR IN ESTABLISHING THE EXTENT OF THE WORK TO BE PERFORMED BY ANY TRADE. REFER TO GENERAL CONDITIONS.

# II)PRODUCTS

# A) GENERAL MECHANICAL MATERIALS:

1)DRIP PANS: WHERE REQUIRED, PROVIDE DRIP PANS FABRICATED FROM CORROSION-RESISTANT SHEET METAL WITH WATERTIGHT JOINTS, AND WITH EDGES TURNED UP A MINIMUM OF 2-1/2". REINFORCE TOP, EITHER BY STRUCTURAL ANGLES OR BY ROLLING TOP OVER 1/4" STEEL ROD.

PROVIDE HOLE, GASKET, AND FLANGE AT LOW POINT FOR WATERTIGHT JOINT AND 1" DRAIN LINE

- 2) FIRESTOPPING/FIRE-RESISTANT SEALANT: WHERE REQUIRED, PROVIDE A FIRESTOP SYSTEM APPROPRIATE FOR THE ASSEMBLY PENETRATED AND THE PENETRATING ELEMENT. USE ONLY FIRESTOP PRODUCTS THAT HAVE BEEN UL 1479 OR ASTM E 814 TESTED FOR SPECIFIC FIRE—RATED CONDITIONS CONFORMING TO CONSTRUCTION ASSEMBLY TYPE, PENETRATING ITEM TYPE, ANNULAR SPACE REQUIREMENT AND FIRE-RATING INVOLVED FOR EACH SEPARATE INSTANCE. SUBMIT MANUFACTUER'S SPECIFIC DETAIL FOR EACH TYPE OF PENETRATION.
- 3) ACCESS DOORS: WHERE REQUIRED FOR PROPER SERVICE AND MAINTENANCE OF ALL MECHANICAL COMPONENTS, PROVIDE STEEL ACCESS DOORS AND FRAMES, FACTORY-FABRICATED AND ASSEMBLED UNITS, COMPLETE WITH ATTACHMENT DEVICES AND FASTENERS SUITABLE FOR
- B) ELECTRICAL REQUIREMENTS OF MECHANICAL WORK:
- 1)BASIC ELECTRICAL COMPONENTS INCLUDE, BUT ARE NOT LIMITED TO ALL REQUIRED STARTERS, DISCONNECT SWITCHES, CONTROL DEVICES, AND MOTORS. IT INCLUDES MOTORS THAT ARE FACTORY-INSTALLED AS PART OF EQUIPMENT AND APPLIANCES AS WELL AS FIELD-INSTALLED
- 2) STARTERS AND DISCONNECTS: WHERE AVAILABLE, PROVIDE FACTORY MOUNTED DISCONNECTS AND STARTERS, OR, WHEN FACTORY MOUNTED STARTERS AND DISCONNECTS ARE NOT AVAILABLE PROVIDE COMBINATION STARTERS AND DISCONNECT SWITCHES, OR, WHERE COMBINATION STARTERS AND DISCONNECT SWITCHES ARE NOT SUITABLE OR AVAILABLE, PROVIDE SEPARATE STARTERS AND DISCONNECTS FOR ALL HVAC EQUIPMENT, AS REQUIRED FOR PROPER INSTALLATION AND OPERATION OF EQUIPMENT.

### C) MECHANICAL IDENTIFICATION:

- 1)PROVIDE EQUIPMENT MARKERS COMPLYING WITH ANSI A13.1 FOR LETTERING SIZE, LENGTH OF COLOR FIELD, COLORS, AND INSTALLED VIEWING ANGLES OF IDENTIFICATION DEVICES.
- 2) PLASTIC EQUIPMENT MARKERS: PROVIDE MANUFACTURER'S STANDARD LAMINATED PLASTIC, COLOR CODED EQUIPMENT MARKERS.
- 3) LETTERING AND GRAPHICS: COORDINATE NAMES, ABBREVIATIONS AND OTHER DESIGNATIONS USED IN MECHANICAL IDENTIFICATION WORK, WITH CORRESPONDING DESIGNATIONS SHOWN, SPECIFIED OR SCHEDULED. PROVIDE NUMBERS, LETTERING AND WORDING AS INDICATED OR, IF NOT OTHERWISE INDICATED, AS RECOMMENDED BY MANUFACTURERS OR AS REQUIRED FOR PROPER IDENTIFICATION AND OPERATION/MAINTENANCE OF MECHANICAL SYSTEMS AND
- D) VIBRATION CONTROL AND SEISMIC RESTRAINTS:
- 1)FIBERGLASS PADS AND SHAPES, NEOPRENE PADS, VIBRATION ISOLATION SPRINGS, PAD-TYPE ISOLATORS, PLATE-TYPE ISOLATORS, DOUBLE-PLATE-TYPE ISOLATORS, THREADED DOUBLE-PLATE-TYPE ISOLATORS, ALL-DIRECTIONAL ANCHORS, NEOPRENE MOUNTINGS, FREE STANDING SPRING ISOLATORS, HOUSED SPRING ISOLATORS, VERTICALLY-RESTRAINED SPRING ISOLATORS, EARTHQUAKE-RESISTANT SPRING ISOLATORS, SEISMIC SNUBBERS, THRUST RESTRAINTS, EQUIPMENT RAILS, FABRICATED EQUIPMENT BASES, INERTIA BASE FRAMES, ROOF-CURB ISOLATORS, ISOLATION HANGERS, RISER ISOLATORS, FLEXIBLE PIPE CONNECTORS SHALL BE PROVIDED AS REQUIRED AND AS SUITABLE FOR USE AND SERVICE.
- 2) WHERE SEISMIC RESTRAINTS ARE REQUIRED, THE CONTRACTOR SHALL PROVIDE CALCULATIONS, DETAILS AND LOCATIONS THAT ARE STAMPED BY A PROFESSIONAL ENGINEER.
- E) DUCTWORK:
- 1)UNLESS OTHERWISE SPECIFIED, ALL RIGID DUCTWORK SHALL BE SHEET METAL MATERIALS AS SPECIFIED IN ASTM A700, WITH GALVANIZED SHEET STEEL: LOCK-FORMING QUALITY, ASTM A527, COATING DESIGNATION G90; MILL PHOSPHATIZED FINISH
- 2) PRESSURE CLASS AND SEAL CLASS (PER SMACNA): 2" PRESSURE CLASS, SEAL CLASS C.
- 3) RECTANGULAR DUCT FABRICATION: FABRICATE RECTANGULAR DUCTS WITH GALVANIZED SHEET STEEL, IN ACCORDANCE WITH SMACNA "HVAC DUCT CONSTRUCTION STANDARDS", TABLES 1-3 THROUGH 1-19, INCLUDING THEIR ASSOCIATED DETAILS. CONFORM TO THE REQUIREMENTS IN THE REFERENCED STANDARD FOR METAL THICKNESS, REINFORCING TYPES AND INTERVALS, TIE ROD APPLICATIONS, AND JOINT TYPES AND INTERVALS.
- 4) WHERE DUCT SUPPORTS ARE REQUIRED BETWEEN THE BUILDING STRUCTURAL FRAMING, SUITABLE INTERMEDIATE STEEL FRAMING SHALL BE PROVIDED BY THE CONTRACTOR.
- 5) WATER BASED LIQUID RUBBER DUCT SEALANT OR FLANGED JOINT MASTICS SHALL BE ONE-PART, ACID- CURING, SILICONE ELASTOMERIC JOINT SEALANTS, COMPLYING WITH ASTM C920, TYPE S, GRADE NS, CLASS 25, USE O.
- 6) FLEXIBLE DUCT CONNECTORS SHALL BE INSTALLED AT POINTS AS CLOSE AS POSSIBLE TO AIR HANDLERS AND FANS. THE CONNECTOR SHALL BE AT LEAST FOUR (4") INCHES WIDE, AND FABRICATED SPECIFICALLY FOR USE AS A FLEXIBLE CONNECTOR. ALL CONNECTIONS SHALL BE AIR TIGHT AND MADE SO THE CONNECTOR IS UNDAMAGED WHEN THE JOINT IS REMOVED.
- 7) FLEXIBLE DUCTS: LIMITED TO 6 FEET MAXIMUM STRAIGHT. DO NOT USE FLEX AS AN ELBOW.

- (a) NORMAL DUTY (UP TO 2" PRESSURE CLASS): TRILAMINATE OF ALUMINUM FOIL, FIBERGLASS AND ALUMINZED POLYESTER MECHANICALLY LOCKED WITH A HELIX OF GALVANIZED STEEL. UL 181, CLASS 1. EQUIVALENT TO BUCKLEY FABRI-FLEX TYPE 3 (BARE) OR 3M (INSULATED WITH
- 8) BELLMOUTH OR 45 DEGREE TAKEOFFS SHALL BE USED FOR DUCT TAKEOFFS TO MINIMIZE
- 9) MANUAL VOLUME DAMPERS SHALL BE INSTALLED AT ALL DUCT TAKEOFFS AND AS NEEDED ELSEWHERE TO PROPERLY BALANCE THE SYSTEMS.
- 10) WHERE NOTED ON THE DRAWINGS, INSTALL 1-1/2" ACOUSTICAL DUCT LINER SIMILAR TO JOHNS MANVILLE LINACOUSTIC RC.
- 11) FIRE, SMOKE, COMBINATION FIRE/SMOKE DAMPERS AND CEILING RADIATION DAMPERS
- (a) FIRE DAMPERS: UL 555 LISTED TYPE "B" (OUT OF AIRSTREAM) 1-1/2 HOUR RATED FOR LESS THAN 3-HOUR FIRE-RESISTANCE RATED ASSEMBLIES AND 3 HOUR RATED FOR 3-HOUR OR GREATER FIRE-RESISTANCE RATED ASSEMBLIES
- (1) DYNAMIC FIRE DAMPERS SHALL BE USED IN SYSTEMS DESIGNED TO OPERATE WITH FANS ON DURING A FIRE.
- (2) STATIC FIRE DAMPERS MAY BE USED IN SYSTEMS NOT OPERATIONAL DURING A FIRE.
- (b) SMOKE DAMPERS: UL 555S LISTED.
- (c) COMBINATION FIRE/SMOKE DAMPERS: UL 555 AND UL 555S LISTED (d) CEILING RADIATION DAMPERS: UL 555C LISTED.
- (e) REFER TO BOTH MECHANICAL AND ARCHITECTURAL DRAWINGS FOR THE LOCATION OF RATED
- 12) SMOKE DETECTORS IN AIR SYSTEMS GREATER THAN 2000 CFM SHALL BE FURNISHED AND INSTALLED BY THIS CONTRACTOR IN BOTH THE SUPPLY AND RETURN AIR DUCTWORK AS PER 2009 IMC AND NFPA 90A.
- (a) IF THERE IS A FIRE ALARM SYSTEM IN THE BUILDING, THIS CONTRACTOR SHALL NOTIFY THE FIRE ALARM CONTRACTOR TO PROVIDE DUCT SMOKE DETECTORS WHERE REQUIRED.

### F) AIR CONDITIONING CONDENSATE PIPING:

- 1) AIR CONDITIONING CONDENSATE PIPING SHALL BE SCHEDULE 40 PVC.
- (a) ROOF TOP UNITS SHALL DRAIN CONDENSATE ONTO ROOF
- (b) INDOOR UNITS SHALL DRAIN CONDENSATE TO SANITARY OR STORM VIA INDIRECT
- 2) PROVIDE AND INSTALL ISOLATION VALVES, UNIONS/FLANGES, MANUAL AIR VENTS, AND DRAIN VALVES AT ALL PIECES OF EQUIPMENT.
- 3) PITCH WATER PIPING UP IN THE DIRECTION OF FLOW, 1 INCH PER 40 FEET MINIMUM. PROVIDE AN AIR VENT AT ALL HIGH POINTS AND A DRAIN VALVE AT ALL LOW POINTS.
- 4) CUT ALL HOLES OF SUFFICIENT SIZE AND HANG ALL PIPE SO THAT THERE WILL BE NO COPPER OR STEEL TO METAL CONTACT AND RESULTANT NOISE DURING PIPE EXPANSION AND CONTRACTION. PROVIDE EXPANSION LOOPS WITH ROLLERS, GUIDES AND ANCHORS WHERE STRAIGHT RUNS OF PIPE EXCEED 100 FEET.
- 5) BEFORE SYSTEM OPERATION, CLEAN AND FLUSH ALL PIPING SYSTEMS TO REMOVE GREASE, OIL, SCALE, ETC. OPERATE SYSTEM FOR A MINIMUM OF 24 HOURS WITH STARTUP STRAINERS TO REMOVE DEBRIS, THEN REMOVE AND DISPOSE OF STARTUP STRAINER.
- 1)ALL INSULATION SHALL BE UL APPROVED FOR A FLAME SPREAD RATING OF NOT OVER 25 AND A SMOKE DEVELOPED RATING OF NOT OVER 50.
- 2) ALL INSULATION SHALL CONFORM TO THE REQUIREMENTS OF IECC 2009
- 3) REFRIGERANT PIPING INSULATION SHALL BE FLEXIBLE ELASTOMERIC THERMAL INSULATION: CLOSED-CELL, SPONGE- OR EXPANDED-RUBBER MATERIALS. COMPLY WITH ASTM C 534, TYPE I FOR TUBULAR MATERIALS AND TYPE II FOR SHEET MATERIALS.
- (a) ADHESIVE: AS RECOMMENDED BY INSULATION MATERIAL MANUFACTURER.
- (b) PROVIDE UV PROTECTIVE COATING ON ELASTOMERIC INSULATION THAT IS EXPOSED TO
- (c) MINIMUM PIPE INSULATION
- (1) PIPE DIAMETER LESS THAN 1½": ½" THICK.
- (2) PIPE DIAMETER 1½" AND LARGER: 1" THICK.
- 4) DUCTWORK: ALL INDOOR SUPPLY AND OUTDOOR AIR DUCTS AND PLENUMS SHALL BE INSULATED WITH FIBERGLASS WITH FSK JACKET WITH AN INSTALLED MINIMUM R-5 INSULATION, SIMILAR TO JOHNS MANVILLE MICROLITE EQ TYPE 100, 2" THICK.
- (a) ROOF MOUNTED SUPPLY, RETURN AND EXHAUST AIR DUCTS SHALL BE INSULATED WITH 3.0

### PCF FIBERGLASS INSULATION BOARD WITH FSK JACKET WITH A MINIMUM INSTALLED R-8 INSULATION, SIMILAR TO JOHNS MANVILLE 814, 2" THICK OR WITH 1-1/2" POLYISOCYANURATE FOAM SHEATHING, SIMILAR TO JOHNS MANVILLE AP. PITCHED TOP AND COVERED WITH POLYGUARD ALUMAGUARD ALL-WEATHER WITH COOL WRAP FINISH OR SIMILAR WATERPROOF

- (b) EXHAUST DUCTS SHALL BE INSULATED WITH R-5 TO TEN FEET BACK FROM BUILDING EXTERIOR.
- (c) DUCTS LOCATED OUTSIDE THE CONDITIONED BUILDING ENVELOPE SHALL BE INSULATED WITH FIBERGLASS WITH FSK JACKET WITH AN INSTALLED MINIMUM R-8 INSULATION, SIMILAR TO JOHNS MANVILLE MICROLITE EQ TYPE 100, 3" THICK.
- III) <u>EXECUTION</u>
- A) THE CONTRACTOR SHALL PROVIDE ALL SUPERVISION, LABOR, EQUIPMENT, MATERIAL, MACHINERY, PLANS, RIGGING, AND ANY AND ALL OTHER ITEMS NECESSARY TO COMPLETE THE MECHANICAL SYSTEM. SMALL DETAILS NOT USUALLY INDICATED ON THE DRAWINGS OR SPECIFIED, BUT WHICH ARE NECESSARY FOR THE PROPER INSTALLATION AND OPERATION OF THE MECHANICAL SYSTEM SHALL BE INCLUDED IN THE WORK AND IN THE CONTRACTOR'S ESTIMATE THE SAME AS IF HEREIN SPECIFIED OR SHOWN ON THE DRAWINGS.
- B) THE CONTRACTOR SHALL INSTALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. THIS INCLUDES CHECKING THE MANUFACTURER'S INSTRUCTIONS TO DETERMINE WHAT TYPE OF GLYCOL SYSTEM MAY BE USED WITHI EQUIPMENT SO AS NOT TO VOID THE WARRANTY OR IMPAIR THE OPERATION OF THE EQUIPMENT. WHERE THE DRAWINGS AND SPECIFICATIONS CONFLICT WITH THE MANUFACTURER'S RECOMMENDATIONS, IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO BRING THIS TO THE ATTENTION OF THE ENGINEER.
- C) THE HVAC EQUIPMENT MAY NOT BE USED FOR TEMPORARY HEAT DURING CONSTRUCTION. THE HVAC EQUIPMENT SHALL NOT BE STARTED AND TESTED UNTIL ALL CONSTRUCTION ACTIVITY THAT HAS THE POTENTIAL OF CREATING AIR BORNE PARTICULATES THAT COULD BE DRAWN INTO THE HVAC EQUIPMENT AND DUCTWORK SYSTEMS HAS BEEN COMPLETED. IN ADDITION, ALL DUTWORK OPENINGS SHALL BE SEALED UNTIL THE TIME WHEN THE HVAC EQUIPMENT IS TO BE STARTED AND
- D) DUCTWORK AND FITTINGS SHALL HAVE ENDS COVERED WITH PLASTIC AT ALL TIMES.
- E) UPON COMPLETION OF WORK, THE CONTRACTOR SHALL CLEAN, OIL AND GREASE (UNLESS FACTORY LUBRICATED) ALL FANS, PUMPS, MOTORS, ALL OTHER RUNNING EQUIPMENT AND APPARATUS AND MAKE CERTAIN THAT ALL SUCH APPARATUS AND MECHANISMS ARE IN PROPER WORKING ORDER AND MADE READY FOR TESTING.
- F) REPLACE ALL FILTERS USED DURING CONSTRUCTION.
- G) EQUIPMENT SHALL BE STARTED, TESTED, ADJUSTED AND PLACED IN SATISFACTORY OPERATING
- H) THE CONTRACTOR SHALL INSTRUCT OWNER IN THE PROPER OPERATION OF EQUIPMENT, EXPLAIN THE PROPER OPERATING AND MAINTENANCE PROCEDURES AND SHALL FURNISH THE OWNER WITH ALL INSTRUCTION PAMPHLETS, BOOKS AND OTHER MATERIAL FURNISHED BY THE VARIOUS MANUFACTURERS
- I) ALL VIBRATING EQUIPMENT NOT MOUNTED ON THE GROUND FLOOR SHALL BE MOUNTED ON OR SUSPENDED FROM VIBRATION ISOLATORS.
- J)EQUIPMENT SHALL BE INSTALLED WITH CLEARANCE FOR PROPER MAINTENANCE. FILTERS, COILS, DRIVES, VALVES, AND CONTROLS SHALL BE ACCESSIBLE FOR SERVICING AND/OR REPLACEMENT.
- K) EQUIPMENT SHALL BE COVERED FOR ONE YEAR FROM THE REVIEWING ENGINEER'S DATE OF ACCEPTANCE AND/OR THE DURATION OF THE MANUFACTURER'S GUARANTEE OR WARRANTY, WHICH EVER IS LONGER. THE CONTRACTOR SHALL FURNISH THE OWNER WITH ALL MANUFACTURER'S GUARANTEES OR WARRANTIES.
- L)THE WATER AND AIR SYSTEMS SHALL BE BALANCED FROM -5% TO + 10% OF THE GPM AND CFM VALUES SHOWN ON THE APPROVED HVAC PLANS. BALANCING SHALL BE DONE IN ACCORDANCE WITH STANDARDS ESTABLISHED BY THE AABC OR NEBB USING REPORT SHEETS DEVELOPED BY THE AABC OR NEBB. SUBMIT REPORTS TO THE ENGINEER.

## END OF SECTION 15500

# AMDREW W. ARSENAULT

DESIGN DAY

BELOW: PLEASE REFER ALL QUESTIONS, SUBMITTALS AND CORRESPONDENCE TO THE PROJECT MANAGER.

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HVAC PROJECT MANAGER:

DERRY FIRE DEPT. ISLAND POND STATION WARNER HILL RD DERRY, NH

TOWN OF DERRY DERRY, NH

SPECIFICATIONS.

SECTION 15900 - HVAC CONTROLS AND SEQUENCES OF OPERATION

# I) <u>GENERAL</u>

A) REFER TO SPECIFICATION SECTION 15500 - HVAC SPECIFICATIONS, ESPECIALLY GENERAL FOR WORK INCLUDED, QUALITY ASSURANCE AND RELATED DOCUMENTS.

B) PROVIDE A COMPLETE ELECTRIC/ELECTRONIC CONTROL SYSTEM TO ACCOMPLISH ALL CONTROL

- SEQUENCES AS DESCRIBED BELOW. C) ALL LINE AND LOW VOLTAGE CONTROL WIRING, TRANSFORMERS, DISCONNECTS, ETC REQUIRED FOR
- THE CONTROL SYSTEMS THAT IS NOT SHOWN ON THE ELECTRICAL DRAWINGS SHALL BE PROVIDED BY THE CONTROLS CONTRACTOR (HENCEFORTH CALLED "THE CONTRACTOR").
- 1)LINE VOLTAGE POWER FROM CIRCUIT BREAKERS IN ELECTRICAL PANELS TO CONTROL TRANSFORMERS OR CONTROL DEVICES SHALL BE INSTALLED BY THE CONTRACTOR.
- 2) COMPLY WITH DIVISION 16 REQUIREMENTS. 3) CONNECT VARIABLE FREQUENCY DRIVES (VFD) AND DUCT & AREA SMOKE DETECTORS

AGAINST MAXIMUM SYSTEM PRESSURE.

- (FURNISHED BY OTHERS) INTO CONTROL CIRCUITS TO ACCOMPLISH THE SEQUENCES OF OPERATION II)<u>PRODUCTS</u> A) PROVIDE CONTROL PRODUCTS (IF NOT FACTORY PROVIDED BY HVAC EQUIPMENT MANUFACTURER)
- B) CONTROL DAMPERS SHALL BE LOW LEAKAGE DAMPERS WITH BLADE AND EDGE SEALS. CLASS 1A WITH LEAKAGE OF LESS THAN 3 CFM/SQFT AT 1.0" W.G.

INCLUDING, BUT NOT LIMITED TO, CONTROL DAMPERS & VALVES, THERMOSTATS, TIMECLOCKS,

SENSORS, RELAYS, CONTROLLERS, AND OTHER COMPONENTS AS REQUIRED FOR A COMPLETE

- C) CONTROL VALVES SHALL BE SELECTED FOR FLUID TYPE, TEMPERATURE AND PRESSURE CLASS WHICH MATCH PIPING MATERIALS AND END CONNECTIONS. CONTROL VALVES MUST CLOSE OFF
- D) DAMPER AND VALVE ACTUATORS SHALL BE ELECTRIC, SIZED TO SMOOTHLY OPERATE DAMPER OR VALVE WITH ADEQUATE TORQUE FOR TIGHT SHUTOFF AGAINST MAXIMUM SYSTEM PRESSURE.
- 1)ACTUATION REQUIREMENTS SHALL BE PER THE SEQUENCES OF OPERATION. E) ROOM THERMOSTATS SHALL BE 7 DAY PROGRAMMABLE WITH A 5°F DEADBAND BETWEEN HEATING
- 1)USER ADJUSTABLE SETPOINTS SHALL BE PROVIDED UNLESS NOTED OTHERWISE ON THE

& COOLING AND SETBACK CAPABILITY (55°F HEATING & 85°F COOLING).

# DRAWINGS.

AND SUPPORT CONDUCTORS NEATLY.

WALLS IN CONDUIT.

- III) <u>EXECUTION</u>
- A) INSTALL SYSTEMS AND MATERIALS IN ACCORDANCE WITH MANUFACTURER INSTRUCITONS AND ROUGHING-IN DRAWINGS AND DETAILS ON THE DRAWINGS. INSTALL ELECTRICAL COMPONENTS AND USE ELECTRICAL PRODUCTS COMPLYING WITH REQUIREMENTS OF APPLICABLE DIVISION 16 SECTIONS. COORDINATE THE INSTALLATION IN ACCORDANCE WITH FINAL SHOP DRAWINGS, FIELD MEASUREMENTS, MANUFACTURER'S DATA AND AS SPECIFIED HEREIN.
- B) MOUNT CONTROLLERS AT CONVENIENT LOCATIONS AND HEIGHTS. COORDINATE WITH ARCHITECT
- C) PROVIDE REMOTE CONTROL OF MANUAL RESET CONTROLLERS AS REQUIRED FOR USER ACCESSIBILITY, COORDINATE WITH OWNER.
- D) THE TERM "CONTROL WIRING" IS DEFINED TO INCLUDE PROVIDING OF WIRE, CONDUIT AND MISCELLANEOUS MATERIALS AS REQUIRED FOR MOUNTING AND CONNECTING ELECTRIC CONTROL DEVICES.
- E) INSTALL COMPLETE CONTROL WIRING SYSTEM FOR CONTROL SYSTEMS. CONCEAL WIRING, EXCEPT IN MECHANICAL ROOMS AND AREAS WHERE OTHER CONDUIT AND PIPING ARE EXPOSED. PROVIDE MULTI-CONDUCTOR INSTRUMENT HARNESS (BUNDLE) IN PLACE OF SINGLE CONDUCTORS WHERE A NUMBER OF CONDUCTORS CAN BE RUN ALONG A COMMON PATH. FASTEN FLEXIBLE CONDUCTORS BRIDGING CABINETS AND DOORS NEATLY ALONG HINGE SIDE AND PROTECT AGAINST ABRASION. TIE
- F) INSTALL CIRCUITS OVER 25-VOLT WITH COLOR-CODED THWN/THHN WIRE IN EMT OR MC CABLE AS WHIPS TO EQUIPMENT CONNECTIONS. USE LIQUID-TITE CONDUIT IN EXTERIOR OR HAZARDOUS
- G) INSTALL CIRCUITS UNDER 25-VOLT WITH COLOR-CODED NO. 18 WIRE WITH INSULATION ON EACH CONDUCTOR AND PLASTIC SHEATH OVER ALL. PROVIDE PLENUM RATED CABLE IN PLENUM CEILINGS.

H) INSTALL LOW VOLTAGE CIRCUITS WHICH ARE LOCATED IN CONCRETE SLABS OR IN MASONRY

I) WHERE CONTROL WIRING MUST BE SURFACE MOUNTED IN OCCUPIED ROOMS AND IT IS NOT POSSIBLE TO CONCEAL WIRING, RUN WIRING IN WIREMOLD RACEWAY (COLOR BY ARCHITECT).

J)NUMBER-CODE OR COLOR-CODE CONDUCTORS APPROPRIATELY FOR IDENTIFICATION AND SERVICING

OF THE CONTROL SYSTEM. K) DEMONSTRATE CONTROL SYSTEM TO AND TRAIN OWNER'S PERSONNEL IN OPERATION AND MAINTENANCE OF CONTROL SYSTEM.

- IV) SEQUENCES OF OPERATION
- A) SPLIT SYSTEMS (GF+DXC+CU)
- 1) THE FAN OF THE GF SHALL RUN CONTINUOUSLY DURING OCCUPIED TIMES. (a) DURING UNOCCUPIED TIMES, THE FAN SHALL ONLY RUN ON A CALL FOR HEATING OR
- 2) DURING OCCUPIED TIMES, THE OA DAMPER SHALL OPEN TO MAXIMUM POSITION (LISTED ON VENTILATION CHART AND GF SCHEDULE) WHEN THE AHU FAN IS OPERATING.
- 3) THE ASSOCIATED ZONE DAMPER SYSTEM SHALL CONTROL HEATING AND COOLING FUNCTIONS OF THE SPLIT SYSTEM. SEE BELOW.
- 4) ON A CALL FOR HEATING, THE GAS FURNACE SHALL OPERATE.
- 5) ON A CALL FOR COOLING, THE CONDENSING UNIT SHALL OPERATE TO PROVIDE MECHANICAL COOLING.

1)THE 7-DAY PROGRAMMABLE TIME CLOCK SHALL DETERMINE OCCUPIED AND UNOCCUPIED MODE.

- 2) THE ZONE DAMPER SYSTEM SHALL DETERMINE WHETHER THE SPLIT SYSTEM IS IN HEATING, COOLING OR VENTILATION MODE.
- (a) DURING HEATING OR COOLING MODES, CALLING ZONE DAMPERS SHALL BE OPEN AND NON-CALLING ZONES DAMPERS SHALL BE CLOSED.

(b) DURING VENTILATION MODE, ALL ZONE DAMPERS SHALL BE OPEN.

- 3) THE BYPASS DAMPER SHALL BE FULLY CLOSED WHEN ALL ZONE DAMPERS ARE OPEN AND SHALL MODULATE OPEN TO LIMIT SUPPLY DUCT STATIC PRESSURE INCREASE AS ZONE DAMPERS
- MODULATE CLOSED. END OF SECTION 15900

B) ZONE DAMPER SYSTEMS (ZD)

CABLE OPERATED DAMPER BACK DRAFT DAMPER

RETURN / EXHAUST AIRFLOW CONNECT TO EXISTING

LEGEND OF PIPING SYMBOLS

DESCRIPTION

BALL VALVE

GATE VALVE

CHECK VALVE

BUTTERFLY VALVE

OS&Y GATE VALVE

BACK FLOW PREVENTER

TRIPLE-DUTY VALVE

TRIPLE-DUTY VALVE WITH MEASUREMENT PORTS

2-WAY MOTORIZED VALVE

3-WAY MOTORIZED VALVE

PRESSURE REDUCING VALVE

TEMPERATURE & PRESSURE

DIFFERENTIAL PRESSURE

TEMPERING VALVE

RELIEF VALVE

BYPASS VALVE

SOLENOID VALVE

DIRECTION OF FLOW

DIRECTION OF PITCH

CONNECT TO EXISTING

PIPE CONTINUES

THERMOMETER

SHUTOFF & PIGTAIL

VACUUM BREAKER

DESCRIPTION

DUCT DOWN

ELECTRIC HEAT TRACING

RECTANGULAR RETURN OR

ROUND RETURN OR EXHAUST DUCT UP

ROUND RETURN OR EXHAUST

RECTANGULAR SUPPLY DUCT U

RECTANGULAR SUPPLY DUCT

ROUND SUPPLY DUCT DOWN

DIFFUSER IDENTIFICATION TAG

REGISTER, GRILLE AND

INDICATOR LAMP

NA NOT APPLICABLE

NO NORMALLY OPEN

DIAMETER

PD PRESSURE DROP

PROPYLENE

POUNDS PER

PH/Ø PHASE

R RETURN

RA RETURN AIR

RTU ROOFTOP UNIT

SF SQUARE FEET

SQ IN SQUARE INCHES

S SUPPLY

V VOLTS

W WATTS

WB WET BULB

WC WATER COLUMN

SA SUPPLY AIR

TEMP TEMPERATURE

SQUARE INCH

OA OUTSIDE AIR

VENTILATOR

HW HOT WATER

HWCUH HOT WATER
CABINET HEATER

HX HEAT EXCHANGER

ID INSIDE DIAMETER

LEAVING AIR

**TEMPERATURE** 

LEAVING FLUID TEMPERATURE

LOW PRESSURE

THOUSANDS OF

CONTRACTOR

MINUTE OR

PROTECTION

MINIMUM

MOCP

MINIMUM CIRCUIT

MAX OVERCURRENT

PRESSURE STEAM

IN INCHES

LPS STEAM

M MINUTES

LWT TEMPERATURE

KW KILOWATTS

ROUND SUPPLY DUCT UP

EXHAUST DUCT UP

EXHAUST DUCT DOWN

GAS COCK

SYMBOL

<u>ф</u>

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DESCRIPTION

PIPE ELBOW UP

PIPE TEE UP

END CAP

PETE'S PLUG

CIRCUIT SETTER

CIRCULATOR PUMP

MANUAL AIR VENT

AIR SCOOP

AUTOMATIC AIR VENT

AIR SCOOP WITH VENT

AIR SEPARATOR WITH VENT

FIN TUBE IDENTIFICATION TAG

MANUAL BALANCING DAMPER

LEGEND OF DUCT SYMBOLS

DESCRIPTION

FIRE DAMPER

SMOKE DAMPER

SMOKE & FIRE DAMPER

MOTORIZED DAMPER

CARBON DIOXIDE SENSOR

MECHANICAL ABBREVIATIONS

AMP AMPACITY

APD DROP

CAP CAPACITY

AIR PRESSURE

ATC AUTOMATIC TEMP.

CHW CHILLED WATER

C/HWR WATER RETURN

C/HWS CHILLED & HOT WATER SUPPLY

CHWR CHILLED WATER
RETURN

CHWS CHILLED WATER SUPPLY

COND CONDENSATE

CONN CONNECT OR CONNECTION

CONV CONVECTOR

CW COLD WATER

CWR CONDENSER WATER RETURN

DB DRY BULB

DX DIRECT EXPANSION

EA EXHAUST AIR

DN DOWN

CONDENSER CWS WATER SUPPLY

CIRCULATOR

SUPPLY AIRFLOW

FIN TUBE RADIATION WITH COVER

STRAINER

PIPE TEE DOWN

PIPE CROSS OVER

FLEXIBLE PIPE CONNECTOR

HOSE THREAD DRAIN VALVE WITH CAP AND CHAIN

STRAINER WITH BLOWDOWN

PIPE ELBOW DOWN

LEGEND OF CONTROL SYMBOLS SYMBOL DESCRIPTION SYMBOL DESCRIPTION THERMOSTAT HUMIDISTAT TEMPERATURE SENSOR PRESSURE SENSOR SMOKE DETECTOR CARBON MONOXIDE SENSOR

TEMPERATURE

EER EFFICIENCY RATIO HWUH HEATER

FPM FEET PER MINUTE LB/# POUNDS

EXTERNAL STATIC HWS HOT WATER SUPPLY

CONTRACTOR

TEMPERATURE

ET EXPANSION TANK

FAHRENHEIT

FPD FLUID PRESSURE DROP

T HD FEET HEAD

FW FRESH WATER

CONTRACTOR

GHWR GLYCOL & WATER RETURN

GPM GALLONS PER MINUTE

HP HORSEPOWER

GHWS GLYCOL & WATER MBH

FTR FIN TUBE RADIATION

FA FRESH AIR

BTU/H UNITS/HOUR ERV ENERGY RECOVERY HWR HOT WATE

REVISIONS:

DESIGNED BY:

DRAWN BY

DDM JOB #

SCALE:

CHECKED BY:

DCM

AS NOTED

SHEET 4 OF 4

DATE: II/O2/2017