DUCTWORK REPAIR AND REPLACEMENT AT HEC FOR ST. PETERSBURG COLLEGE

SPC PROJECT NO. 265-H-18-8

PREPARED BY
GRINER ENGINEERING INC.
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ELECTRICAL SYMBOL LEGEND

SYMBOL	DESCRIPTION	MOUNTING
T	1 X 4 FLUORESCENT FIXTURE LETTER INDICATES TYPE	SEE FIXTURE SCHEDULE
	LINEAR INDIRECT FLUORESCENT FIXTURE LETTER INDICATES TYPE	SEE FIXTURE SCHEDULE
A	2 X 4 FLUORESCENT FIXTURE LETTER INDICATES TYPE	SEE FIXTURE SCHEDULE
	SHADING DENOTES FIXTURE WITH EM BATTERY PACK. 'NL' DENOTES FIXTURE UNSWITCHED FOR NIGHT LIGHT	SEE FIXTURE SCHEDULE
T	FLUORESCENT STRIP FIXTURE LETTER INDICATES TYPE	SEE FIXTURE SCHEDULE
T	FLUORESCENT WALL BRACKET FIXTURE LETTER INDICATES TYPE	SEE FIXTURE SCHEDULE
L	PL FLUORESCENT DOWNLIGHT LETTER INDICATES TYPE	SEE FIXTURE SCHEDULE
EX	EXIT–SHADING DENOTES FACEPLATE LOCATION. LETTER INDICATES TYPE. PROVIDE ARROWS AS REQUIRED.	SEE FIXTURE SCHEDULE
S S3 D	SINGLE POLE SWITCH (20A–120/277) '3' DENOTES 3–WAY 'D' DENOTES DIMMER	48" AFF OR AS NOTED
OS	OCCUPANCY SENSOR	48" AFF OR AS NOTED
S	LOW VOLTAGE LIGHTING SWITCH	48" AFF OR AS NOTED
IG	DUPLEX RECEPTACLE, 125V, 20A 'IG' DENOTES ISOLATED GROUND	18" AFF OR AS NOTED
	DUPLEX RECEPTACLE, 125V, 20A	18" AFF OR AS NOTED
	DUPLEX RECEPTACLE, 125V, 20A	48" AFF OR AS NOTED
	QUAD RECEPTACLE, 125V, 20A	18" AFF OR AS NOTED
	POWER/TELEPHONE POLE	SEE DETAIL OR AS NOTED
	OUTLET BOX OR J–BOX FOR POWER AND DATA SUPPLY TO FURNITURE SYSTEMS	18" AFF OR AS NOTED
	COMBINATION VOICE/DATA OUTLET	18" AFF OR AS NOTED
	DATA OUTLET	18" AFF OR AS NOTED
	VOICE OUTLET	18" AFF OR AS NOTED
	FAX OUTLET	18" AFF OR AS NOTED
CR	CARD READER	COORDIANE WITH SECURITY INSTALLER
SC	SURVEILLANCE CAMERA	COORIDANE WITH SECURITY INSTALLER
TV	T.V. OUTLET	18" AFF OR AS NOTED
	PANELBOARD 120/208V	SEE PANEL SCHEDULE
	RACEWAY CONCEALED IN WALL OR ABOVE CEILING	SEE SPECIFICATIONS
	HOMERUN TO PANEL. LETTERS INDICATE PANEL. NUMBERS INDICATE CIRCUIT. NOTE: HASH MARKS INDICATES THE NUMBER OF WIRES EXCLUDING THE REQUIRED EQUIPMENT GROUND.	SEE SPECIFICATIONS
S	MOTOR, NUMERAL INDICATES HORSEPOWER	AS NOTED
$	MOTOR RATED SWITCH WITH OVERLOAD RELAYS AS REQUIRED.	MOUNTED ADJACENT TO EQUIPMENT
	NON–FUSIBLE SAFETY SWITCH–SIZE AS NOTED	SEE SPECIFICATIONS
	FUSIBLE SAFETY SWITCH–SIZE AS NOTED	SEE SPECIFICATIONS
R	FAN OR AIR HANDLER SHUTDOWN RELAY	MOUNTED ADJACENT TO EQUIPMENT
	FIRE ALARM VISUAL SIGNAL 75cd UON	80" AFF OR AS NOTED
	FIRE ALARM MANUAL PULLSTATION	48" AFF OR AS NOTED
	FIRE ALARM AUDIBLE/VISUAL SIGNAL 75cd UON. ADA COMPATIBLE.	80" AFF OR AS NOTED
CLG	FIRE ALARM AUDIBLE/VISUAL SIGNAL 75cd UON. ADA COMPATIBLE.	CEILING MOUNTED AS NOTED
S	FIRE ALARM SMOKE DETECTOR	ON CEILING OR AS NOTED
	FIRE ALARM HEAT DETECTOR	ON CEILING OR AS NOTED
	120 VOLT SINGLE STATION SMOKE DETECTOR	WALL OR AS NOTED
S	FIRE ALARM SMOKE DETECTOR	CEILING OR AS NOTED
T	FIRE ALARM TAMPER AND FLOW SWITCH	AS NOTED
	FIRE ALARM MINIHORN	WALL OR AS NOTED
CO	FIRE ALARM COMBINED HEAT AND CO SYSTEM DETECTOR	ON CEILING OR AS NOTED
SB CO	FIRE ALARM COMBINED SMOKE AND CO SYSTEM DETECTOR 'SB' DENOTES SOUND BASE	ON CEILING OR AS NOTED
FACP FAA	FIRE ALARM PANEL ('FACP' DENOTES FIRE ALARM CONTROL PANEL, 'FAA' DENOTES ANNUNCIATOR)	60" AFF OR AS NOTED
3 3	REFER TO LIKE NUMBERED NOTES	

NOTE:

1. ALL MOUNTING HEIGHTS SHOWN ARE TO THE TOP OF THE DEVICE UNLESS NOTED OTHERWISE.
2. NOT ALL SYMBOLS APPEAR ON PLANS.

ABBREVIATIONS:

AFF	– ABOVE FINISHED FLOOR	HVAC	– HEATING,VENTILATING,AIR CONDITIONING
AHU	– AIR HANDLING UNIT	JB	– JUNCTION BOX
BFG	– BELOW FINISHED GRADE	LRA	– LOCKED ROTOR AMPERES
C	– CONDUIT	MCB	– MAIN CIRCUIT BREAKER
CW	– COOL WHITE	MLO	– MAIN LUGS ONLY
DACP	– DOOR ALARM CONTROL PANEL	N	– NEUTRAL
DN	– FEED DOWNWARD	NL	– NIGHT LIGHT
EF	– EXHAUST FAN	OB	– OUTLET BOX
EG	– EQUIPMENT GROUND	PB	– PULL BOX, PUSH–BUTTON
ENCL	– ENCLOSURE	PS	– PAY STATION
EWC	– ELECTRIC WATER COOLER	SF	– SUPPLY FAN
EWH	– ELECTRIC WATER HEATER	SPEC	– SPECIFICATIONS
WX	– EXPLOSION PROOF	TL	– TWISTLOCK
FCU	– FAN COIL UNIT	TTB	– TELEPHONE TERMINAL BOARD
FHP	– FRACTIONAL HORSEPOWER	TVTB	– TELEVISION TERMINAL BOARD
FLA	– FULL LOAD AMPERES	UNO	– UNLESS NOTED OTHERWISE
G	– GROUND	UP	– FEED UPWARD
GFI	– GROUND FAULT INTERRUPTER	VERT	– VERTICAL
HID	– HIGH INTENSITY DISCHARGE	WM	– WATT MISER
HORIZ	– HORIZONTAL	WP	– WEATHERPROOF
IG	– ISOLATED GROUND	WW	– WARM WHITE
LW	– LIGHT WHITE	XFMR	– TRANSFORMER
HP	– HORSEPOWER, HEAT PUMP		

NATIONAL ELECTRIC CODE NOTES:

ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF NFPA 70 – 2011 NATIONAL ELECTRIC CODE

ELECTRICAL SUBMITTAL NOTES:

SUBMIT ALL ELECTRICAL SYSTEMS SUBMITTALS AT ONE (1) TIME IN ONE (1) INTEGRAL GROUP. PIECE–BY–PIECE SUBMISSION OF INDIVIDUAL ITEMS WILL NOT BE ACCEPTABLE. ENGINEER MAY CHECK CONTENTS OF EACH SUBMITTAL SET UPON INITIAL DELIVERY; IF NOT COMPLETE AS SET FORTH HEREIN, SUBMITTAL SETS MAY BE RETURNED TO CONTRACTOR WITHOUT REVIEW AND APPROVAL AND WILL NOT BE ACCEPTED UNTIL MADE COMPLETE. SHOP DRAWINGS WILL BE REVIEWED MAXIMUM TWICE AS PART OF THIS CONTRACT. ADDITIONAL SHOP DRAWING REVIEWS SHALL BE INVOICED AT $85.00 PER HOUR, BILLABLE TO THE SUB–CONTRACTOR.

ELECTRICAL GENERAL NOTES:

1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE FLORIDA BUILDING CODE, NATIONAL ELECTRIC CODE, ST. PETERSBURG COLLEGE DESIGN AND CONSTRUCTION STANDARDS, AND NFPA CODES LATEST EDITIONS.
2. THE WORK, APPARATUS AND MATERIALS WHICH SHALL BE FURNISHED UNDER THE SPECIFICATIONS AND ACCOMPANYING DRAWINGS SHALL INCLUDE ALL ITEMS SPECIFIED HEREINAFTER AND SHOWN ON THE DRAWINGS. ALL OTHER MATERIALS NECESSARY FOR THE COMPLETE INSTALLATION SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. CONTRACTOR TO PROVIDE COMPLETE ELECTRICAL SYSTEMS AS INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREIN.
3. THE CONTRACTOR SHALL FURNISH ALL PROTECTIVE DEVICES, CONDUCTORS, SUPPORTS, RACEWAYS, ETC. TO PROVIDE COMPLETE INTERIOR ELECTRICAL SYSTEMS AS SHOWN ON THE DRAWINGS AND AS SPECIFIED HEREINAFTER. THE WORK SHALL INCLUDE COMPLETE TESTING OF ALL EQUIPMENT AND WIRING AT THE COMPLETION OF THE WORK AND MAKING ANY MINOR CONNECTION CHANGES OR ADJUSTMENTS NECESSARY FOR THE PROPER FUNCTIONING OF THE SYSTEM AND EQUIPMENT. ALL WORKMANSHIP SHALL BE OF THE HIGHEST QUALITY AND NO SUBSTANDARD WORK WILL BE ACCEPTED.
4. ALL REQUIRED INSURANCE TO BE PROVIDED FOR PROTECTION AGAINST PUBLIC LIABILITY OF PROPERTY DAMAGE FOR DURATION OF THE WORK.
5. IN GENERAL, MATERIALS AND APPARATUS SHALL COMPLY WITH ALL APPLICABLE TESTS, RATINGS, SPECIFICATIONS, AND REQUIREMENTS OF THE IEEE AND NEMA AND SHALL BEAR THE APPROVED DEVICE LABEL OF THE UNDERWRITERS' LABORATORIES, INC. OR OTHER TESTING LABORATORY APPROVED BY THE SPC AUTHORITY HAVING JURISDICTION.
6. CONTRACTOR SHALL GUARANTEE ALL WORK FOR A PERIOD OF ONE YEAR FROM DATE OF SUBSTANTIAL COMPLETION. CONTRACTOR SHALL RECTIFY ANY DEFECTS DUE TO FAULTY MATERIALS OR WORKMANSHIP AND PAY FOR ANY DAMAGE TO OTHER WORK RESULTING THEREFROM WITHIN SAID PERIOD. THE OWNER WILL GIVE NOTICE OF DEFECTS WITH REASONABLE PROMPTNESS.
7. BIDDERS ARE TO VISIT THE SITE AND FAMILIARIZE THEMSELVES WITH EXISTING CONDITIONS AND SATISFY THEMSELVES AS TO THE NATURE AND SCOPE OF WORK AND THE EXTENT OF DEMOLITION. THE SUBMISSION OF A BID WILL BE EVIDENCED THAT SUCH AN EXAMINATION HAS BEEN MADE. LATER CLAIMS FOR LABOR, EQUIPMENT OR MATERIALS REQUIRED, OR FOR DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN HAD AN EXAMINATION BEEN MADE, WILL NOT BE ALLOWED.
8. PRIOR TO SUBMITTING A BID, THE CONTRACTOR SHALL HAVE STUDIED AND COMPARED THE CONTRACT DOCUMENTS WITH EXISTING/PROPOSED CONDITIONS AND NOT LATER THAN TEN (10) DAYS PRIOR TO THE BID OPENING SHALL REPORT TO THE ENGINEER AND OWNER ANY ERROR, INCONSISTENCY, OR OMISSION IN THE CONTRACT DOCUMENTS.
9. ALL CUTTING, PATCHING AND REPAIR WORK SHALL BE THE RESPONSIBILITY OF THE TRADE INVOLVED. THE WORK SHALL BE PERFORMED BY SUB–CONTRACTOR SPECIALIZING IN THAT DISCIPLINE.
10. PROTECT EXISTING ELECTRICAL EQUIPMENT AND INSTALLATIONS NECESSARY TO REMAIN. IF DAMAGED OR DISTURBED IN THE COURSE OF THE WORK, REMOVE DAMAGED PORTIONS AND INSTALL NEW PRODUCTS OF EQUAL CAPACITY, QUALITY, AND FUNCTIONALITY.
11. THE CONTRACTOR SHALL INCLUDE WITHIN THE BID ALL REQUIRED OFF HOUR, OVERTIME, AND NON–BUSINESS HOUR WORK AS REQUIRED TO PERFORM THE WORK WITHOUT DISRUPTING THE BUILDING NORMAL BUSINESS OPERATIONS.
12. ALL WORK SHALL BE COORDINATED WITH OTHER TRADES FOR ITEMS IN THEIR SCOPE OF WORK WHICH WOULD REQUIRE ELECTRICAL WORK (DISCONNECTION/RECONNECTION ETC.) AND ARE NOT INDICATED ON THE ELECTRICAL PLANS. ALL SUBCONTRACTORS ARE REQUIRED TO COORDINATE THEIR WORK WITH OTHER TRADES. LACK OF THIS COORDINATION RESULTING IN ADDED COST TO THE CONTRACT WILL BE BORNE BY THE SUBCONTRACTOR.
13. THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS AND SUBMITTALS FOR ELECTRICAL EQUIPMENT SHOWN ON THE PLANS AND SPECIFICATIONS FOR THE ENGINEERS APPROVAL. THE ENGINEER MAY REQUIRE THE CONTRACTOR TO REDO ANY WORK, WHICH WAS NOT APPROVED, OR THE ENGINEER MAY REQUIRE A CREDIT TO THE OWNER. PROVIDE A SET OF AS BUILTS AFTER THE JOB IS COMPLETED. THIS SET SHALL BE CONTINUOUSLY UPDATED DURING CONSTRUCTION.
14. ALL WORK SHALL BE PERFORMED DURING TIME PERIODS ACCEPTABLE TO THE OWNER. SCHEDULE ALL WORK WITH THE OWNER'S REPRESENTATIVE MINIMUM FOURTEEN (14) DAYS BEFORE PERFORMING ANY WORK THAT WILL IMPACT ST. PETERSBURG COLLEGE OPERATIONS.
15. THE CONTRACTOR SHALL COORDINATE ALL PHASING OF ELECTRICAL WORK TO COINCIDE WITH PREVIOUS AND SUBSEQUENT PHASES OF THE REMODELING PROJECT. PROVISIONS SHALL BE MADE FOR THE CONTINUATION AND EXTENSIONS OF ALL CIRCUITS AND SYSTEMS AS REQUIRED AND INDICATED ON THE ELECTRICAL DRAWINGS.
16. ALL ELECTRICAL AND FIRE ALARM WORK SHALL BE IN CONDUITS UNLESS LOW VOLTAGE DATA/PHONE WIRING ABOVE CEILING. ALL LOW VOLTAGE WIRING IN CEILING SPACE OR IN AIR HANDLING PLENUMS NOT IN CONDUIT SHALL BE UL LISTED AS SUITABLE FOR PLENUM USE.
17. ALL JUNCTION BOXES AND COVER PLATES SHALL BE PAINTED AND LABELED.
18. PROVIDE SEAL FOR PENETRATION OF RATED WALLS/CEILINGS BY CONDUIT.
19. BRANCH CIRCUIT CONDUCTORS SHALL NOT BE SMALLER THAN NO. 12 AND WHERE BRANCH CIRCUIT CONDUCTOR RUNS FROM SOURCE (PANEL) TO THE LAST DEVICE ON THE CIRCUIT EXCEEDS 75 FT. IN LENGTH, THE CONDUCTORS SHALL BE NO. 10 MINIMUM AND FOR THE ENTIRE LENGTH OF THE CIRCUIT. FOR RUNS OVER 150 FT. IN LENGTH THE CONDUCTOR SHALL BE NO. 8 MINIMUM AND FOR THE ENTIRE LENGTH OF THE CIRCUIT. THE ABOVE APPLIES TO 120 VOLT CIRCUITS ONLY.
20. WORK IS TO BE CARRIED OUT WITHOUT UNNECESSARY INTERFERENCE WITH OWNER'S EXISTING FACILITIES AND OPERATIONS. POWER INTERRUPTIONS SHALL BE SCHEDULED WITH OWNER AND SHALL BE TAKEN ONLY DURING THOSE PERIODS WHICH HE HAS APPROVED IN WRITING. COORDINATE EXACT PHASING OF CONSTRUCTION WITH OWNER MINIMUM (14) FOURTEEN DAYS ADVANCE NOTICE.
21. THE CONTRACTOR SHALL STRICTLY CONFORM TO THE NEC REQUIREMENTS FOR DE–RATING FOR CONDUCTOR CAPACITY AND CONDUIT FILL.
22. CONTRACTOR SHALL VERIFY EXISTING FIRE ALARM SYSTEM IS OPERATIONAL PRIOR TO START OF WORK AND REPORT ANY DEFICIENCIES TO OWNER. ONCE CONTRACTOR BEGINS WORK ALL REPAIRS, REPLACEMENT AND REPROGRAMMING COSTS TO MAKE SYSTEM OPERATIONAL WITH NEW EQUIPMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
23. THE FIRE ALARM SYSTEM PANEL IS EXISTING TO REMAIN. ALL FIRE ALARM WORK SHALL REQUIRE THE USE OF THE SPC APPROVED VENDOR. ALL WORK ASSOCIATED WITH THE FIRE ALARM SHALL BE COMPLETED UNDER A SEPARATE SET OF DOCUMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR POINT TO POINT WIRING DIAGRAMS, BATTERY CALCULATIONS, RISER DIAGRAMS AND SIGNED AND SEALED SHOP DRAWINGS. THE FIRE ALARM SHALL BE RE–CERTIFIED UPON COMPLETION.
24. SUBMIT CLOSEOUT DOCUMENTS TO ST. PETERSBURG COLLEGE. THE EXACT SITE ADDRESS FOR CLOSEOUT DOCUMENTS TO BE PROVIDED BY ST. PETERSBURG PROJECT COORDINATOR.
25. CONTRACTOR SHALL REFER TO FLORIDA BUILDING CODE REQUIREMENTS AND INSPECTION SCHEDULE. CONFIRM WITH ST. PETERSBURG AUTHORITY HAVING JURISDICTION FOR REQUIREMENTS.
26. ANY DEVIATION AND CHANGES OF WORK SHALL BE SUBMITTED TO ST. PETERSBURG BUILDING DEPARTMENT FOR APPROVAL.
27. SUBMIT FIRE ALARM SHOP DRAWINGS TO ST. PETERSBURG BUILDING DEPARTMENT FOR APPROVAL PRIOR TO START ANY WORK.

FIRE ALARM GENERAL NOTES:

1. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE PROPOSED ADDRESSABLE FIRE ALARM DEVICES AND WIRING LAYOUTS, ANY REVISIONS AND/OR ADDITIONS REQUIRED BY THE LOCAL JURISDICTION PRIOR TO OBTAINING CERTIFICATE OF OCCUPANCY ARE THE RESPONSIBILITY OF THE CONTRACTOR AND WILL NOT BE REASON FOR ADDITIONAL COMPENSATION TO THE CONTRACTOR.
2. THE FIRE ALARM SYSTEM COMPONENTS SHALL BE INSTALLED IN COMPLIANCE WITH NFPA 70, 72, AND FLORIDA BUILDING CODE.
3. SYSTEM INSPECTION, TEST RESULT, AND OPERATION SHEETS SHALL BE PROVIDED TO THE OWNER.
4. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AS–BUILT DRAWINGS SHOWING EXACT FIELD INSTALLATION TO THE OWNER AFTER COMPLETION OF THE PROJECT.
5. ALL FIELD CHANGES SHALL BE COORDINATED WITH OWNER'S REPRESENTATIVE.
6. SMOKE DETECTORS SHALL BE INSTALLED MINIMUM 3'–0" FROM HVAC SUPPLY AIR DIFFUSERS.
7. ALL JUNCTION BOXES AND COVER PLATES TO EMERGENCY SYSTEM SHALL BE PAINTED RED FOR QUICK RECOGNITION.
8. ALL CONTROL AND ALARM CABLES SHALL BE INSTALLED IN CONDUIT.
9. CONTRACTOR SHALL VERIFY THAT THE QUANTITY AND LOCATIONS SHOWN ON THE DRAWINGS SHALL PROVIDE A COMPLETE AND FUNCTIONAL SYSTEM TO THE OWNER.
10. WHEN CEILING MOUNTED, SMOKE AND/OR HEAT DETECTORS SHALL BE MOUNTED NO CLOSER THAT 4" TO A SIDE WALL.
11. CONTRACTOR SHALL VERIFY EXISTING FIRE ALARM SYSTEM IS OPERATIONAL PRIOR TO START OF WORK AND REPORT ANY DEFICIENCIES TO OWNER. ONCE CONTRACTOR BEGINS WORK ALL REPAIRS, REPLACEMENT AND REPROGRAMMING COSTS TO MAKE SYSTEM OPERATIONAL WITH NEW EQUIPMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
12. THE CONTRACTOR SHALL COORDINATE THE DEMOLITION AND RENOVATION FIRE ALARM WORK WITH THE OWNER AND AUTHORITY HAVING JURISDICTION TO ENSURE FALSE ALARMS ARE AVOIDED DURING DEMOLITION. THE FIRE ALARM IS TO REMAIN ACTIVE DURING DEMOLITION.
13. THE FIRE ALARM SYSTEM PANEL IS EXISTING TO REMAIN. ALL FIRE ALARM WORK SHALL REQUIRE THE USE OF THE OWNER APPROVED VENDOR.
14. THE FIRE ALARM SHALL BE RE–CERTIFIED UPON COMPLETION OF WORK.

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CLIENT INFORMATION

DRAWN BY: JWY

REVIEWED BY: JWY

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SHEET TITLE: ELECTRICAL COVER SHEET

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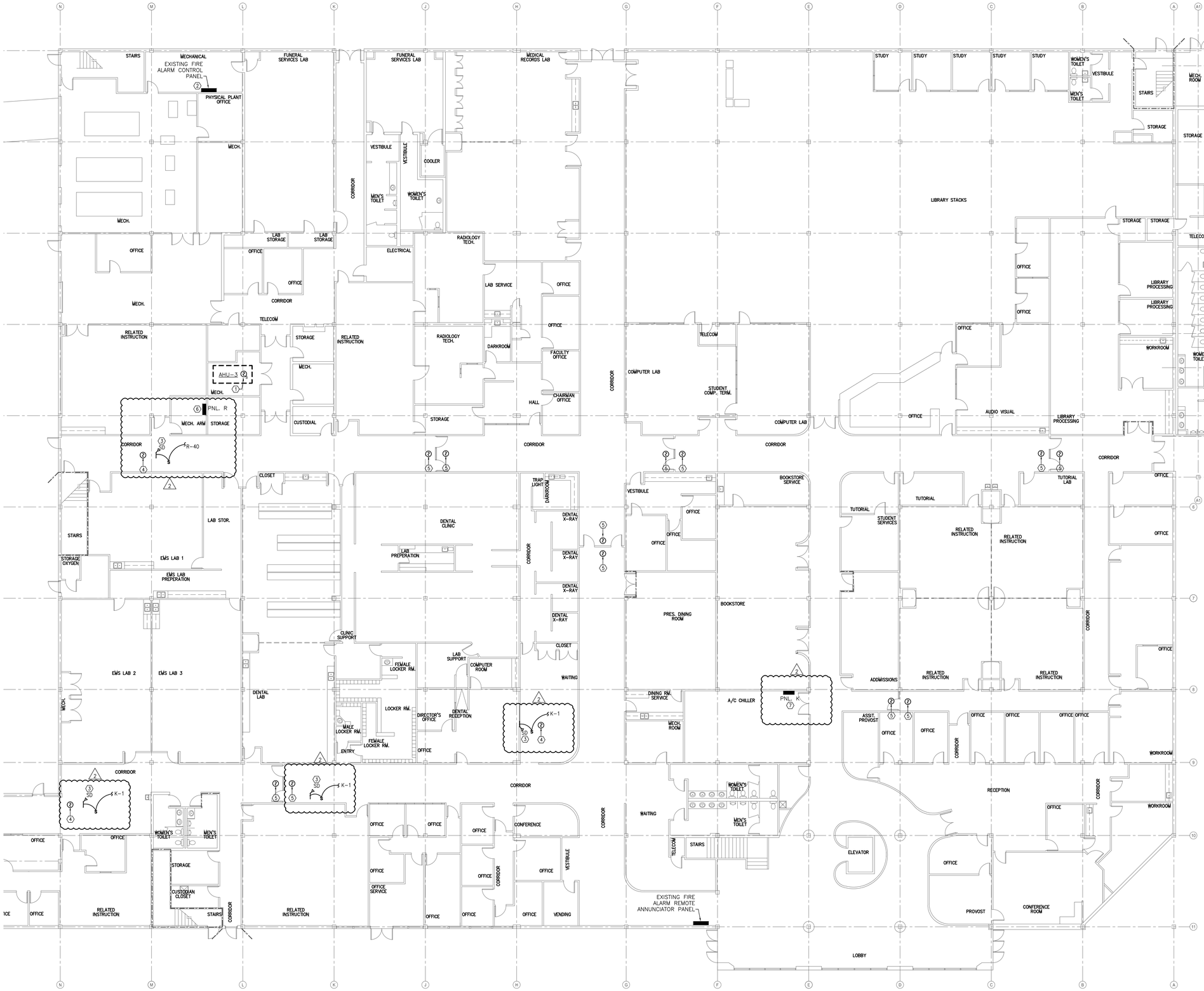

NORTH

1ST FLOOR ELECTRICAL RENOVATION PLAN

SCALE : 3/32" = 1'-0"

KEYED NOTES:

1. REPLACE EXISTING DUCT SMOKE DETECTOR IN SUPPLY AIR DUCT AND RECONNECT TO EXISTING FIRE ALARM CONTROL PANEL. NEW DUCT MOUNTED SMOKE DETECTORS TO BE FURNISHED BY A LICENSED FIRE ALARM CONTRACTOR, INSTALLED IN THE DUCTWORK BY THE MECHANICAL CONTRACTOR AND CONNECTED TO THE FIRE ALARM SYSTEM BY THE FIRE ALARM CONTRACTOR. PROVIDE AND LOCATE REMOTE KEY OPERATED TEST STATION (RTS) AT 48" AFF AND LABEL WITH ASSOCIATED HVAC UNIT NUMBER.
2. EXISTING FIRE ALARM CONTROL PANEL IS MANUFACTURED BY SIMPLEX AND IS NON-ADDRESSABLE. FIRE ALARM PANEL SERVICE AGREEMENT IS WITH WAYNE AUTOMATIC FIRE SPRINKLER, INC., TAMPA, FL, 813-630-0303.
3. NEW SMOKE DAMPER TO BE FURNISHED AND INSTALLED IN THE DUCTWORK BY THE MECHANICAL CONTRACTOR AND CONNECTED TO THE FIRE ALARM SYSTEM BY THE FIRE ALARM CONTRACTOR. EXTEND 115 VOLT CIRCUIT FROM SMOKE DAMPER TO DESIGNATED ELECTRICAL PANEL. PROVIDE TOGGLE DISCONNECT SWITCH TO ENABLE ISOLATING DAMPER FOR SERVICING/REPAIRS. PROVIDE LOW VOLTAGE FIRE ALARM CIRCUIT FROM EXISTING FIRE ALARM DEVICE LOCATED IN THE FIRE ALARM ZONE. SMOKE DAMPER SHALL CLOSE UPON ALARM BY NEW CEILING MOUNTED SMOKE DETECTOR AND UPON ALARM IN SAME FIRE ALARM ZONE.
4. NEW CEILING MOUNTED AREA SMOKE DETECTOR LOCATED WITHIN 5 FEET OF SMOKE DAMPER. INITIATION OF DEVICE SHALL CLOSE NEW SMOKE DAMPER. PROVIDE LOW VOLTAGE FIRE ALARM CIRCUIT FROM EXISTING FIRE ALARM DEVICE LOCATED IN THE FIRE ALARM ZONE.
5. EXISTING CEILING MOUNTED AREA SMOKE DETECTOR.
6. PROVIDE NEW 115 VOLT, 20 AMP BREAKER IN SPACE NO. 40 FOR POWER TO NEW SMOKE DAMPERS.
7. PROVIDE NEW 115 VOLT, 20 AMP BREAKER IN SPACE NO. 1 FOR POWER TO NEW SMOKE DAMPERS.

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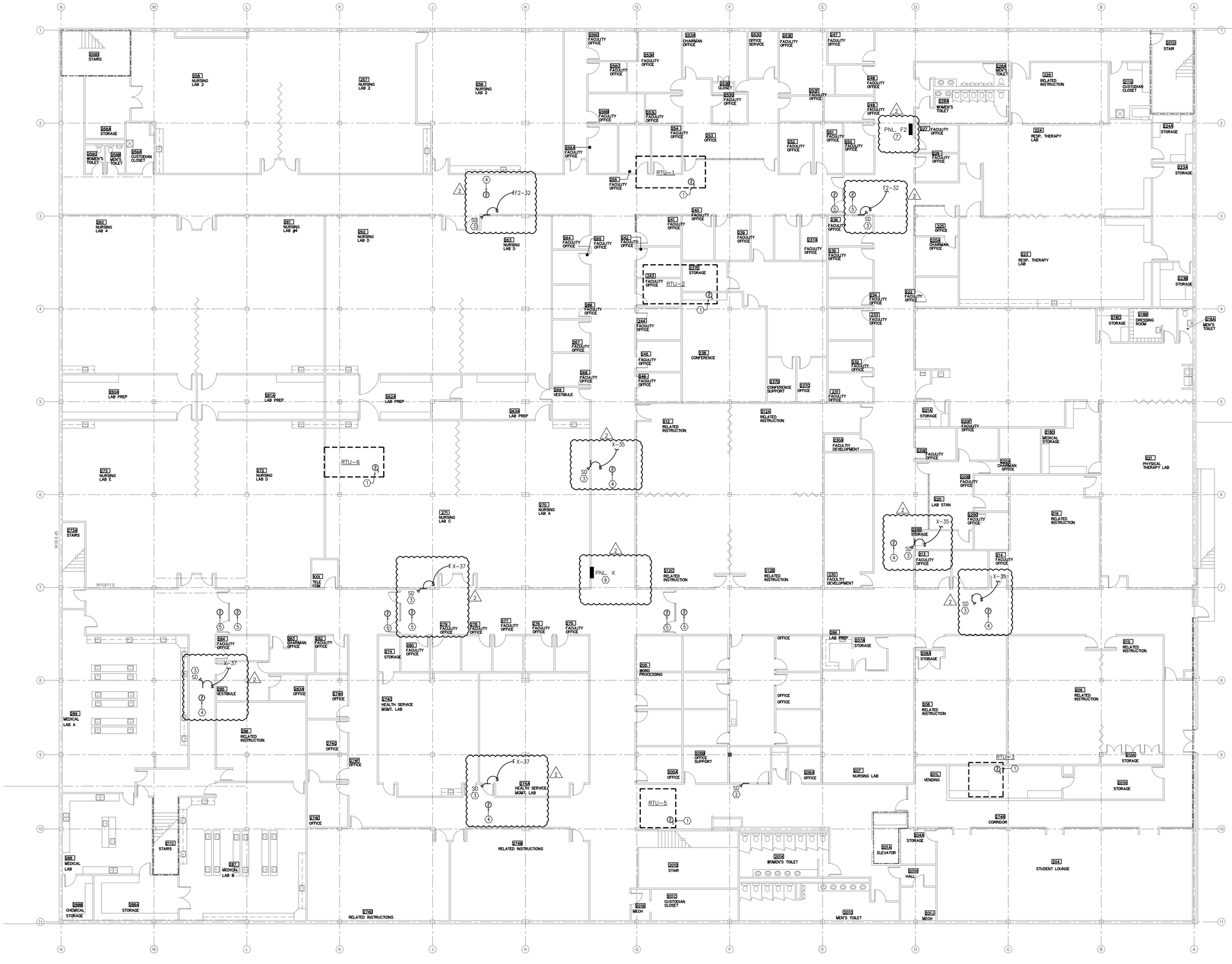

KEYED NOTES:

1. REPLACE EXISTING DUCT SMOKE DETECTOR IN SUPPLY AIR DUCT AND RECONNECT TO EXISTING FIRE ALARM CONTROL PANEL. NEW DUCT MOUNTED SMOKE DETECTORS TO BE FURNISHED BY A LICENSED FIRE ALARM CONTRACTOR, INSTALLED IN THE DUCTWORK BY THE MECHANICAL CONTRACTOR AND CONNECTED TO THE FIRE ALARM SYSTEM BY THE FIRE ALARM CONTRACTOR. PROVIDE AND LOCATE REMOTE KEY OPERATED TEST STATION (RTS) AT 48" AFF AND LABEL WITH ASSOCIATED HVAC UNIT NUMBER.
2. EXISTING SMOKE DAMPER.
3. NEW SMOKE DAMPER TO BE FURNISHED AND INSTALLED IN THE DUCTWORK BY THE MECHANICAL CONTRACTOR AND CONNECTED TO THE FIRE ALARM SYSTEM BY THE FIRE ALARM CONTRACTOR. EXTEND 115 VOLT CIRCUIT FROM SMOKE DAMPER TO DESIGNATED ELECTRICAL PANEL. PROVIDE TOGGLE DISCONNECT SWITCH TO ENABLE ISOLATING DAMPER FOR SERVICING/REPAIRS. PROVIDE LOW VOLTAGE FIRE ALARM CIRCUIT FROM EXISTING FIRE ALARM DEVICE LOCATED IN THE FIRE ALARM ZONE. SMOKE DAMPER SHALL CLOSE UPON ALARM BY NEW CEILING MOUNTED SMOKE DETECTOR AND UPON ALARM IN SAME FIRE ALARM ZONE.
4. NEW CEILING MOUNTED AREA SMOKE DETECTOR LOCATED WITHIN 5 FEET OF SMOKE DAMPER. INITIATION OF DEVICE SHALL CLOSE NEW SMOKE DAMPER. PROVIDE LOW VOLTAGE FIRE ALARM CIRCUIT FROM EXISTING FIRE ALARM DEVICE LOCATED IN THE FIRE ALARM ZONE.
5. EXISTING CEILING MOUNTED AREA SMOKE DETECTOR.
6. PROVIDE NEW 115 VOLT, 20 AMP BREAKER IN SPACE NO. 35 AND 37 FOR POWER TO NEW SMOKE DAMPERS.
7. PROVIDE NEW 115 VOLT, 20 AMP BREAKER IN SPACE NO. 32 FOR POWER TO NEW SMOKE DAMPERS.

NORTH

2ND FLOOR ELECTRICAL RENOVATION PLAN

SCALE : 3/32" = 1'-0"

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E2.2

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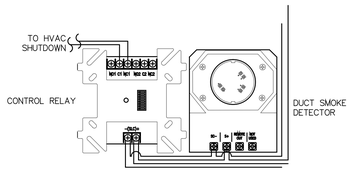
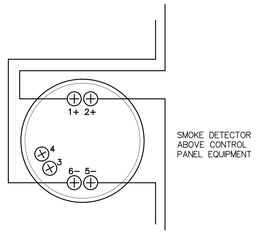


TYPICAL DUCT SMOKE DETECTOR WIRING DETAIL
NOT TO SCALE



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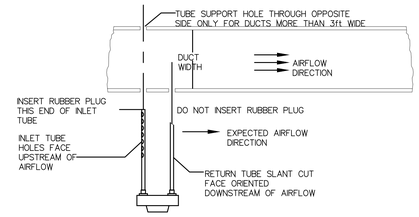
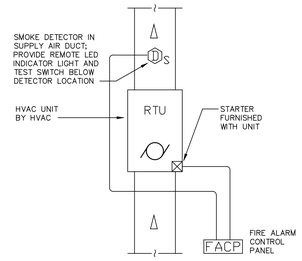
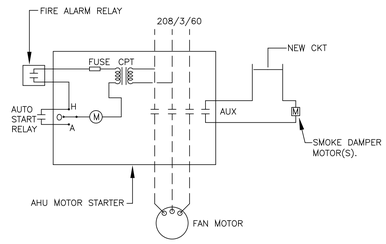


TYPICAL DUCT SMOKE DETECTOR INSTALLATION DETAIL
NOT TO SCALE



TYPICAL WIRING DIAGRAM - HVAC DUCT SMOKE DETECTOR
NOT TO SCALE



NOTES:
INTERLOCK NEW FIRE/SMOKE DAMPERS WITH ASSOCIATED NEW AIR HANDLING UNIT

FIRE/SMOKE DAMPER INTERLOCK DETAIL
NOT TO SCALE

GENERAL FIRE ALARM DETAILS:
FIRE ALARM DETAILS ARE FOR REFERENCE ONLY. REFER TO MANUFACTURER INSTALLATION INSTRUCTION AND REQUIREMENTS FOR EXACT CONNECTIONS AND LAYOUTS.

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HVAC SYMBOL LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
18X12	EXISTING DUCTWORK TO REMAIN SIZE IN INCHES (PLAN DIM. FIRST)		ROUND DUCT DOWN
	EXISTING DUCTWORK/EQUIPMENT TO BE REMOVED		ROUND DUCT UP
18X12	NEW DUCTWORK SIZE IN INCHES (PLAN DIM. FIRST)		GOOSENECK
	NEW FLEXIBLE DUCT		ROOF MOUNTED EXHAUST FAN
	NEW DUCTSOX DUCTWORK	SD	SMOKE DAMPER (VERTICAL POSITION)
	NESTED SQUARE/RECTANGULAR BRANCH TAKE OFF	AD AD	DUCT ACCESS DOOR
	SPIN-IN FITTING WITH VOLUME DAMPER	FSD	COMBINATION FIRE/SMOKE DAMPER (VERTICAL POSITION)
	SPIN-IN FITTING WITHOUT VOLUME DAMPER	FD	FIRE DAMPER (VERTICAL POSITION)
	DUCT TRANSITION (RECTANGLE TO RECTANGLE)	FD	FIRE DAMPER (HORIZONTAL POSITION)
	DUCT TRANSITION (RECTANGLE TO ROUND)		MOTORIZED VOLUME DAMPER IN DUCTWORK
	DUCT TEE WITH TURNING VANES	VD	MANUAL VOLUME DAMPER IN DUCTWORK
	DUCT ELBOW UP	SD	DUCT MOUNTED SMOKE DETECTOR
	DUCT ELBOW DOWN		SIDEWALL RETURN GRILLE
	90° ELBOW WITH TURNING VANES		SIDEWALL SUPPLY GRILLE
W R	90° RADIUS ELBOW (R=1.5W)	FC	FLEXIBLE DUCT CONNECTOR
VD	45° BRANCH TAKE-OFF WITH VOLUME DAMPER	S.A. R.A. EXH.	CEILING DIFFUSER (SUPPLY, RETURN, & EXHAUST)
EDH-?	ELECTRIC DUCT HEATER	S.A. R.A. EXH.	EXISTING CEILING DIFFUSER (SUPPLY, RETURN, & EXHAUST)
UC ??	UNDER CUT DOOR (INCHES GIVEN)	AD-? ??? ?x?	AIR DEVICE IDENTIFICATION AIRFLOW NECK SIZE
	SUPPLY AIRFLOW DIRECTION		
	EXISTING DUCTWORK TO REMAIN, SINGLE LINE DUCTWORK		
	EXISTING DUCTWORK TO BE REMOVED, SINGLE LINE DUCTWORK		
	NEW CONNECTION TO EXISTING	?	EXHAUST/RETURN AIRFLOW DIRECTION
T	THERMOSTAT (MTD. 4'-0" AFF)	H	KEYED NOTE
S	SENSOR (MTD. 4'-0" AFF)	C	HUMIDISTAT
H	HEAT DETECTOR	SP	HVAC EQUIPMENT CONTROL
CO	CARBON MONOXIDE SENSOR	PS	STATIC PRESSURE SENSOR
			CARBON DIOXIDE SENSOR

HVAC PIPING AND VALVES LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	ELBOW - TURNED UP		TRIPLE DUTY VALVE (SHUT-OFF, BALANCING & CHECK)
	ELBOW - TURNED DOWN		BALL VALVE
	PIPE RISER		AUTO CIRCUIT SETTER VALVE
	TEE - OUTLET UP		HORIZONTAL SWING CHECK VALVE
	TEE - OUTLET DOWN		Y-TYPE STRAINER WITH BLOW DOWN AND VALVE
	CAP		BASKET TYPE STRAINER
	UNION		
	CONCENTRIC INCREASER	A	COMPRESSED AIR PIPING
	ECCENTRIC REDUCER	CWR	CONDENSER WATER RETURN PIPING
	FLEXIBLE PIPE CONNECTOR	CWS	CONDENSER WATER SUPPLY PIPING
	THERMOMETER	CD	CONDENSATE PIPING
	PRESSURE GAGE	CHWR	CHILLED WATER RETURN PIPING
P/T	PRESSURE/TEMPERATURE PLUG	CHWS	CHILLED WATER SUPPLY PIPING
	AUTOMATIC AIR VENT	HWR	HOT WATER HEATING SYSTEM RETURN PIPING
	MANUAL AIR VENT	HWS	HOT WATER HEATING SYSTEM SUPPLY PIPING
	VENTURI FLOW MEASUREMENT DEVICE	G G	FUEL GAS PIPING
	BUTTERFLY VALVE	RD	REFRIGERATION SYSTEM DISCHARGE PIPING
M	MOTORIZED CONTROL VALVE (BUTTERFLY VALVE)	RS	REFRIGERATION SYSTEM RETURN PIPING (SUCTION)
		RL	REFRIGERATION SYSTEM SUPPLY PIPING (LIQUID)

HVAC GENERAL NOTES

1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE FLORIDA BUILDING CODE-MECHANICAL 2007 WITH 2009 AMMENDMENTS, NATIONAL ELECTRIC CODE AND NFPA.
2. PRIOR TO SUBMITTING A BID, THE CONTRACTOR SHALL HAVE STUDIED AND COMPARED THE CONTRACT DOCUMENTS WITH EXISTING/PROPOSED CONDITIONS AND NOT LATER THAN TEN (10) DAYS PRIOR TO THE BID OPENING SHALL REPORT TO THE ENGINEER ANY ERROR, INCONSISTENCY, OR OMISSION IN THE CONTRACT DOCUMENTS.
3. PROVIDE FLEXIBLE CONNECTION FROM EACH DUCTWORK CONNECTION TO THE INLET AND OUTLET OF EACH EXISTING AIR HANDLING UNIT. NO FLEX CONNECTIONS PERMITTED BETWEEN DUCTWORK AND VAV TERMINAL UNITS.
4. ALL DUCTS SHOWN ARE INSIDE CLEAR DIMENSIONS.
5. SLEEVE AND SEAL ALL PIPING PASSING THROUGH WALLS.
6. ALL CUTTING, PATCHING AND REPAIR WORK SHALL BE PERFORMED BY A SUB-CONCTRACTOR SPECIALIZING IN THE APPROPRIATE DISCIPLINE.
7. REFER TO SHEET M5.1, SECTION 15950 FOR DUCT LEAKAGE PRESSURE TESTING REQUIREMENTS. THE MAXIMUM ALLOWABLE LEAKAGE FOR THE DUCTWORK IS 2%.
8. THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS AND SUBMITTALS FOR HVAC DUCTWORK SHOWN ON THE PLANS AND SPECIFICATIONS FOR THE ENGINEERS APPROVAL. THE ENGINEER MAY REQUIRE THE CONTRACTOR TO REDO ANY WORK, WHICH WAS NOT APPROVED, OR THE ENGINEER MAY REQUIRE A CREDIT TO THE OWNER. PROVIDE A SET OF AS-BUILTS AFTER THE JOB IS COMPLETED. THIS SET SHALL BE CONTINUOUSLY UPDATED DURING CONSTRUCTION.
9. PROVIDE AIR TURNING VANES AT ALL 90-DEGREE RECTANGULAR ELBOWS.
10. FLEXIBLE DUCTWORK IS NOT ACCEPTABLE FOR USE IN THIS PROJECT.
11. CONTRACTOR SHALL PROVIDE "AS-BUILT" DRAWINGS IN ELECTRONIC FORMAT, AUTOCAD VERSION 2010 OR NEWER. CONTRACTOR SHALL ALSO PROVIDE 3 FULL SIZE HARD PRINTS OF AS-BUILT DRAWINGS.
12. DUCTWORK LAYOUTS SHOWN ON THE PLANS ARE BASED ON EXISTING DRAWINGS OBTAINED FROM THE OWNER AND FROM SITE OBSERVATIONS OF EXISTING CONDITIONS. EXACT ROUTING OF EXISTING DUCTWORK AND LOCATION OF VAV TERMINAL UNITS SHALL BE FIELD VERIFIED BY THE CONTRACTOR AS WORK PROGRESSES. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LENGTHS OF DUCT AND QUANTITY OF FITTINGS REQUIRED FOR EACH SYSTEM.

SCOPE OF WORK

1. REMOVE EXISTING DUCTWORK AND PROVIDE NEW DUCTWORK FOR SYSTEMS IDENTIFIED ON THE FLOOR PLANS. THE DUCTWORK THAT IS TO BE REPLACED IS THE MEDIUM PRESSURE DUCTWORK BETWEEN THE AIR HANDLING UNITS OR PACKAGED ROOFTOP UNITS AND THE INLET TO THE VARIABLE AIR VOLUME TERMINAL UNITS. THE EXISTING DUCTWORK IS INTERNALLY INSULATED SHEET METAL, WITH PORTIONS OF DUCTWORK CLOSEST TO AIR HANDLING EQUIPMENT ADDITIONALLY INSULATED WITH EXTERNAL INSULATION.
2. RELOCATION OF EXISTING DUCT MOUNTED STATIC PRESSURE SENSORS TO NEW DUCTWORK AT LOCATIONS IDENTIFIED ON THE DRAWINGS.
3. REMOVAL OF EXISTING CEILING SYSTEMS IN ROOMS WHERE DEMOLITION AND REPLACEMENT DUCTWORK IS LOCATED. CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING ANY DAMAGED CEILING TILES TO MATCH EXISTING. WHERE THE CONDITION OF EXISTING CEILING SYSTEMS ARE POOR AND CANNOT BE REMOVED AND REINSTALLED WITHOUT INCURRING DAMAGE; NEW CEILING SYSTEMS SHALL BE PROVIDED. REMOVAL AND REPLACEMENT OF CEILING SYSTEMS SHALL BE PERFORMED BY A CONTRACTOR SPECIALIZING IN T-BAR ACOUSTICAL CEILING SYSTEMS. NEW CEILING SYSTEMS SHALL BE:
   GRID: 24"x24" ARMSTRONG FLAT LAY-IN, WHITE FINISH.
   TILE: ARMSTRONG 1728A, FINE FISSURED, SQUARE LAY-IN HUMIGUARD PLUS, WHITE FINISH, 24"x24"x⅝".
4. CONTRACTORS BID PRICE SHALL INCLUDE ALL WORK ASSOCIATED WITH PROVIDING THE NEW DUCTWORK SYSTEMS.
5. THE WORK WILL BE COMPLETED IN PHASES DUE TO THE REQUIREMENT THAT THE FACILITY MUST REMAIN OPERATIONAL DURING THE DUCTWORK REPLACEMENT. THE CONTRACTOR SHALL PROVIDE A SEPARATE BID PRICE AND CONSTRUCTION TIMETABLE FOR EACH SYSTEM. THE OWNER WILL PRIORITIZE SYSTEM REPLACEMENT AND IDENTIFY PERIODS OF TIME WHEN WORK CAN BE PERFORMED, I.E. SCHOOL HOLIDAYS, ETC.
6. THE OWNER (SPC) WILL PROVIDE TEST AND BALANCE CONTRACTOR TO MONITOR PRE AND POST CONSTRUCTION AIR VOLUMES. SUBMITTALS SHALL BE PROVIDED IN ELECTRONIC FORMAT. TEST AND BALANCE WORK IS LIMITED TO AIR HANDLING UNITS, PACKAGED ROOFTOP AIR CONDITIONERS AND VARIABLE AIR VOLUME TERMINAL UNITS. TEST AND BALANCE OF AIR INLETS AND OUTLETS IS NOT REQUIRED.
7. EXISTING CORRIDOR WALLS ARE METAL STUD WITH GYPSUM BOARD, CONTINUOUS FROM FLOOR TO FLOOR AND SEALED FOR SMOKE TIGHT CONSTRUCTION. WHERE DUCTWORK IS REMOVED WALL OPENINGS SHALL BE PATCHED AND SEALED TO MAINTAIN INTEGRITY OF SMOKE TIGHT CONSTRUCTION. WHERE NEW DUCTWORK PENETRATES WALL THE INSULATION SHALL BE CONTINUOUS THRU WALL AND ANNULAR SPACE BETWEEN INSULATION AND WALL SHALL BE SEALED.
8. THE CONTRACTOR SHALL PROVIDE DUCT PRESSURE LEAKAGE TESTING AS SPECIFIED IN SECTION 15950.
9. PROVIDE DUCT CLEANING FOR AHU-1, DUCT CLEANING SHALL BE PROVIDED FOR INTERNAL INSULATED DUCTS BETWEEN AIR HANDLING UNIT OUTLET AND INLETS TO ASSOCIATED VAV TERMINAL UNITS. ALL DUCTWORK IS INTERNALLY LINED. REFER TO SHEET M5.2 FOR DUCT CLEANING SPECIFICATION.

HVAC ABBREVIATIONS

ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
ADA	AMERICAN WITH DISABILITIES ACT	EWB	ENTERING WET BULB TEMPERATURE	LRA	LOCKED ROTOR AMPS	SMACNA	SHEET METAL & AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION
A.F.F.	ABOVE FINISHED FLOOR	EWT	ENTERING WATER TEMPERATURE	LWB	LEAVING WET BULB TEMPERATURE		
A.F.G.	ABOVE FINISHED GRADE	FBC	FLORIDA BUILDING CODE	LWT	LEAVING WATER TEMPERATURE	SP	STATIC PRESSURE
AFR	ABOVE FINISHED ROOF	FCU	FAN COIL UNIT	MBH	THOUSANDS OF BTU PER HOUR	SS	SANITARY SEWER STACK
AHU	AIR-HANDLING UNIT	FD	FIRE DAMPER	MC	MECHANICAL CONTRACTOR	TSP	TOTAL STATIC PRESSURE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	FD	FLOOR DRAIN	MCA	MINIMUM CIRCUIT AMPS	UBC	UNIFORM BUILDING CODE
AP	ACCESS PANEL	FLA	FULL LOAD AMPS	MOCP	MAXIMUM OVER CURRENT PROTECTION	UL	UNDERWRITERS LABORATORIES
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATION, & AIR CONDITIONING ENGINEERS	F.P.C.	FIRE PROTECTION CONTRACTOR	NC	NORMALLY CLOSED	UMC	UNIFORM MECHANICAL CODE
		FPM	FEET PER MINUTE	NEC	NATIONAL ELECTRIC CODE	UON	UNLESS OTHERWISE NOTED
		FT	FEET	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION	UPC	UNIFORM PLUMBING CODE
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS	GAL	GALLONS	NIC	NOT IN CONTRACT	V	VENT
		G.C.	GENERAL CONTRACTOR	NO	NORMALLY OPEN	V	VOLTS
ASPE	AMERICAN SOCIETY OF PLUMBING ENGINEERS	GPH	GALLONS PER HOUR	NTS	NOT TO SCALE	VAV	VARIABLE AIR VOLUME
		GPM	GALLONS PER MINUTE	OA	OUTSIDE AIR	VB	VACUUM BREAKER
BHP	BRAKE HORSE POWER	HP	HORSEPOWER	PC	PLUMBING CONTRACTOR	VFD	VARIABLE FREQUENCY DRIVE
BTU	BRITISH THERMAL UNIT	HR	HOUR	PSI	POUNDS PER SQUARE INCH	VIF	VERIFY IN FIELD
BTUH	BRITISH THERMAL UNITS PER HOUR	HSPF	HEATING SEASON PERFORMANCE FACTOR	PSIG	POUNDS PER SQUARE INCH-GAUGE	VRF	VARIABLE REFRIGERANT FLOW
CFM	CUBIC FEET PER MINUTE	HVAC	HEATING, VENTILATION, & AIR CONDITIONING	PTAC	PACKAGED TERMINAL AIR CONDITIONER	VRV	VARIABLE REFRIGERANT VOLUME
CO	CLEAN OUT			PVC	POLYVINYL CHLORIDE	VS	VENT STACK
COP	COEFFICIENT OF PERFORMANCE	Hz	HERTZ	RA	RETURN AIR	VTR	VENT THROUGH ROOF
CPVC	CHLORINATED POLYVINYL CHLORIDE	IBC	INTERNATIONAL BUILDING CODE	RD	ROOF DRAIN		
CU	CONDENSING UNIT	IECC	INTERNATIONAL ENERGY CONSERVATION CODE	RLA	RATED LOAD AMPS	%RH	PERCENT RELATIVE HUMIDITY
DDC	DIRECT DIGITAL CONTROLS			RO	ROOF OVERFLOW	ΔP	CHANGE IN PRESSURE
DIA.	DIAMETER	IMC	INTERNATIONAL MECHANICAL CODE	RPBFP	REDUCED PRESSURE BACKFLOW PREVENTER	ΔT	CHANGE IN TEMPERATURE
EAT	ENTERING AIR TEMPERATURE	IPC	INTERNATIONAL PLUMBING CODE			°C	DEGREES CELCIUS
EC	ELECTRICAL CONTRACTOR	IPLV	INTEGRATED PART-LOAD VALUE	RPM	REVOLUTIONS PER MINUTE	°F	DEGREES FAHRENHEIT
EDB	ENTERING DRY BULB TEMPERATURE	KW	KILOWATTS	RTU	ROOF TOP UNIT	°K	DEGREES KELVIN
EER	ENERGY EFFICIENCY RATIO	LAT	LEAVING AIR TEMPERATURE	SA	SUPPLY AIR	°R	DEGREES RANKIN
ESP	EXTERNAL STATIC PRESSURE	LB	POUNDS FORCE	SC	SITE CONTRACTOR	"WC	INCHES WATER COLUMN
ETR	EXISTING TO REMAIN	LDB	LEAVING DRY BULB TEMPERATURE	SEER	SEASONAL ENERGY EFFICIENCY RATIO	ø	DIAMETER
EUH	ELECTRIC UNIT HEATER	LEED	LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN			ϕ	ELECTRICAL PHASE

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REVIEWED BY: JWY

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2	4-02-2012	REVIEW COMMENTS

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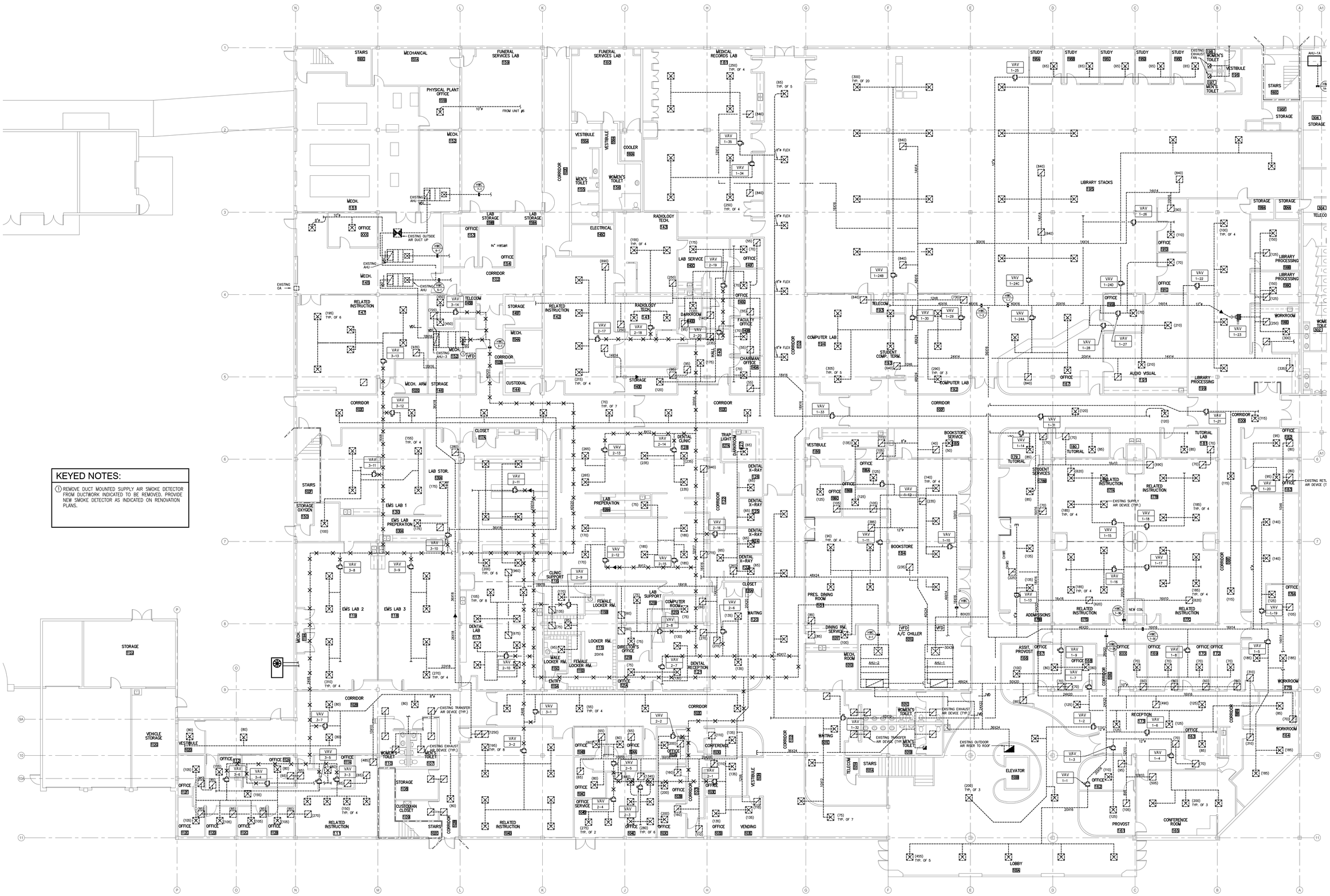

KEYED NOTES:

1. REMOVE DUCT MOUNTED SUPPLY AIR SMOKE DETECTOR FROM DUCTWORK INDICATED TO BE REMOVED. PROVIDE NEW SMOKE DETECTOR AS INDICATED ON RENOVATION PLANS.

NORTH

1ST FLOOR DEMOLITION PLAN

SCALE : 3/32" = 1'-0"

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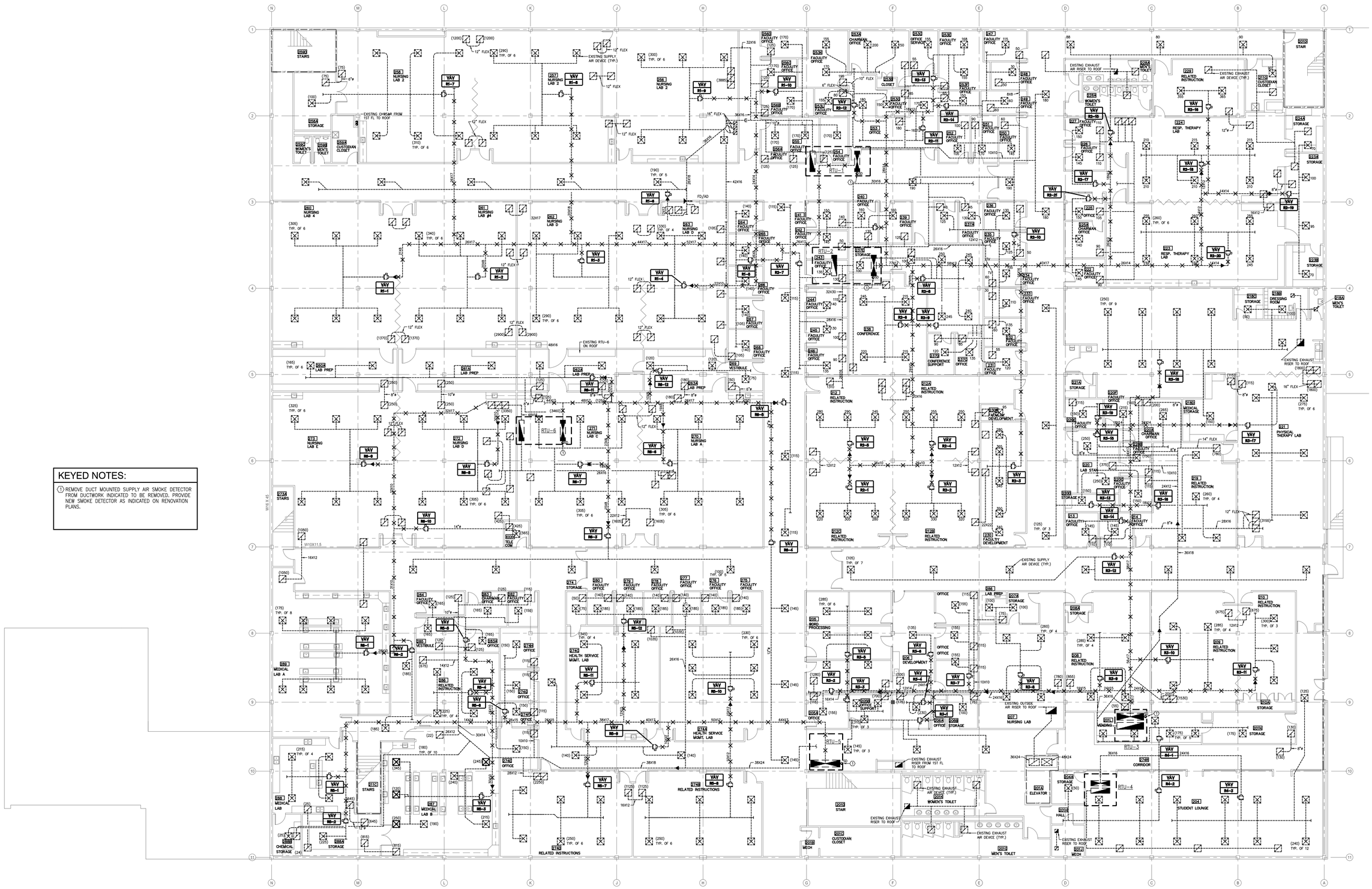

KEYED NOTES:

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NORTH

2ND FLOOR DEMOLITION PLAN

SCALE : 3/32" = 1'-0"

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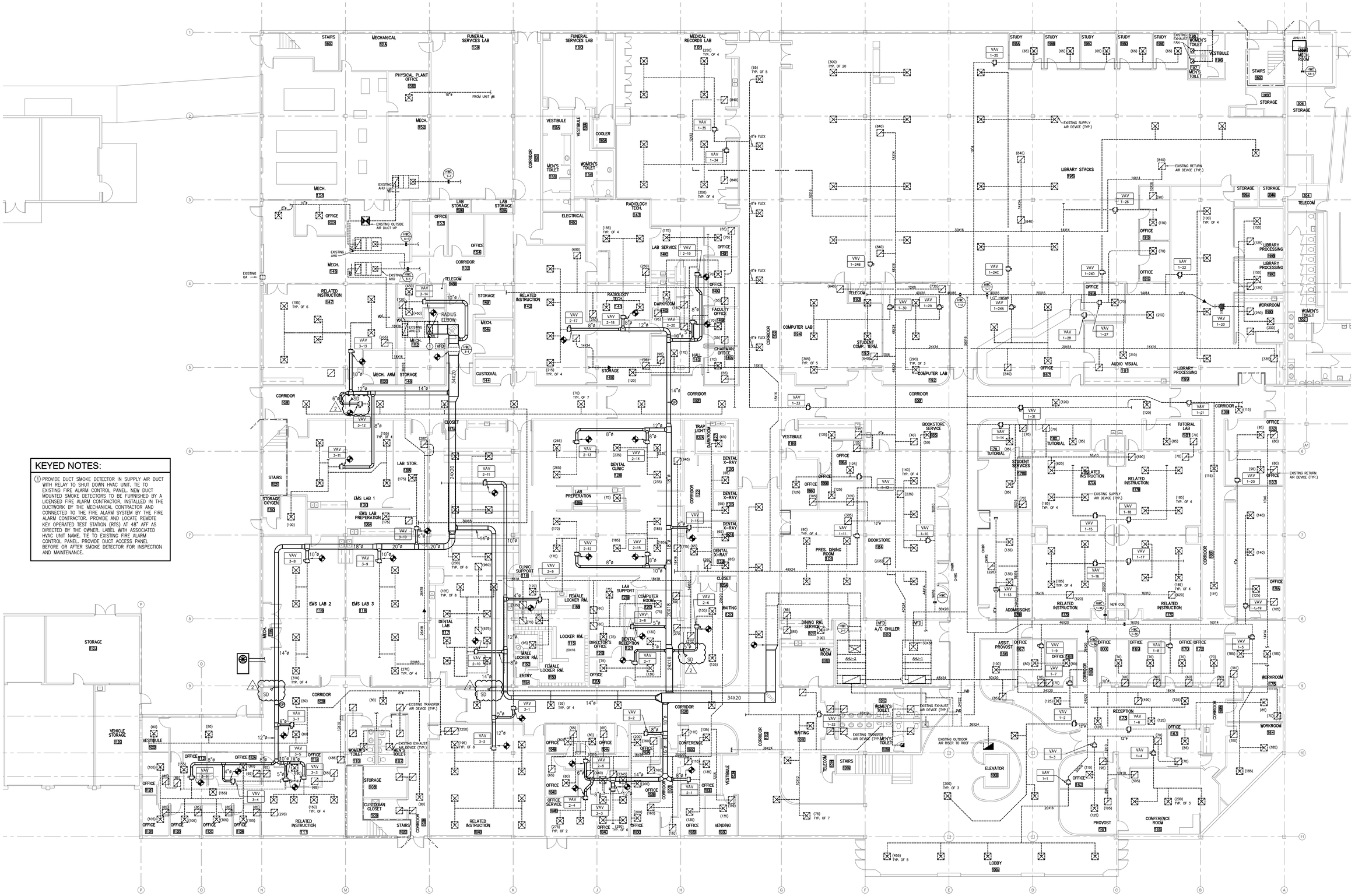

KEYED NOTES:

1. PROVIDE DUCT SMOKE DETECTOR IN SUPPLY AIR DUCT WITH RELAY TO SHUT DOWN HVAC UNIT. TIE TO EXISTING FIRE ALARM CONTROL PANEL. NEW DUCT MOUNTED SMOKE DETECTORS TO BE FURNISHED BY A LICENSED FIRE ALARM CONTRACTOR, INSTALLED IN THE DUCTWORK BY THE MECHANICAL CONTRACTOR AND CONNECTED TO THE FIRE ALARM SYSTEM BY THE FIRE ALARM CONTRACTOR. PROVIDE AND LOCATE REMOTE KEY OPERATED TEST STATION (RTS) AT 48" AFF AS DIRECTED BY THE OWNER. LABEL WITH ASSOCIATED HVAC UNIT NAME. TIE TO EXISTING FIRE ALARM CONTROL PANEL. PROVIDE DUCT ACCESS PANEL BEFORE OR AFTER SMOKE DETECTOR FOR INSPECTION AND MAINTENANCE.

1ST FLOOR RENOVATION PLAN

NORTH

SCALE : 3/32" = 1'-0"

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KEYED NOTES:

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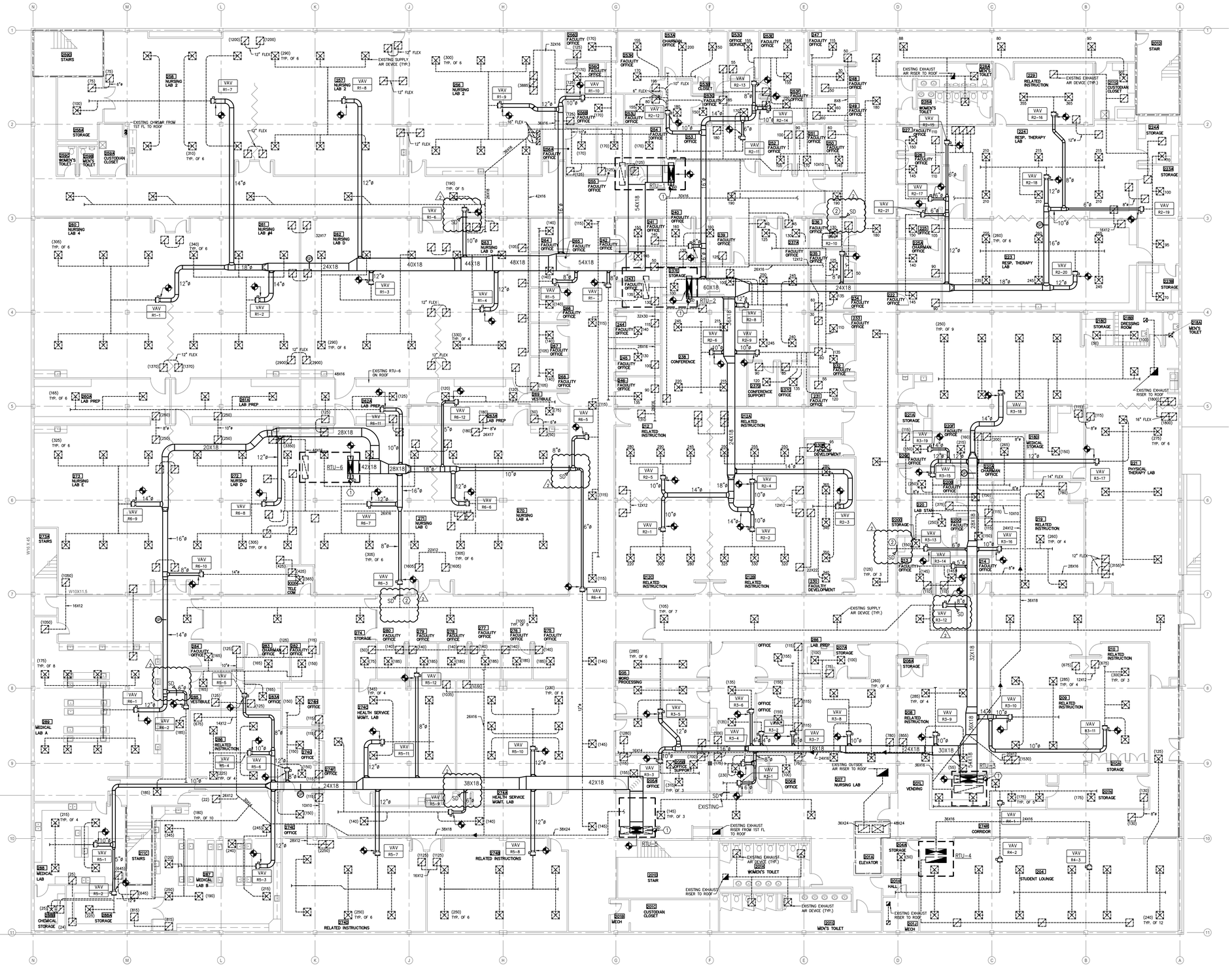
2. PROVIDE SMOKE DAMPER IN EXISTING DUCT.



NORTH

2ND FLOOR RENOVATION PLAN

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DUCTWORK REPAIR AND REPLACEMENT

7200 66TH STREET NORTH, PINELLAS PARK, FLORIDA

CLIENT INFORMATION

DRAWN BY: JWY

REVIEWED BY: JWY

GEI PROJECT NUMBER: 11066

DATE: MARCH 12, 2012

SHEET TITLE: 2ND FLOOR RENOVATION PLAN

NO.	DATE	SET ISSUED FOR:
1	3-15-2012	REVIEW COMMENTS
2	4-02-2012	REVIEW COMMENTS

SHEET NUMBER: M2.4

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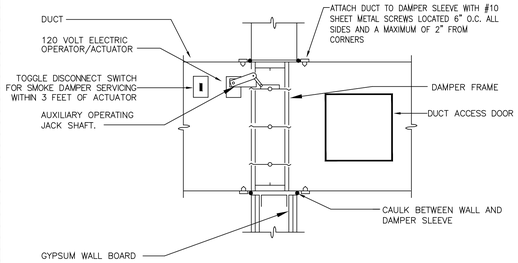


OPERATION:

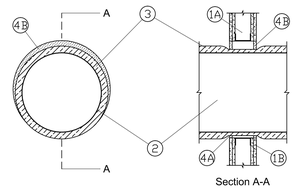
A. SMOKE DAMPER MODE
SMOKE DETECTOR UPON SENSING HEAT/SMOKE ACTUATES DAMPER MOTOR TO CLOSE DAMPER.
B. RELAYS:
ACTIVATED BY THE FIRE ALARM SYSTEM, TO SHUT DOWN H.V.A.C. SYSTEM AND CLOSE SMOKE DAMPERS.
C. SHUT DOWN OF H.V.A.C. SYSTEM TO INITIATE CLOSING OF SMOKE DAMPERS.

GENERAL:

A. INSTALLATION OF DAMPERS OUT OF WALL IS SIMILAR FOR ATTACHMENT OF DUCT TO DAMPER SLEEVE.

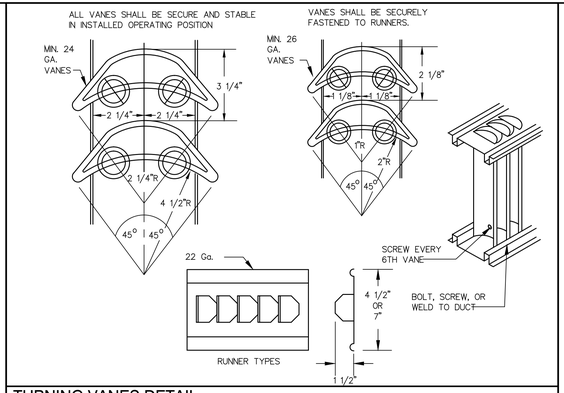
SMOKE DAMPER SPECIFICATION
1. FABRICATE IN ACCORDANCE WITH NFPA 90A AND UL 555S.
2. LEAKAGE RATING: CLASS I, MAXIMUM OF 8 CFM AT 4 INCHES WG DIFFERENTIAL PRESSURE.
3. DAMPER TEMPERATURE RATING: 250 DEGREES F.
4. FRAME: 16 GAGE, GALVANIZED STEEL.
5. BLADES:
STYLE: [SINGLE SKIN WITH 3 LONGITUDINAL GROOVES] [AIRFOIL-SHAPED, SINGLE PIECE, DOUBLE SKIN].
ACTION: OPPOSED.
ORIENTATION: HORIZONTAL.
MATERIAL: MINIMUM 16 GAGE EQUIVALENT THICKNESS, GALVANIZED STEEL.
WIDTH: MAXIMUM 6 INCHES.
6. BEARINGS: STAINLESS STEEL PRESSED INTO FRAME.
7. SEALS: SILICONE BLADE EDGE SEALS AND FLEXIBLE STAINLESS STEEL JAMB SEALS.
8. LINKAGE: CONCEALED IN FRAME.
9. ACTUATOR:
TYPE: ELECTRIC 120 VOLT, 60 HERTZ, TWO-POSITION, FAIL CLOSE, FAIL CLOSE.
MOUNTING: EXTERNAL.
10. SLEEVE: FACTORY INSTALLED 20 GAGE SLEEVE, MINIMUM 12 INCHES LONG.

SMOKE DAMPER THROUGH WALL INSTALLATION DETAIL
NOT TO SCALE

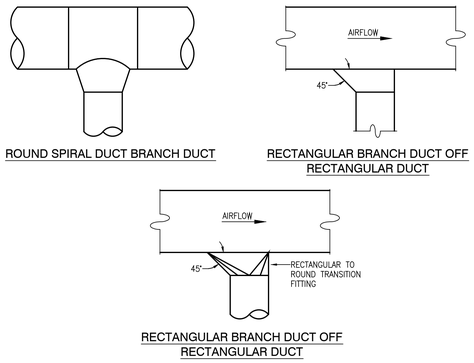


1. WALL ASSEMBLY – GYPSUM BOARD/STEEL STUD WALL ASSEMBLY.
A. STUDS – WALL FRAMING MIN 3-1/2 IN. (89 MM) WIDE STEEL CHANNEL STUDS SPACED MAX 24 IN. (610 MM) OC.
B. GYPSUM BOARD* – 5/8 IN. (16 MM) THICK, 4 FT (1.22 M) WIDE WITH SQUARE OR TAPERED EDGES.
2. STEEL DUCT – SPIRAL-WOUND OR LONG SEAM STEEL DUCT TO BE INSTALLED ECCENTRICALLY OR CONCENTRICALLY WITHIN THE OPENING. STEEL DUCT TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF THE WALL ASSEMBLY.
3. BATTS AND BLANKETS* – NOM 2 IN. (51 MM) THICK LIGHT DENSITY (MIN 3/4 PCF OR 12 KG/M3) GLASS FIBER BLANKET INSULATION JACKETED ON THE OUTSIDE WITH A FOIL-SCRIM-KRAFT FACING. LONGITUDINAL AND TRANSVERSE JOINTS SEALED WITH FOIL-SCRIM-KRAFT TAPE. NOM ANNULAR SPACE TO BE 1 IN. (25 MM).
SEE BATTS AND BLANKETS (BKNV) CATEGORY IN THE BUILDING MATERIALS DIRECTORY FOR NAMES OF MANUFACTURERS. ANY BATT OR BLANKET MEETING THE ABOVE SPECIFICATIONS AND BEARING THE UL CLASSIFICATION MARKING WITH A FLAME SPREAD VALUE OF 25 OR LESS AND A SMOKE DEVELOPED VALUE OF 50 OR LESS MAY BE USED.
4. FILL, VOID OR CAVITY MATERIAL* – SEALANT – MIN 5/8 IN. (16 MM) THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH BOTH SURFACES OF THE WALL.
SPECIFIED TECHNOLOGIES INC – SPECSEAL SERIES SSS SEALANT OR SPECSEAL LCI SEALANT

ROUND DUCT THOUGH SMOKE-TIGHT CORRIDOR WALL
NOT TO SCALE



TURNING VANES DETAIL
NOT TO SCALE



ROUND SPIRAL DUCT BRANCH DUCT

RECTANGULAR BRANCH DUCT OFF RECTANGULAR DUCT

RECTANGULAR BRANCH DUCT OFF RECTANGULAR DUCT

DUCTWORK FITTINGS DETAIL
NOT TO SCALE

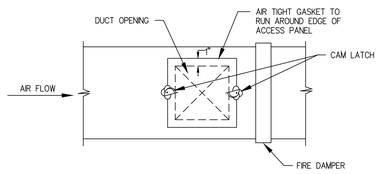
ROUND DUCT HANGERS MINIMUM SIZE				
DIA.	MAXIMUM SPACING	ROD	STRAP	
10" DN.	12'	1/4"	1" x 22 GA.	
11-18"	12'	1/4"	1" X 22 GA.	
19-24"	12'	1/4"	1" X 22 GA.	
25-36"	12'	3/8"	1" X 20 GA.	
37-50"	12'	TWO 3/8"	(2) 1" X 20 GA.	
51-60"	12'	TWO 3/8"	(2) 1" X 18 GA.	
61-84"	12'	TWO 3/8"	(2) 1" X 16 GA.	

NOTES:
1. STRAPS ARE GALVANIZED STEEL; RODS ARE UNCOATED OR GALVANIZED STEEL.
2. TABLE ALLOWS FOR CONVENTIONAL WALL THICKNESS, AND JOINT SYSTEMS PLUS ONE LB/SF OF INSULATION WEIGHT.

RECTANGULAR DUCT HANGERS MINIMUM SIZE								
MAXIMUM HALF OF DUCT PERIMETER	PAIR AT 10 FT. SPACING		PAIR AT 8 FT. SPACING		PAIR AT 5 FT. SPACING		PAIR AT 4 FT. SPACING	
	STRAP	WIRE/ ROD	STRAP	WIRE/ ROD	STRAP	WIRE/ ROD	STRAP	WIRE/ ROD
P/2=30"	1"x22 GA.	10 GA. (135")	1"x22 GA.	10 GA. (135")	1"x22 GA.	10 GA. (106")	1"x22 GA.	10 GA. (106")
P/2=72"	1"x18 GA.	3/8"	1"x20 GA.	1/2"	1"x22 GA.	1/2"	1"x22 GA.	1/2"
P/2=96"	1"x16 GA.	3/8"	1"x18 GA.	3/8"	1"x20 GA.	3/8"	1"x22 GA.	1/2"
P/2=120"	1 1/2"x16 GA.	1/2"	1"x16 GA.	3/8"	1"x18 GA.	3/8"	1"x20 GA.	1/2"
P/2=168"	1 1/2"x16 GA.	1/2"	1"x16 GA.	1/2"	1"x16 GA.	3/8"	1"x18 GA.	3/8"
P/2=192"	1 1/2"x16 GA.	1/2"	1"x16 GA.	1/2"	1"x16 GA.	3/8"	1"x16 GA.	3/8"
P/2=>193"	SPECIAL ANALYSIS REQUIRED							

WHEN STRAPS ARE LAP JOINED USE THESE MINIMUM FASTENERS:	SINGLE HANGER MAXIMUM ALLOWABLE LOAD	
	STRAP	WIRE OR ROD (DIA.)
1"x18, 20, 22 GA. – (2)#10 OR (1) 1/4" BOLT 1"x16 GA. – (2) 1/4" DIA. 1"x16 GA. – (2) 3/8" DIA. PLACE FASTENERS IN SERIES, NOT SIDE BY SIDE.	1"x22 GA.–260 LBS. 1"x20 GA.–320 LBS. 1"x18 GA.–420 LBS. 1"x16 GA.–700 LBS. 1 1/2"x16 GA.–1100 LBS.	0.106"–80 LBS. 0.135"–120 LBS. 0.162"–160 LBS. 1/4" DIA.–270 LBS. 3/8" DIA.–680 LBS. 1/2" DIA.–1250 LBS.

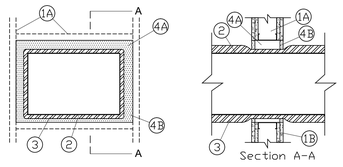
NOTES:
1. DIMENSIONS OTHER THAN GUAGE ARE IN INCHES.
2. TABLES ALLOW FOR DUCT WEIGHT, 1 LB/SF INSULATION WEIGHT AND NORMAL REINFORCEMENT AND TRAPEZE WEIGHT, BUT NO EXTERNAL LOADS!
3. STRAPS ARE GALVANIZED STEEL; OTHER MATERIALS ARE UNCOATED STEEL.
4. ALLOWABLE LOADS FOR P/2 ASSUME TNAT DUCTS ARE 16 GA. MAXIMUM, EXCEPT THAT WHEN MAXIMUM DUCT DIMENSION (W) IS OVER 60" THEN P/2 MAXIMUM IS (1.25 W).



ACCESS PANEL SIZE SCHEDULE	
FIRE DAMPER SIZE	ACCESS PANEL SIZE
6" TO 15"	10" W x (DAMPER DEPTH-2") D
15" TO 21"	12" W x (DAMPER DEPTH-2") D
21" AND ABOVE	18" W x (DAMPER DEPTH-2") D

ALL OTHER ACCESS PANELS TO BE A MINIMUM OF 15" x 15" WHERE DUCT SIZE ALLOWS. USE FOUR CAM LATCHES ON PANELS LARGER THAN 18" x 18" SIZE.

DUCTWORK ACCESS PANEL DETAIL
NOT TO SCALE



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B. GYPSUM BOARD* – 5/8 IN. (16 MM) THICK, 4 FT (1.22 M) WIDE WITH SQUARE OR TAPERED EDGES.
2. STEEL DUCT – STEEL DUCT TO BE INSTALLED WITHIN THE FRAMED OPENING. MIN CLEARANCE BETWEEN DUCT AND EDGE OF FRAMED OPENING IN WALL IS 3 IN. (76 MM). STEEL DUCT TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF THE WALL ASSEMBLY.
3. BATTS AND BLANKETS* – NOM 2 IN. (51 MM) THICK LIGHT DENSITY (MIN 3/4 PCF OR 12 KG/M3) GLASS FIBER BLANKET INSULATION JACKETED ON THE OUTSIDE WITH A FOIL-SCRIM-KRAFT FACING. LONGITUDINAL AND TRANSVERSE JOINTS SEALED WITH FOIL-SCRIM-KRAFT TAPE. NOM ANNULAR SPACE BETWEEN INSULATED STEEL DUCT AND PERIPHERY OF OPENING TO BE 1 IN. (25 MM).
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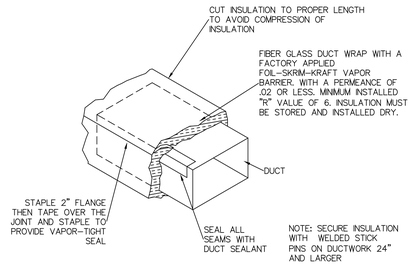
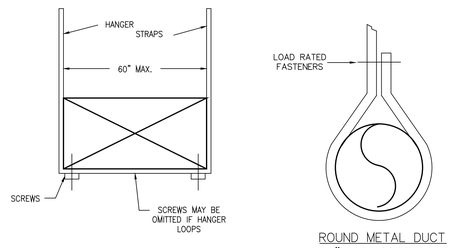


FIBERGLASS BLANKET DUCT INSULATION DETAIL
NOT TO SCALE



SINGLE RECTANGULAR METAL DUCT

ROUND METAL DUCT 24"ϕ MAXIMUM

DUCTWORK SUPPORT DETAIL
NOT TO SCALE

PROFESSIONAL SEAL

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VAV UNIT SCHEDULE - RTU-1

MARK	MANUFACTURER AND MODEL	AIR QUANTITY				ELECTRICAL HEATING COIL (KW)	VOLTAGE (V/Ø/Hz)	NUMBER OF HEATING STAGES	MAXIMUM PRESSURE DROP (INCHES H_2O)	MAXIMUM N.C. LEVEL
		COOLING MODE		HEATING MODE						
		MAX.	MIN.	MAX.	MIN.					
VAV-R1-1	TRANE VCCF-12	1825	730	1825	730	–	–	–	0.01	30
VAV-R1-2	TRANE VCCF-14	2040	815	2040	815	–	–	–	0.01	25
VAV-R1-3	TRANE VCCF-12	1760	705	1760	705	–	–	–	0.01	28
VAV-R1-4	TRANE VCCF-12	1310	525	1310	525	–	–	–	0.01	25
VAV-R1-5	TRANE VCCF-8	705	280	705	280	–	–	–	0.05	25
VAV-R1-6	TRANE VCCF-10	955	380	955	380	–	–	–	0.01	25
VAV-R1-7	TRANE VCCF-14	1970	790	1970	790	–	–	–	0.01	25
VAV-R1-8	TRANE VCCF-12	1740	695	1740	695	–	–	–	0.01	30
VAV-R1-9	TRANE VCCF-12	1820	730	1820	730	–	–	–	0.01	30
VAV-R1-10	TRANE VCEF-10	1030	410	1030	410	8.5	208/1/60	3	0.01	25

VAV UNIT SCHEDULE - RTU-2

MARK	MANUFACTURER AND MODEL	AIR QUANTITY				ELECTRICAL HEATING COIL (KW)	VOLTAGE (V/Ø/Hz)	NUMBER OF HEATING STAGES	MAXIMUM PRESSURE DROP (INCHES H_2O)	MAXIMUM N.C. LEVEL
		COOLING MODE		HEATING MODE						
		MAX.	MIN.	MAX.	MIN.					
VAV-R2-1	TRANE VCCF-10	1005	405	1005	405	–	–	–	0.01	25
VAV-R2-2	TRANE VCCF-10	1005	405	1005	405	–	–	–	0.01	25
VAV-R2-3	TRANE VCCF-14	1930	770	1930	770	–	–	–	0.01	25
VAV-R2-4	TRANE VCCF-10	1075	430	1075	430	–	–	–	0.01	25
VAV-R2-5	TRANE VCCF-10	1005	405	1005	405	–	–	–	0.01	25
VAV-R2-6	TRANE VCEF-10	920	370	920	370	7.5	208/1/60	2	0.01	25
VAV-R2-7	TRANE VCCF-10	1160	465	1160	465	–	–	–	0.01	26
VAV-R2-8	TRANE VCCF-12	1790	715	1790	715	–	–	–	0.01	30
VAV-R2-9	TRANE VCCF-10	1265	505	1265	505	–	–	–	0.01	28
VAV-R2-10	TRANE VCCF-8	775	310	775	310	–	–	–	0.01	25
VAV-R2-11	TRANE VCCF-6	385	155	385	155	–	–	–	0.15	23
VAV-R2-12	TRANE VCEF-10	1010	405	1010	405	8.5	208/1/60	2	0.01	25
VAV-R2-13	TRANE VCCF-8	655	260	655	260	–	–	–	0.05	25
VAV-R2-14	TRANE VCCF-10	920	370	920	370	–	–	–	0.01	25
VAV-R2-15	TRANE VCCF-6	480	190	480	190	–	–	–	0.20	25
VAV-R2-16	TRANE VCCF-8	750	300	750	300	–	–	–	0.05	25
VAV-R2-17	TRANE VCCF-6	280	110	280	110	–	–	–	0.08	20
VAV-R2-18	TRANE VCCF-12	1540	615	1540	615	–	–	–	0.01	28
VAV-R2-19	TRANE VCCF-6	360	145	360	145	–	–	–	0..15	23
VAV-R2-20	TRANE VCCF-12	1585	635	1585	635	–	–	–	0.01	28
VAV-R2-21	TRANE VCCF-6	445	180	445	180	–	–	–	0.20	23

VAV UNIT SCHEDULE - RTU-3

MARK	MANUFACTURER AND MODEL	AIR QUANTITY				ELECTRICAL HEATING COIL (KW)	VOLTAGE (V/Ø/Hz)	NUMBER OF HEATING STAGES	MAXIMUM PRESSURE DROP (INCHES H_2O)	MAXIMUM N.C. LEVEL
		COOLING MODE		HEATING MODE						
		MAX.	MIN.	MAX.	MIN.					
VAV-R3-1	TRANE VCCF-6	440	175	440	175	–	–	–	0.15	23
VAV-R3-2	TRANE VCEF-4	155	65	155	65	1.5	208/1/60	2	0.01	30
VAV-R3-3	TRANE VCCF-10	940	375	940	375	–	–	–	0.01	25
VAV-R3-4	TRANE VCCF-6	330	130	330	130	–	–	–	0.15	23
VAV-R3-5	TRANE VCCF-12	1720	690	1720	690	–	–	–	0.01	28
VAV-R3-6	TRANE VCCF-4	135	55	135	55	–	–	–	0.01	25
VAV-R3-7	TRANE VCCF-6	470	190	470	190	–	–	–	0.20	25
VAV-R3-8	TRANE VCCF-10	1245	500	1245	500	–	–	–	0.01	27
VAV-R3-9	TRANE VCCF-10	1155	460	1155	460	–	–	–	0.01	25
VAV-R3-10	TRANE VCCF-10	1155	460	1155	460	–	–	–	0.01	25
VAV-R3-11	TRANE VCCF-10	910	365	910	365	–	–	–	0.01	24
VAV-R3-12	TRANE VCCF-8	755	300	755	300	–	–	–	0.06	25
VAV-R3-13	TRANE VCCF-6	380	150	380	150	–	–	–	0.15	22
VAV-R3-14	TRANE VCCF-5	290	115	290	115	–	–	–	0.02	23
VAV-R3-15	TRANE VCEF-12	1440	575	1440	575	11.5	208/3/60	2	0.01	28
VAV-R3-16	TRANE VCCF-10	1055	420	1055	420	–	–	–	0.01	25
VAV-R3-17	TRANE VCCF-12	1655	660	1655	660	–	–	–	0.01	28
VAV-R3-18	TRANE VCCF-14	2520	1010	2520	1010	–	–	–	0.01	28
VAV-R3-19	TRANE VCCF-4	155	65	155	65	–	–	–	0.01	25

EXTERIOR AIR HANDLING SCHEDULE

MARK	–	RTU-1	RTU-2	RTU-3	RTU-5	RTU-6
MANUFACTURER	–	TRANE	TRANE	TRANE	TRANE	TRANE
MODEL NUMBER	–	TSCX035	TSCX050	TSCX035	TSCX030	TSCX025
SUPPLY AIR QUANTITY	CFM	15404	20172	17069	12466	12175
OUTSIDE AIR QUANTITY	CFM	3835	5200	4675	3605	3170
FAN WHEEL TYPE/DIAMETER	–	G35–22" AF	D50–32" AF	E35–25" AF	G30–22" AF	E25–22" AF
MAXIMUM FAN SPEED	RPM	1954	1089	1664	1743	1784
MAXIMUM OUTLET VELOCITY	FPM	–	–	–	–	–
STATIC PRESS. DROP EXT./TOTAL	IN. H2O/IN. H2O	2.75/5.29	2.75/4.69	2.75/5.64	2.75/4.98	2.75/5.54
MOTOR SIZE	HP	25	25	30	20	20
ELECTRICAL CHARACTERISTICS	V/ /HZ	460/3/60	460/3/60	460/3/60	460/3/60	460/3/60
PRE–FILTER EFFICIENCY	%	35	35	35	35	35
PRE–FILTER TYPE	–	2" PLEATED	2" PLEATED	2" PLEATED	2" PLEATED	2" PLEATED
AFTER–FILTER EFFICIENCY	%	65	65	65	65	65
AFTER–FILTER TYPE	–	4" PLEATED	4" PLEATED	4" PLEATED	4" PLEATED	4" PLEATED
COOLING COIL						
TOTAL COOLING CAPACITY	MBH	675.34	891.56	784.84	586.63	546.77
SENSIBLE COOLING CAPACITY	MBH	439.89	576.12	493.40	363.21	349.14
COOLING COIL MAX. FACE VELOCITY	FPM	451	408	500	430	499
ENTERING AIR TEMP. DB./WB.	F/ F	77.9/66.5	77.9/66.6	78.2/67.1	78.4/67.4	78/66.8
LEAVING AIR TEMP. DB./WB.	F/ F	52/51.9	52/51.9	52/51.9	52/51.9	52/51.9
COOLING COIL MAX. AIR PRESS. DROP	INCHES W.G.	0.83	0.67	1.04	0.79	1.09
COOLING COIL EWT/LWT	F/ F	44/59	44/59	44/59	44/59	44/59
COOLING COIL WATER FLOWRATE	GPM	89.75	118.49	104.3	77.96	72.66
COOLING COIL MAX. H2O PRESS. DROP	FT. H2O	6.07	7.68	7.89	5.32	4.26
REHEAT COIL						
TOTAL REHEATING CAPACITY	MBH	384.23	503.16	425.76	310.95	303.69
REHEATING COIL MAX. FACE VELOCITY	FPM	451	408	500	430	499
ENTERING AIR TEMP. DB.	F	52	52	52	52	52
LEAVING AIR TEMP. DB.	F	75	75	75	75	75
REHEAT. COIL MAX. AIR PRESS. DROP	INCHES W.G.	0.13	0.11	0.16	0.12	0.17
REHEATING COIL EWT/LWT	F/ F	108/96	108/96	108/96	108/96	108/96
REHEATING COIL WATER FLOWRATE	GPM	64.2	84.08	71.14	51.96	50.75
REHEAT. COIL MAX. H20 PRESS. DROP	FT. H2O	2.32	3.21	2.82	1.79	1.59
HEATING COIL						
TOTAL HEATING CAPACITY	MBH	384.23	503.16	425.76	310.95	303.69
HEATING COIL MAX. FACE VELOCITY	FPM	451	408	500	430	499
ENTERING AIR TEMP. DB.	F	63.8	63.5	62.9	62.5	63.4
LEAVING AIR TEMP. DB.	F	85	85	85	85	85
HEATING COIL MAX. AIR PRESS. DROP	INCHES W.G.	0.13	0.11	0.16	0.12	0.17
HEATING COIL EWT/LWT	F/ F	160/140	160/140	160/140	160/140	160/140
HEATING COIL WATER FLOWRATE	GPM	64.2	84.08	71.14	51.96	50.75
HEATING COIL MAX. WATER PRESS. DROP	FT. H2O	2.32	3.21	2.82	1.79	1.59
SOUND PRESSURE (AT DISCHARGE AT 250 HZ OCTAVE BAND)	DB	91	86	91	88	88
DIMENSIONS	LXWXH	223X102X73	238X126X88	228X102X73	202X97X66	202X84X64
WEIGHT	LBS	7869	10471	8039	6200	5790
NOTES	–	BELOW	BELOW	BELOW	BELOW	BELOW

VAV UNIT SCHEDULE - RTU-5

MARK	MANUFACTURER AND MODEL	AIR QUANTITY				ELECTRICAL HEATING COIL (KW)	VOLTAGE (V/Ø/Hz)	NUMBER OF HEATING STAGES	MAXIMUM PRESSURE DROP (INCHES H_2O)	MAXIMUM N.C. LEVEL
		COOLING MODE		HEATING MODE						
		MAX.	MIN.	MAX.	MIN.					
VAV-R5-1	TRANE VCCF-10	825	350	825	350	–	–	–	0.01	25
VAV-R5-2	TRANE VCCF-5	300	120	300	120	–	–	–	0.02	23
VAV-R5-3	TRANE VCCF-12	1835	735	1835	735	–	–	–	0.01	30
VAV-R5-4	TRANE VCCF-10	910	365	910	365	–	–	–	0.01	25
VAV-R5-5	TRANE VCEF-8	670	270	670	270	5.5	208/1/60	2	0.05	25
VAV-R5-6	TRANE VCCF-8	750	300	750	300	–	–	–	0.05	25
VAV-R5-7	TRANE VCCF-12	1515	605	1515	605	–	–	–	0.01	28
VAV-R5-8	TRANE VCCF-12	1490	595	1490	595	–	–	–	0.01	28
VAV-R5-9	TRANE VCCF-6	415	165	415	165	–	–	–	0.15	23
VAV-R5-10	TRANE VCCF-12	1395	560	1395	560	–	–	–	0.01	25
VAV-R5-11	TRANE VCCF-12	1385	555	1385	555	–	–	–	0.01	25
VAV-R5-12	TRANE VCCF-8	830	330	830	330	–	–	–	0.05	25

VAV UNIT SCHEDULE - RTU-6

MARK	MANUFACTURER AND MODEL	AIR QUANTITY				ELECTRICAL HEATING COIL (KW)	VOLTAGE (V/Ø/Hz)	NUMBER OF HEATING STAGES	MAXIMUM PRESSURE DROP (INCHES H_2O)	MAXIMUM N.C. LEVEL
		COOLING MODE		HEATING MODE						
		MAX.	MIN.	MAX.	MIN.					
VAV-R6-1	TRANE VCCF-12	1410	565	1410	565	–	–	–	0.01	27
VAV-R6-2	TRANE VCCF-6	375	150	375	150	–	–	–	0.15	22
VAV-R6-3	TRANE VCCF-8	510	205	510	205	–	–	–	0.05	22
VAV-R6-4	TRANE VCCF-6	430	170	430	170	–	–	–	0.20	23
VAV-R6-5	TRANE VCCF-8	570	230	570	230	–	–	–	0.05	23
VAV-R6-6	TRANE VCCF-12	1835	735	1835	735	–	–	–	0.01	30
VAV-R6-7	TRANE VCCF-12	1835	735	1835	735	–	–	–	0.01	30
VAV-R6-8	TRANE VCCF-12	1835	735	1835	735	–	–	–	0.01	30
VAV-R6-9	TRANE VCCF-14	1965	785	1965	785	–	–	–	0.01	25
VAV-R6-10	TRANE VCCF-8	565	225	565	225	–	–	–	0.05	23
VAV-R6-11	TRANE VCCF-10	985	395	985	395	–	–	–	0.01	25
VAV-R6-12	TRANE VCCF-5	310	125	310	125	–	–	–	0.02	23

EXISTING AIR HANDLER MODIFICATIONS SCHEDULE

MARK	–	AHU-2	AHU-3
MANUFACTURER	–	TRANE	TRANE
MODEL NUMBER	–	CLCH-25E	CLCH-14C
SUPPLY AIR QUANTITY	CFM	11843	8600
OUTSIDE AIR QUANTITY	CFM	2324	1800 FROM OAU-4
FAN WHEEL TYPE/DIAMETER	–	22" FC	18.25" FC
MAXIMUM FAN SPEED	RPM	–	–
MAXIMUM OUTLET VELOCITY	FPM	–	–
STATIC PRESS. DROP EXT./TOTAL	IN. H2O/IN. H2O	4.00	3.75
MOTOR SIZE	HP	15	10
ELECTRICAL CHARACTERISTICS	V/ /HZ	460/3/60	460/3/60
PRE–FILTER EFFICIENCY	%	35	35
PRE–FILTER TYPE	–	2" PLEATED	2" PLEATED
AFTER–FILTER EFFICIENCY	%	65	65
AFTER–FILTER TYPE	–	4" PLEATED	4" PLEATED
COOLING COIL			
TOTAL COOLING CAPACITY	MBH	459	270
SENSIBLE COOLING CAPACITY	MBH	322	–
COOLING COIL MAX. FACE VELOCITY	FPM	–	–
ENTERING AIR TEMP. DB./WB.	F/ F	77.4/66.0	74.5/64.5
LEAVING AIR TEMP. DB./WB.	F/ F	54.0/52.8	52/51.9
COOLING COIL MAX. AIR PRESS. DROP	INCHES W.G.	–	–
COOLING COIL EWT/LWT	F/ F	44/59	44/59
COOLING COIL WATER FLOWRATE	GPM	62.5	36
COOLING COIL MAX. H2O PRESS. DROP	FT. H2O	–	–
NOTES			

VAV UNIT SCHEDULE - AHU-2

MARK	MANUFACTURER AND MODEL	AIR QUANTITY				ELECTRICAL HEATING COIL (KW)	VOLTAGE (V/Ø/Hz)	NUMBER OF HEATING STAGES	MAXIMUM PRESSURE DROP (INCHES H_2O)	MAXIMUM N.C. LEVEL
		COOLING MODE		HEATING MODE						
		MAX.	MIN.	MAX.	MIN.					
VAV-2-1	TRANE VCCF-8	530	210	530	210	–	–	–	0.05	23
VAV-2-2	TRANE VCCF-8	605	240	605	240	–	–	–	0.05	23
VAV-2-3	TRANE VCCF-12	1640	655	1640	655	–	–	–	0.01	25
VAV-2-4	TRANE VCCF-8	550	220	550	220	–	–	–	0.05	23
VAV-2-5	TRANE VCCF-5	240	95	240	95	–	–	–	0.01	25
VAV-2-6	TRANE VCCF-5	270	110	270	110	–	–	–	0.01	25
VAV-2-7	TRANE VCCF-5	250	100	250	100	–	–	–	0.01	25
VAV-2-8	TRANE VCCF-5	300	120	300	120	–	–	–	0.01	25
VAV-2-9	TRANE VCCF-4	185	75	185	75	–	–	–	0.01	25
VAV-2-10	TRANE VCCF-8	830	335	830	335	–	–	–	0.07	25
VAV-2-11	TRANE VCCF-10	1195	425	1195	425	–	–	–	0.01	24
VAV-2-12	TRANE VCCF-8	500	200	500	200	–	–	–	0.03	22
VAV-2-13	TRANE VCCF-8	535	215	535	215	–	–	–	0.03	22
VAV-2-14	TRANE VCCF-8	780	310	780	310	–	–	–	0.05	25
VAV-2-15	TRANE VCCF-8	560	225	560	225	–	–	–	0.05	25
VAV-2-16	TRANE VCCF-6	400	160	400	160	–	–	–	0.15	25
VAV-2-17	TRANE VCCF-8	850	340	850	340	–	–	–	0.08	27
VAV-2-18	TRANE VCCF-8	610	245	610	245	–	–	–	0.05	25
VAV-2-19	TRANE VCCF-8	540	215	540	215	–	–	–	0.05	25
VAV-2-20	TRANE VCEF-5	260	105	260	105	2	208/1/60	2	0.01	25

VAV UNIT SCHEDULE - AHU-3

MARK	MANUFACTURER AND MODEL	AIR QUANTITY				ELECTRICAL HEATING COIL (KW)	VOLTAGE (V/Ø/Hz)	NUMBER OF HEATING STAGES	MAXIMUM PRESSURE DROP (INCHES H_2O)	MAXIMUM N.C. LEVEL
		COOLING MODE		HEATING MODE						
		MAX.	MIN.	MAX.	MIN.					
VAV-3-1	TRANE VCCF-5	225	90	225	90	–	–	–	0.01	22
VAV-3-2	TRANE VCCF-12	1575	630	1575	630	–	–	–	0.01	25
VAV-3-3	TRANE VCCF-8	600	240	600	240	–	–	–	0.05	25
VAV-3-4	TRANE VCEF-4	160	65	160	65	1	208/1/60	1	0.01	25
VAV-3-5	TRANE VCCF-5	305	120	305	120	–	–	–	0.02	25
VAV-3-6	TRANE VCEF-8	505	200	505	200	3.5	208/1/60	2	0.03	22
VAV-3-7	TRANE VCCF-6	400	160	400	160	–	–	–	0.2	25
VAV-3-8	TRANE VCCF-10	1230	490	1230	490	–	–	–	0.01	25
VAV-3-9	TRANE VCCF-10	1085	435	1085	435	–	–	–	0.01	25
VAV-3-10	TRANE VCCF-6	355	140	355	140	–	–	–	0.15	22
VAV-3-11	TRANE VCCF-8	705	280	705	280	–	–	–	0.05	25
VAV-3-12	TRANE VCCF-6	475	190	475	190	–	–	–	0.2	25
VAV-3-13	TRANE VCCF-10	1190	475	1190	475	–	–	–	0.01	25
VAV-3-14	TRANE VCCF-10	905	360	905	360	–	–	–	0.01	25

NOTE:
SCHEDULES ARE FOR EXISTING EQUIPMENT, SCHEDULES PROVIDED FOR REFERENCE PURPOSES ONLY AND TO ASSIST IN TEST AND BALANCE WORK.

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SECTION 15081
HVAC INSULATION

PART 1 GENERAL
1.01 SUMMARY

A. SECTION INCLUDES:
1. DUCTWORK INSULATION.

1.02 REFERENCES

A. ASTM INTERNATIONAL:
1. ASTM C195 – STANDARD SPECIFICATION FOR MINERAL FIBER THERMAL INSULATING CEMENT.
2. ASTM C449/C449M – STANDARD SPECIFICATION FOR MINERAL FIBER HYDRAULIC–SETTING THERMAL INSULATING AND FINISHING CEMENT.
3. ASTM C518 – STANDARD TEST METHOD FOR STEADY–STATE HEAT FLUX MEASUREMENTS AND THERMAL TRANSMISSION PROPERTIES BY MEANS OF THE HEAT FLOW METER APPARATUS.
4. ASTM C553 – STANDARD SPECIFICATION FOR MINERAL FIBER BLANKET THERMAL INSULATION FOR COMMERCIAL AND INDUSTRIAL APPLICATIONS.
5. ASTM C921 – STANDARD PRACTICE FOR DETERMINING THE PROPERTIES OF JACKETING MATERIALS FOR THERMAL INSULATION.
6. ASTM C1136 – STANDARD SPECIFICATION FOR FLEXIBLE, LOW PERMEANCE VAPOR RETARDERS FOR THERMAL INSULATION.
7. ASTM C1290 – STANDARD SPECIFICATION FOR FLEXIBLE FIBROUS GLASS BLANKET INSULATION USED TO EXTERNALLY INSULATE HVAC DUCTS.
8. ASTM E84 – STANDARD TEST METHOD FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS.
9. ASTM E96 – STANDARD TEST METHODS FOR WATER VAPOR TRANSMISSION OF MATERIALS.
10. ASTM E162 – STANDARD TEST METHOD FOR SURFACE FLAMMABILITY OF MATERIALS USING A RADIANT HEAT ENERGY SOURCE.

B. SHEET METAL AND AIR CONDITIONING CONTRACTORS':
1. SMACNA – HVAC DUCT CONSTRUCTION STANDARD – METAL AND FLEXIBLE.

1.03 SUBMITTALS

A. PRODUCT DATA: SUBMIT PRODUCT DESCRIPTION, THERMAL CHARACTERISTICS AND LIST OF MATERIALS AND THICKNESS FOR EACH SERVICE, AND LOCATION.

B. MANUFACTURER'S INSTALLATION INSTRUCTIONS: SUBMIT MANUFACTURERS PUBLISHED LITERATURE INDICATING PROPER INSTALLATION PROCEDURES.

1.04 QUALIFICATIONS

A. MANUFACTURER: COMPANY SPECIALIZING IN MANUFACTURING PRODUCTS SPECIFIED IN THIS SECTION WITH MINIMUM THREE YEARS EXPERIENCE.

B. APPLICATOR: COMPANY SPECIALIZING IN PERFORMING WORK OF THIS SECTION WITH MINIMUM THREE YEARS EXPERIENCE.

1.05 DELIVERY, STORAGE, AND HANDLING

A. ACCEPT MATERIALS ON SITE IN ORIGINAL FACTORY PACKAGING, LABELED WITH MANUFACTURER'S IDENTIFICATION, INCLUDING PRODUCT DENSITY AND THICKNESS.

1.06 FIELD MEASUREMENTS

A. VERIFY FIELD MEASUREMENTS PRIOR TO FABRICATION.

1.07 WARRANTY

A. FURNISH ONE YEAR MANUFACTURER WARRANTY FOR MAN MADE FIBER.

PART 2 PRODUCTS

2.01 MINERAL FIBER, FLEXIBLE

A. MANUFACTURERS:
1. OWENS CORNING.
2. JOHNS MANVILLE.
3. KNAUF.

B. INSULATION: ASTM C553 MINERAL FIBER BLANKET THERMAL INSULATION FOR COMMERCIAL AND INDUSTRIAL APPLICATIONS, TYPE II.

C. VAPOR RETARDER JACKET:
1. KRAFT PAPER WITH GLASS FIBER YARN AND BONDED TO ALUMINIZED FILM.
2. MOISTURE VAPOR TRANSMISSION: ASTM E96: 0.04 PERM.
3. SECURE WITH TWO COATS OF VAPOR BARRIER MASTIC AND GLASS TAPE.

PART 3 EXECUTION

3.01 EXAMINATION

A. VERIFY DUCTWORK HAS BEEN TESTED BEFORE APPLYING INSULATION MATERIALS.

B. VERIFY SURFACES ARE CLEAN AND DRY, WITH FOREIGN MATERIAL REMOVED.

3.02 INSTALLATION

A. INSULATED DUCTWORK CONVEYING AIR BELOW AMBIENT TEMPERATURE:
1. PROVIDE INSULATION WITH VAPOR RETARDER JACKETS.
2. CONTINUE INSULATION THROUGH WALLS, SLEEVES, HANGERS, AND OTHER DUCT PENETRATIONS.
3. INSULATE ENTIRE SYSTEM INCLUDING FITTINGS, JOINTS, FLANGES, FIRE DAMPERS, FLEXIBLE CONNECTIONS, AND EXPANSION JOINTS.

B. PROVIDE MECHANICAL INSULATION FASTENERS FOR RECTANGULAR DUCT OVER 22 INCHES WIDE.

3.03 SCHEDULES

A. SUPPLY AIR DUCTS: (CONCEALED):
1. FLEXIBLE GLASS FIBER INSULATION: 1–1/2 INCH THICK

END OF SECTION

SECTION 15810
DUCTS

PART 1 GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. DUCT MATERIALS.
2. FLEXIBLE DUCTS.
3. SINGLE WALL SPIRAL ROUND DUCTS.
4. DOUBLE WALL SPIRAL INSULATED ROUND DUCTS.
5. TRANSVERSE DUCT CONNECTION SYSTEM.
6. DUCTWORK FABRICATION.

1.2 REFERENCES

A. ASTM INTERNATIONAL:
1. ASTM A90/A90M – STANDARD TEST METHOD FOR WEIGHT MASS OF COATING ON IRON AND STEEL ARTICLES WITH ZINC OR ZINC–ALLOY COATINGS.
2. ASTM A653/A653M – STANDARD SPECIFICATION FOR STEEL SHEET, ZINC–COATED (GALVANIZED) OR ZINC–IRON ALLOY–COATED (GALVANNEALED) BY THE HOT–DIP PROCESS.
3. ASTM E84 – STANDARD TEST METHOD FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS.

B. NATIONAL FIRE PROTECTION ASSOCIATION:
1. NFPA 90A – STANDARD FOR THE INSTALLATION OF AIR CONDITIONING AND VENTILATING SYSTEMS.

C. SHEET METAL AND AIR CONDITIONING CONTRACTORS:
1. SMACNA – HVAC AIR DUCT LEAKAGE TEST MANUAL.
2. SMACNA – HVAC DUCT CONSTRUCTION STANDARD – METAL AND FLEXIBLE.

D. UNDERWRITERS LABORATORIES INC.:
1. UL 181 – FACTORY–MADE AIR DUCTS AND CONNECTORS.

1.3 PERFORMANCE REQUIREMENTS

A. VARIATION OF DUCT CONFIGURATION OR SIZES OTHER THAN THOSE OF EQUIVALENT OR LOWER LOSS COEFFICIENT IS NOT PERMITTED EXCEPT BY WRITTEN PERMISSION. SIZE ROUND DUCTS INSTALLED IN PLACE OF RECTANGULAR DUCTS IN ACCORDANCE WITH ASHRAE TABLE OF EQUIVALENT RECTANGULAR AND ROUND DUCTS.

1.4 SUBMITTALS

A. SHOP DRAWINGS: SUBMIT DUCT FABRICATION DRAWINGS, DRAWN TO SCALE NOT SMALLER THAN 1/4 INCH EQUALS 1 FOOT, ON DRAWING SHEETS SAME SIZE AS CONTRACT DOCUMENTS, INDICATING:
1. FABRICATION, ASSEMBLY, AND INSTALLATION DETAILS, INCLUDING PLANS, ELEVATIONS, SECTIONS, DETAILS OF COMPONENTS, AND ATTACHMENTS TO OTHER WORK.
2. DUCT LAYOUT, INDICATING PRESSURE CLASSIFICATIONS AND SIZES IN PLAN VIEW. FOR EXHAUST DUCT SYSTEMS, INDICATE CLASSIFICATION OF MATERIALS HANDLED AS DEFINED IN THIS SECTION.
3. FITTINGS.
4. REINFORCING DETAILS AND SPACING.
5. SEAM AND JOINT CONSTRUCTION DETAILS.
6. PENETRATIONS THROUGH FIRE RATED AND OTHER WALLS.
7. HANGERS AND SUPPORTS, INCLUDING METHODS FOR BUILDING ATTACHMENT, VIBRATION ISOLATION, AND DUCT ATTACHMENT.

B. PRODUCT DATA: SUBMIT DATA FOR DUCT MATERIALS AND DUCT CONNECTORS.

C. TEST REPORTS: INDICATE PRESSURE TESTS PERFORMED. INCLUDE DATE, SECTION TESTED, TEST PRESSURE, AND LEAKAGE RATE, FOLLOWING SMACNA HVAC AIR DUCT LEAKAGE TEST MANUAL.

1.5 CLOSEOUT SUBMITTALS

A. PROJECT RECORD DOCUMENTS: RECORD ACTUAL LOCATIONS OF DUCTS AND DUCT FITTINGS. RECORD CHANGES IN FITTING LOCATION AND TYPE. SHOW ADDITIONAL FITTINGS USED.

1.6 QUALITY ASSURANCE

A. PERFORM WORK IN ACCORDANCE WITH SMACNA – HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE.

B. CONSTRUCT DUCTWORK TO NFPA 90A STANDARDS.

1.7 QUALIFICATIONS

A. MANUFACTURER: COMPANY SPECIALIZING IN MANUFACTURING PRODUCTS SPECIFIED IN THIS SECTION WITH MINIMUM THREE YEARS EXPERIENCE.

B. INSTALLER: COMPANY SPECIALIZING IN PERFORMING WORK OF THIS SECTION WITH MINIMUM THREE YEARS EXPERIENCE.

1.8 FIELD MEASUREMENTS

A. VERIFY FIELD MEASUREMENTS PRIOR TO FABRICATION.

1.9 WARRANTY

A. FURNISH ONE YEAR MANUFACTURER WARRANTY FOR DUCTS.

PART 2 PRODUCTS

2.1 DUCT MATERIALS

A. GALVANIZED STEEL DUCTS: ASTM A653/A653M GALVANIZED STEEL SHEET, LOCK–FORMING QUALITY, HAVING G90 ZINC COATING OF IN CONFORMANCE WITH ASTM A90/A90M.

B. FASTENERS: RIVETS, BOLTS, OR SHEET METAL SCREWS.

C. HANGER ROD: ASTM A36/A36M; STEEL, GALVANIZED; THREADED BOTH ENDS, THREADED ONE END, OR CONTINUOUSLY THREADED.

2.2 SINGLE WALL SPIRAL ROUND DUCTS

A. MANUFACTURERS:
1. UNITED MCGILL CORPORATION.
2. THE HAMLIN COMPANIES.
3. EASTERN SHEET METAL.

B. PRODUCT DESCRIPTION: UL 181, CLASS 1, ROUND SPIRAL LOCKSEAM DUCT CONSTRUCTED OF GALVANIZED STEEL.

C. CONSTRUCT DUCT WITH THE FOLLOWING MINIMUM GAGES:
3 INCHES TO 14 INCHES: 26
15 INCHES TO 26 INCHES: 24
28 INCHES TO 36 INCHES: 22
38 INCHES TO 50 INCHES: 20
52 INCHES TO 84 INCHES: 18
D. CONSTRUCT FITTINGS WITH THE FOLLOWING MINIMUM GAGES:
3 INCHES TO 14 INCHES: 24
15 INCHES TO 26 INCHES: 22
28 INCHES TO 36 INCHES: 20
38 INCHES TO 50 INCHES: 20
52 INCHES TO 60 INCHES: 18
62 INCHES TO 84 INCHES: 16

2.3 TRANSVERSE DUCT CONNECTION SYSTEM

A. MANUFACTURERS:
1. DUCTMATE INDUSTRIES, INC; MODEL WDCI.

B. PRODUCT DESCRIPTION: SMACNA RIGIDITY CLASS CONNECTION, INTERLOCKING ANGLE AND DUCT EDGE CONNECTION SYSTEM WITH SEALANT, GASKET, CLEATS, AND CORNER CLIPS.

2.4 DUCTWORK FABRICATION

A. FABRICATE AND SUPPORT RECTANGULAR DUCTS IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE AND AS INDICATED ON DRAWINGS. PROVIDE DUCT MATERIAL, GAGES, REINFORCING, AND SEALING FOR OPERATING PRESSURES INDICATED.

B. FABRICATE AND SUPPORT ROUND DUCTS WITH LONGITUDINAL SEAMS IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE (ROUND DUCT CONSTRUCTION STANDARDS), AND AS INDICATED ON DRAWINGS. PROVIDE DUCT MATERIAL, GAGES, REINFORCING, AND SEALING FOR OPERATING PRESSURES INDICATED.

C. 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 AIRFOIL TURNING VANES.

D. INCREASE DUCT SIZES GRADUALLY, NOT EXCEEDING 15 DEGREES DIVERGENCE WHEREVER POSSIBLE; MAXIMUM 30 DEGREES DIVERGENCE UPSTREAM OF EQUIPMENT AND 45 DEGREES CONVERGENCE DOWNSTREAM.

E. PROVIDE STANDARD 45–DEGREE LATERAL WYE TAKEOFFS. WHEN SPACE DOES NOT ALLOW 45–DEGREE LATERAL WYE TAKEOFF, USE 90–DEGREE CONICAL TEE CONNECTIONS.

PART 3 EXECUTION

3.1 EXAMINATION

A. VERIFY SIZES OF EQUIPMENT CONNECTIONS BEFORE FABRICATING TRANSITIONS.

3.2 INSTALLATION

A. INSTALL AND SEAL DUCTS IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE.

B. DURING CONSTRUCTION, INSTALL TEMPORARY CLOSURES OF METAL OR TAPED POLYETHYLENE ON OPEN DUCTWORK TO PREVENT CONSTRUCTION DUST FROM ENTERING DUCTWORK SYSTEM.

C. DUCT HANGERS SHALL BE GALVANIZED STRAP OR HANGER ROD TYPE. USE DOUBLE NUTS AND LOCK WASHERS ON THREADED ROD SUPPORTS.

3.3 INTERFACE WITH OTHER PRODUCTS

A. INSTALL OPENINGS IN DUCTWORK WHERE REQUIRED TO ACCOMMODATE THERMOMETERS AND CONTROLLERS. INSTALL PITOT TUBE OPENINGS FOR TESTING OF SYSTEMS. INSTALL PITOT TUBE COMPLETE WITH METAL CAN WITH SPRING DEVICE OR SCREW TO PREVENT AIR LEAKAGE. WHERE OPENINGS ARE PROVIDED IN INSULATED DUCTWORK, INSTALL INSULATION MATERIAL INSIDE METAL RING.

B. CONNECT AIR TERMINAL UNITS TO SUPPLY DUCTS DIRECTLY. DO NOT USE FLEXIBLE DUCT TO CHANGE DIRECTION.

3.4 SCHEDULES

A. DUCTWORK MATERIAL SCHEDULE:
SUPPLY (SYSTEM WITH COOLING COILS): GALVANIZED STEEL

B. DUCTWORK PRESSURE CLASS SCHEDULE:
VARIABLE AIR VOLUME SUPPLY (UPSTREAM OF VAV BOXES): 3 INCH WG

3.5 SCHEDULES

A. DUCTWORK MATERIAL SCHEDULE:
SUPPLY (SYSTEM WITH COOLING COILS): GALVANIZED STEEL

B. DUCTWORK PRESSURE CLASS SCHEDULE:
VARIABLE AIR VOLUME SUPPLY (UPSTREAM OF VAV BOXES): 3 INCH WG

END OF SECTION

SECTION 15820
DUCT ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. DUCT ACCESS DOORS.
2. FLEXIBLE DUCT CONNECTIONS.
3. DUCT TEST HOLES.

1.2 REFERENCES

A. NATIONAL FIRE PROTECTION ASSOCIATION:
1. NFPA 90A – STANDARD FOR THE INSTALLATION OF AIR CONDITIONING AND VENTILATING SYSTEMS.

B. SHEET METAL AND AIR CONDITIONING CONTRACTORS:
1. SMACNA – HVAC DUCT CONSTRUCTION STANDARD – METAL AND FLEXIBLE.

1.3 SUBMITTALS

A. PRODUCT DATA: SUBMIT DATA FOR SHOP FABRICATED ASSEMBLIES AND HARDWARE USED.

B. PRODUCT DATA: SUBMIT FOR THE FOLLOWING. INCLUDE WHERE APPLICABLE ELECTRICAL CHARACTERISTICS AND CONNECTION REQUIREMENTS.
1. FLEXIBLE DUCT CONNECTIONS.
2. DUCT ACCESS DOORS.
3. DUCT TEST HOLES.

1.4 CLOSEOUT SUBMITTALS

A. PROJECT RECORD DOCUMENTS: RECORD ACTUAL LOCATIONS OF ACCESS DOORS AND TEST HOLES.

1.5 QUALIFICATIONS

A. MANUFACTURER: COMPANY SPECIALIZING IN MANUFACTURING PRODUCTS SPECIFIED IN THIS SECTION WITH MINIMUM THREE YEARS DOCUMENTED EXPERIENCE.

1.6 FIELD MEASUREMENTS

A. VERIFY FIELD MEASUREMENTS PRIOR TO FABRICATION.

PART 2 PRODUCTS

2.1 DUCT ACCESS DOORS

A. MANUFACTURERS:
1. GREENHECK.
2. RUSKIN.

B. FABRICATE IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE.

C. FABRICATION: RIGID AND CLOSE FITTING OF GALVANIZED STEEL WITH SEALING GASKETS AND QUICK FASTENING LOCKING DEVICES. FOR INSULATED DUCTWORK, FURNISH MINIMUM 1 INCH THICK INSULATION WITH SHEET METAL COVER.
1. LESS THAN 12 INCHES SQUARE, SECURE WITH SASH LOCKS.
2. UP TO 18 INCHES SQUARE: FURNISH TWO HINGES AND TWO SASH LOCKS.
3. UP TO 24 X 48 INCHES: THREE HINGES AND TWO COMPRESSION LATCHES [WITH OUTSIDE AND INSIDE HANDLES].
4. LARGER SIZES: FURNISH ADDITIONAL HINGE.
5. COMPRESSION LATCH.
6. ACCESS PANELS WITH SHEET METAL SCREW FASTENERS ARE NOT ACCEPTABLE.

2.2 FLEXIBLE DUCT CONNECTIONS

A. MANUFACTURERS:
1. DURODYNE.

B. CONNECTOR: FABRIC CRIMPED INTO METAL EDGING STRIP.
1. FABRIC: UL LISTED FIRE–RETARDANT NEOPRENE COATED WOVEN GLASS FIBER FABRIC CONFORMING TO NFPA 90A, MINIMUM DENSITY 30 OZ PER SQ YD.
2. NET FABRIC WIDTH: APPROXIMATELY 6 INCHES WIDE.
3. METAL: 3 INCH WIDE, 24 GAGE GALVANIZED STEEL.

C. LEADED VINYL SHEET: MINIMUM 0.55 INCH THICK, 0.87 LBS. PER SQ FT, 10 DB ATTENUATION IN 10 TO 10,000 HZ RANGE.

2.3 DUCT TEST HOLES

A. PERMANENT TEST HOLES: FACTORY FABRICATED, AIR TIGHT FLANGED FITTINGS WITH SCREW CAP. FURNISH EXTENDED NECK FITTINGS TO CLEAR INSULATION.

PART 3 EXECUTION

3.1 INSTALLATION.

A. INSTALL IN ACCORDANCE WITH NFPA 90A, AND FOLLOW SMACNA HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE.

B. ACCESS DOOR SIZES: INSTALL MINIMUM 8 X 8 INCH SIZE FOR HAND ACCESS, 18 X 18 INCH SIZE FOR SHOULDER ACCESS. REVIEW LOCATIONS PRIOR TO FABRICATION.

C. INSTALL PERMANENT DUCT TEST HOLES WHERE REQUIRED FOR TESTING AND BALANCING PURPOSES.

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.
2. MEASUREMENT OF FINAL OPERATING CONDITION OF HVAC SYSTEMS.

1.2 REFERENCES

A. ASSOCIATED AIR BALANCE COUNCIL:
1. AABC MN–1 – NATIONAL STANDARDS FOR TESTING AND BALANCING HEATING, VENTILATING, AND AIR CONDITIONING SYSTEMS.

B. AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR–CONDITIONING ENGINEERS:
1. ASHRAE 111 – PRACTICES FOR MEASUREMENT, TESTING, ADJUSTING AND BALANCING OF BUILDING HEATING, VENTILATION, AIR–CONDITIONING AND REFRIGERATION SYSTEMS.

C. NATURAL ENVIRONMENTAL BALANCING BUREAU:
1. NEBB – PROCEDURAL STANDARDS FOR TESTING, ADJUSTING, AND BALANCING OF ENVIRONMENTAL SYSTEMS.

1.3 SUBMITTALS

A. PRIOR TO COMMENCING WORK, SUBMIT PROOF OF LATEST CALIBRATION DATE OF EACH INSTRUMENT.

B. TEST REPORTS: INDICATE DATA ON AABC MN–1 NATIONAL STANDARDS FOR TOTAL SYSTEM BALANCE FORMS OR NEBB REPORT FORMS.

C. FIELD REPORTS: INDICATE DEFICIENCIES PREVENTING PROPER TESTING, ADJUSTING, AND BALANCING OF SYSTEMS AND EQUIPMENT TO ACHIEVE SPECIFIED PERFORMANCE.

D. PRIOR TO COMMENCING WORK, SUBMIT REPORT FORMS OR OUTLINES INDICATING ADJUSTING, BALANCING, AND EQUIPMENT DATA REQUIRED. INCLUDE DETAILED PROCEDURES, AGENDA, SAMPLE REPORT FORMS AND COPY OF AABC NATIONAL PROJECT PERFORMANCE GUARANTY OR COPY OF NEBB CERTIFICATE OF CONFORMANCE CERTIFICATION.

E. SUBMIT DRAFT COPIES OF REPORT FOR REVIEW PRIOR TO FINAL ACCEPTANCE OF PROJECT.

F. FURNISH REPORTS IN SOFT COVER, LETTER SIZE, 3–RING BINDER MANUALS, COMPLETE WITH TABLE OF CONTENTS PAGE AND INDEXING TABS, WITH COVER IDENTIFICATION AT FRONT AND SIDE. INCLUDE SET OF REDUCED DRAWINGS WITH AIR OUTLETS AND EQUIPMENT IDENTIFIED TO CORRESPOND WITH DATA SHEETS, AND INDICATING THERMOSTAT LOCATIONS.

1.4 CLOSEOUT SUBMITTALS

A. OPERATION AND MAINTENANCE DATA: FURNISH FINAL COPY OF TESTING, ADJUSTING, AND BALANCING REPORT INCLUSION IN OPERATING AND MAINTENANCE MANUALS.

1.5 QUALITY ASSURANCE

A. PERFORM WORK IN ACCORDANCE WITH AABC MN–1 NATIONAL STANDARDS FOR FIELD MEASUREMENT AND INSTRUMENTATION, TOTAL SYSTEM BALANCE OR NEBB PROCEDURAL STANDARDS FOR TESTING, BALANCING AND ADJUSTING OF ENVIRONMENTAL SYSTEMS.

1.6 QUALIFICATIONS

A. AGENCY: COMPANY SPECIALIZING IN TESTING, ADJUSTING, AND BALANCING OF SYSTEMS SPECIFIED IN THIS SECTION WITH MINIMUM THREE YEARS EXPERIENCE CERTIFIED BY AABC OR CERTIFIED BY NEBB.

B. AGENCIES:
1. SOUTHERN INDEPENDENT TESTING AGENCY.
2. THE PHOENIX AGENCY.
3. SPECTECH.

C. PERFORM WORK UNDER SUPERVISION OF AABC CERTIFIED TEST AND BALANCE ENGINEER OR NEBB CERTIFIED TESTING, BALANCING AND ADJUSTING SUPERVISOR.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 EXAMINATION

A. VERIFY SYSTEMS ARE COMPLETE AND OPERABLE BEFORE COMMENCING WORK. VERIFY THE FOLLOWING:
1. TEMPERATURE CONTROL SYSTEMS ARE INSTALLED COMPLETE AND OPERABLE.
2. FINAL FILTERS ARE CLEAN AND IN PLACE. COORDINATE FILTER REPLACEMENT WITH OWNER.
3. DUCT SYSTEMS ARE CLEAN OF DEBRIS.
4. DUCT SYSTEM LEAKAGE IS MINIMIZED.

3.2 PREPARATION

A. FURNISH INSTRUMENTS REQUIRED FOR TESTING, ADJUSTING, AND BALANCING OPERATIONS.

B. MAKE INSTRUMENTS AVAILABLE TO ARCHITECT/ENGINEER TO FACILITATE SPOT CHECKS DURING TESTING.

3.3 INSTALLATION TOLERANCES

A. AIR HANDLING SYSTEMS: ADJUST TO WITHIN PLUS OR MINUS 10 PERCENT OF DESIGN.

3.4 ADJUSTING

A. VERIFY RECORDED DATA REPRESENTS ACTUAL MEASURED OR OBSERVED CONDITIONS.

B. REPORT DEFECTS AND DEFICIENCIES NOTED DURING PERFORMANCE OF SERVICES, PREVENTING SYSTEM BALANCE.

3.5 AIR SYSTEM PROCEDURE

A. ADJUST AIR HANDLING AND DISTRIBUTION SYSTEMS TO OBTAIN REQUIRED OR DESIGN SUPPLY, RETURN, AND EXHAUST AIR QUANTITIES.

B. MAKE AIR QUANTITY MEASUREMENTS IN MAIN DUCTS BY PITOT TUBE TRAVERSE OF ENTIRE CROSS SECTIONAL AREA OF DUCT.

C. VARY TOTAL SYSTEM AIR QUANTITIES BY ADJUSTMENT OF FAN SPEEDS. PROVIDE SHEAVE DRIVE CHANGES TO VARY FAN SPEED.

D. MEASURE STATIC AIR PRESSURE CONDITIONS ON AIR SUPPLY UNITS, INCLUDING FILTER AND COIL PRESSURE DROPS, AND TOTAL PRESSURE ACROSS FAN. MAKE ALLOWANCES FOR 50 PERCENT LOADING OF FILTERS.

3.6 DUCT LEAKAGE PRESSURE TESTING

A. LEAKAGE TESTING SHALL OCCUR BEFORE DUCT IS INSULATED OR OTHERWISE CONCEALED.

B. TESTING PRESSURE SHALL MATCH THE DUCT'S CONSTRUCTION PRESSURE CLASS (3" W.G.).

C. DUCTS SHALL BE LEAK TESTED PER THE PROCEDURES IN SMACNA'S HVAC AIR DUCT LEAKAGE TEST MANUAL. DUCT LEAKAGE SHALL NOT EXCEED 2 PERCENT.

D. PRIOR TO TESTING, ISOLATE ANY COMPONENTS THAT MIGHT BE DAMAGED BY LEAK TESTING.

E. RESEAL AND RETEST AS REQUIRED TO ACHIEVE THE SPECIFIED LEAKAGE CLASS.

3.7 SCHEDULES

A. EQUIPMENT REQUIRING TESTING, ADJUSTING, AND BALANCING:
1. PACKAGED ROOF TOP HEATING/COOLING UNITS.
2. AIR HANDLING UNITS.
3. AIR TERMINAL UNITS.

B. REPORT FORMS
1. TITLE PAGE:
NAME OF TESTING, ADJUSTING, AND BALANCING AGENCY
ADDRESS OF TESTING, ADJUSTING, AND BALANCING AGENCY
TELEPHONE AND FACSIMILE NUMBERS OF TESTING, ADJUSTING, AND BALANCING AGENCY
PROJECT NAME
PROJECT LOCATION
PROJECT ARCHITECT
PROJECT ENGINEER
PROJECT CONTRACTOR
PROJECT ALTITUDE
REPORT DATE

2. SUMMARY COMMENTS:
DESIGN VERSUS FINAL PERFORMANCE
NOTABLE CHARACTERISTICS OF SYSTEM
DESCRIPTION OF SYSTEMS OPERATION SEQUENCE
SUMMARY OF OUTDOOR AND EXHAUST FLOWS TO INDICATE BUILDING PRESSURIZATION
NOMENCLATURE USED THROUGHOUT REPORT
TEST CONDITIONS

3. INSTRUMENT LIST:
INSTRUMENT
MANUFACTURER
MODEL NUMBER
SERIAL NUMBER
RANGE
CALIBRATION DATE

4. ELECTRIC MOTORS:
MANUFACTURER
MODEL/FRAME
HP/BHP AND KW
PHASE, VOLTAGE, AMPERAGE; NAMEPLATE, ACTUAL, NO LOAD
RPM
SERVICE FACTOR
STARTER SIZE, RATING, HEATER ELEMENTS
SHEAVE MAKE/SIZE/BORE

5. V–BELT DRIVE:
IDENTIFICATION/LOCATION
REQUIRED DRIVEN RPM
DRIVEN SHEAVE, DIAMETER AND RPM
BELT, SIZE AND QUANTITY
MOTOR SHEAVE DIAMETER AND RPM
CENTER TO CENTER DISTANCE, MAXIMUM, MINIMUM, AND ACTUAL

6. COOLING COIL DATA:
IDENTIFICATION/NUMBER
LOCATION
SERVICE
MANUFACTURER
AIR FLOW, DESIGN AND ACTUAL
ENTERING AIR DB TEMPERATURE, DESIGN AND ACTUAL
ENTERING AIR WB TEMPERATURE, DESIGN AND ACTUAL
LEAVING AIR DB TEMPERATURE, DESIGN AND ACTUAL
LEAVING AIR WB TEMPERATURE, DESIGN AND ACTUAL
WATER FLOW, DESIGN AND ACTUAL
WATER PRESSURE DROP, DESIGN AND ACTUAL
ENTERING WATER TEMPERATURE, DESIGN AND ACTUAL
LEAVING WATER TEMPERATURE, DESIGN AND ACTUAL
SATURATED SUCTION TEMPERATURE, DESIGN AND ACTUAL
AIR PRESSURE DROP, DESIGN AND ACTUAL

7. AIR MOVING EQUIPMENT:
LOCATION
MANUFACTURER
MODEL NUMBER
SERIAL NUMBER
ARRANGEMENT/CLASS/DISCHARGE
AIR FLOW, SPECIFIED AND ACTUAL
RETURN AIR FLOW, SPECIFIED AND ACTUAL
OUTSIDE AIR FLOW, SPECIFIED AND ACTUAL
TOTAL STATIC PRESSURE (TOTAL EXTERNAL), SPECIFIED AND ACTUAL
INLET PRESSURE
DISCHARGE PRESSURE
SHEAVE MAKE/SIZE/BORE
NUMBER OF BELTS/MAKE/SIZE
FAN RPM

8. DUCT TRAVERSE:
SYSTEM ZONE/BRANCH
DUCT SIZE
AREA
DESIGN VELOCITY
DESIGN AIR FLOW
TEST VELOCITY
TEST AIR FLOW
DUCT STATIC PRESSURE
AIR TEMPERATURE
AIR CORRECTION FACTOR

9. DUCT LEAK TEST:
DESCRIPTION OF DUCTWORK UNDER TEST
DUCT DESIGN OPERATING PRESSURE
DUCT DESIGN TEST STATIC PRESSURE
DUCT CAPACITY, AIR FLOW
MAXIMUM ALLOWABLE LEAKAGE DUCT CAPACITY TIMES LEAK FACTOR
TEST APPARATUS
1) BLOWER
2) ORIFICE, TUBE SIZE
3) ORIFICE SIZE
4) CALIBRATED
TEST STATIC PRESSURE
TEST ORIFICE DIFFERENTIAL PRESSURE
LEAKAGE

10. TERMINAL UNIT DATA:
MANUFACTURER
TYPE, CONSTANT, VARIABLE, SINGLE, DUAL DUCT
IDENTIFICATION/NUMBER
LOCATION
MODEL NUMBER
SIZE
MINIMUM STATIC PRESSURE
MINIMUM DESIGN AIR FLOW
MAXIMUM DESIGN AIR FLOW
MAXIMUM ACTUAL AIR FLOW
INLET STATIC PRESSURE

11. AIR DISTRIBUTION TEST SHEET:
AIR TERMINAL NUMBER
ROOM NUMBER/LOCATION
TERMINAL TYPE
TERMINAL SIZE
AREA FACTOR
DESIGN VELOCITY
DESIGN AIR FLOW
TEST (FINAL) VELOCITY
TEST (FINAL) AIR FLOW
PERCENT OF DESIGN AIR FLOW

END OF SECTION

PROFESSIONAL SEAL

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CLIENT INFORMATION

DRAWN BY JWY
REVIEWED BY JWY
GEI PROJECT NUMBER 11066
DATE MARCH 12, 2012
SHEET TITLE MECHANICAL SPECIFICATIONS

NO.	DATE	SET ISSUED FOR:

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SECTION 15999
DUCT CLEANING

PART 1 -- SPECIAL PROVISIONS
1.01 QUALIFICATION OF THE HVAC SYSTEM CLEANING CONTRACTOR

(A) MEMBERSHIP: THE HVAC SYSTEM CLEANING CONTRACTOR SHALL BE A CERTIFIED MEMBER OF THE NATIONAL AIR DUCT CLEANERS ASSOCIATION (NADCA), OR SHALL MAINTAIN MEMBERSHIP IN A NATIONALLY RECOGNIZED NON-PROFIT INDUSTRY ORGANIZATION DEDICATED TO THE CLEANING OF HVAC SYSTEMS.

(B) CERTIFICATION: THE HVAC SYSTEM CLEANING CONTRACTOR SHALL HAVE A MINIMUM OF ONE (1) AIR SYSTEM CLEANING SPECIALIST (ASCS) CERTIFIED BY NADCA ON A FULL TIME BASIS, OR SHALL HAVE STAFF CERTIFIED BY A NATIONALLY RECOGNIZED CERTIFICATION PROGRAM AND ORGANIZATION DEDICATED TO THE CLEANING OF HVAC SYSTEMS.

(C) SUPERVISOR QUALIFICATIONS: A PERSON CERTIFIED AS AN ASCS BY NADCA, OR MAINTAINING AN EQUIVALENT CERTIFICATION BY A NATIONALLY RECOGNIZED PROGRAM AND ORGANIZATION, SHALL BE RESPONSIBLE FOR THE TOTAL WORK HEREIN SPECIFIED.

(D) EXPERIENCE: THE HVAC SYSTEM CLEANING CONTRACTOR SHALL SUBMIT RECORDS OF EXPERIENCE IN THE FIELD OF HVAC SYSTEM CLEANING AS REQUESTED BY THE OWNER. BIDS SHALL ONLY BE CONSIDERED FROM FIRMS WHICH ARE REGULARLY ENGAGED IN HVAC SYSTEM MAINTENANCE WITH AN EMPHASIS ON HVAC SYSTEM CLEANING AND DECONTAMINATION.

(E) EQUIPMENT, MATERIALS AND LABOR: THE HVAC SYSTEM CLEANING CONTRACTOR SHALL POSSESS AND FURNISH ALL NECESSARY EQUIPMENT, MATERIALS AND LABOR TO ADEQUATELY PERFORM THE SPECIFIED SERVICES.
1. THE CONTRACTOR SHALL ASSURE THAT ITS EMPLOYEES HAVE RECEIVED SAFETY EQUIPMENT TRAINING, MEDICAL SURVEILLANCE PROGRAMS, INDIVIDUAL HEALTH PROTECTION MEASURES, AND MANUFACTURER'S PRODUCT AND MATERIAL SAFETY DATA SHEETS (MSDS) AS REQUIRED FOR THE WORK BY THE U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, AND AS DESCRIBED BY THIS SPECIFICATION. FOR WORK PERFORMED IN COUNTRIES OUTSIDE OF THE U.S.A., CONTRACTORS SHOULD COMPLY WITH APPLICABLE NATIONAL SAFETY CODES AND STANDARDS.
2. THE CONTRACTOR SHALL MAINTAIN A COPY OF ALL CURRENT MSDS DOCUMENTATION AND SAFETY CERTIFICATIONS AT THE SITE AT ALL TIMES, AS WELL AS COMPLY WITH ALL OTHER SITE DOCUMENTATION REQUIREMENTS OF APPLICABLE OSHA PROGRAMS AND THIS SPECIFICATION.
3. CONTRACTOR SHALL SUBMIT TO THE OWNER ALL MATERIAL SAFETY DATA SHEETS (MSDS) FOR ALL CHEMICAL PRODUCTS PROPOSED TO BE USED IN THE CLEANING PROCESS.

(F) LICENSING: THE HVAC SYSTEM CLEANING CONTRACTOR SHALL PROVIDE PROOF OF MAINTAINING THE PROPER LICENSE(S), IF ANY, AS REQUIRED TO DO WORK IN THIS STATE. CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE AND LOCAL RULES, REGULATIONS, AND LICENSING REQUIREMENTS.

1.02 STANDARDS

(A) NADCA STANDARDS: THE HVAC SYSTEM CLEANING CONTRACTOR SHALL PERFORM THE SERVICES SPECIFIED HERE IN ACCORDANCE WITH THE CURRENT PUBLISHED STANDARDS OF THE NATIONAL AIR DUCT CLEANERS ASSOCIATION (NADCA).
1. ALL TERMS IN THIS SPECIFICATION SHALL HAVE THEIR MEANING DEFINED AS STATED IN THE NADCA STANDARDS.
2. NADCA STANDARDS MUST BE FOLLOWED WITH NO MODIFICATIONS OR DEVIATIONS BEING ALLOWED.

1.03 DOCUMENTS

(A) MECHANICAL DRAWINGS: THE OWNER SHALL PROVIDE THE HVAC SYSTEM CLEANING CONTRACTOR WITH ONE COPY OF THE FOLLOWING DOCUMENTS:
1. PROJECT DRAWINGS AND SPECIFICATIONS.
2. APPROVED CONSTRUCTION REVISIONS PERTAINING TO THE HVAC SYSTEM.
3. ANY EXISTING INDOOR AIR QUALITY (IAQ) ASSESSMENTS OR ENVIRONMENTAL REPORTS PREPARED FOR THE FACILITY.

PART 2 -- HVAC SYSTEM CLEANING SPECIFICATIONS AND REQUIREMENTS

2.01 SCOPE OF WORK

(A) SCOPE: THIS SECTION DEFINES THE MINIMUM REQUIREMENTS NECESSARY TO RENDER HVAC COMPONENTS CLEAN, AND TO VERIFY THE CLEANLINESS THROUGH INSPECTION AND/OR TESTING IN ACCORDANCE WITH ITEMS SPECIFIED HEREIN AND APPLICABLE NADCA STANDARDS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF VISIBLE SURFACE CONTAMINANTS AND DEPOSITS FROM WITHIN THE HVAC SYSTEM IN STRICT ACCORDANCE WITH THESE SPECIFICATIONS.
THE HVAC SYSTEM INCLUDES ANY INTERIOR SURFACE OF THE FACILITY'S AIR DISTRIBUTION SYSTEM FOR CONDITIONED SPACES AND/OR OCCUPIED ZONES.

2.02 HVAC SYSTEM COMPONENT INSPECTIONS AND SITE PREPARATIONS

(A) HVAC SYSTEM COMPONENT INSPECTIONS: PRIOR TO THE COMMENCEMENT OF ANY CLEANING WORK, THE HVAC SYSTEM CLEANING CONTRACTOR SHALL PERFORM A VISUAL INSPECTION OF THE HVAC SYSTEM TO DETERMINE APPROPRIATE METHODS, TOOLS, AND EQUIPMENT REQUIRED TO SATISFACTORILY COMPLETE THIS PROJECT. THE CLEANLINESS INSPECTION SHOULD INCLUDE AIR HANDLING UNITS AND REPRESENTATIVE AREAS OF THE HVAC SYSTEM COMPONENTS AND DUCTWORK.

THE CLEANLINESS INSPECTION SHALL BE CONDUCTED WITHOUT NEGATIVELY IMPACTING THE INDOOR ENVIRONMENT THROUGH EXCESSIVE DISRUPTION OF SETTLED DUST, MICROBIAL AMPLIFICATION OR OTHER DEBRIS. IN CASES WHERE CONTAMINATION IS SUSPECTED, AND/OR IN SENSITIVE ENVIRONMENTS WHERE EVEN SMALL AMOUNTS OF CONTAMINANT MAY BE OF CONCERN, ENVIRONMENTAL ENGINEERING CONTROL MEASURES SHOULD BE IMPLEMENTED

1. DAMAGED SYSTEM COMPONENTS FOUND DURING THE INSPECTION SHALL BE DOCUMENTED AND BROUGHT TO THE ATTENTION OF THE OWNER.

(B) SITE EVALUATION AND PREPARATIONS: CONTRACTOR SHALL CONDUCT A SITE EVALUATION, AND ESTABLISH A SPECIFIC, COORDINATED PLAN WHICH DETAILS HOW EACH AREA OF THE BUILDING WILL BE PROTECTED DURING THE VARIOUS PHASES OF THE PROJECT.

(C) INSPECTOR QUALIFICATIONS: QUALIFIED PERSONNEL SHOULD PERFORM THE HVAC CLEANLINESS INSPECTION TO DETERMINE THE NEED FOR CLEANING. AT MINIMUM, SUCH PERSONNEL SHOULD HAVE AN UNDERSTANDING OF HVAC SYSTEM DESIGN, AND EXPERIENCE IN UTILIZING ACCEPTED INDOOR ENVIRONMENTAL SAMPLING PRACTICES, CURRENT INDUSTRY HVAC CLEANING PROCEDURES, AND APPLICABLE INDUSTRY STANDARDS.

2.03 GENERAL HVAC SYSTEM CLEANING REQUIREMENTS

(A) CONTAINMENT: DEBRIS REMOVED DURING CLEANING SHALL BE COLLECTED AND PRECAUTIONS MUST BE TAKEN TO ENSURE THAT DEBRIS IS NOT OTHERWISE DISPERSED OUTSIDE THE HVAC SYSTEM DURING THE CLEANING PROCESS.

(B) PARTICULATE COLLECTION: WHERE THE PARTICULATE COLLECTION EQUIPMENT IS EXHAUSTING INSIDE THE BUILDING, HEPA FILTRATION WITH 99.97% COLLECTION EFFICIENCY FOR 0.3-MICRON SIZE (OR GREATER) PARTICLES SHALL BE USED. WHEN THE PARTICULATE COLLECTION EQUIPMENT IS EXHAUSTING OUTSIDE THE BUILDING, MECHANICAL CLEANING OPERATIONS SHALL BE UNDERTAKEN ONLY WITH PARTICULATE COLLECTION EQUIPMENT IN PLACE, INCLUDING ADEQUATE FILTRATION TO CONTAIN DEBRIS REMOVED FROM THE HVAC SYSTEM. WHEN THE PARTICULATE COLLECTION EQUIPMENT IS EXHAUSTING OUTSIDE THE BUILDING, PRECAUTIONS SHALL BE TAKEN TO LOCATE THE EQUIPMENT DOWN WIND AND AWAY FROM ALL AIR INTAKES AND OTHER POINTS OF ENTRY INTO THE BUILDING.

(C) CONTROLLING ODORS: MEASURES SHALL BE EMPLOYED TO CONTROL ODORS AND/OR MIST VAPORS DURING THE CLEANING PROCESS.

(D) COMPONENT CLEANING: CLEANING METHODS SHALL BE EMPLOYED SUCH THAT ALL HVAC SYSTEM COMPONENTS MUST BE VISIBLY CLEAN AS DEFINED IN APPLICABLE STANDARDS (SEE NADCA STANDARDS). UPON COMPLETION, ALL COMPONENTS MUST BE RETURNED TO THOSE SETTINGS RECORDED JUST PRIOR TO CLEANING OPERATIONS.

(E) SERVICE OPENINGS: THE CONTRACTOR SHALL UTILIZE SERVICE OPENINGS, AS REQUIRED FOR PROPER CLEANING, AT VARIOUS POINTS OF THE HVAC SYSTEM FOR PHYSICAL AND MECHANICAL ENTRY, AND INSPECTION.

1. CONTRACTOR SHALL UTILIZE THE EXISTING SERVICE OPENINGS ALREADY INSTALLED IN THE HVAC SYSTEM WHERE POSSIBLE.
2. OTHER OPENINGS SHALL BE CREATED WHERE NEEDED AND THEY MUST BE CREATED SO THEY CAN BE SEALED IN ACCORDANCE WITH INDUSTRY CODES AND STANDARDS.
3. CLOSURES MUST NOT SIGNIFICANTLY HINDER, RESTRICT, OR ALTER THE AIRFLOW WITHIN THE SYSTEM.
4. CLOSURES MUST BE PROPERLY INSULATED TO PREVENT HEAT LOSS/GAIN OR CONDENSATION ON SURFACES WITHIN THE SYSTEM.
5. OPENINGS MUST NOT COMPROMISE THE STRUCTURAL INTEGRITY OF THE SYSTEM.
6. CONSTRUCTION TECHNIQUES USED IN THE CREATION OF OPENINGS SHOULD CONFORM TO REQUIREMENTS OF APPLICABLE BUILDING AND FIRE CODES, AND APPLICABLE NFPA, SMACNA AND NADCA STANDARDS.
7. CUTTING SERVICE OPENINGS INTO FLEXIBLE DUCT IS NOT PERMITTED. FLEXIBLE DUCT SHALL BE DISCONNECTED AT THE ENDS AS NEEDED FOR PROPER CLEANING AND INSPECTION.
8. RIGID FIBER GLASS DUCT SYSTEMS SHALL BE RESEALED IN ACCORDANCE WITH NAIMA RECOMMENDED PRACTICES. ONLY CLOSURE TECHNIQUES THAT COMPLY WITH UL STANDARD 181 OR UL STANDARD 181A ARE SUITABLE FOR FIBER GLASS DUCT SYSTEM CLOSURES.
9. ALL SERVICE OPENINGS CAPABLE OF BEING RE-OPENED FOR FUTURE INSPECTION OR REMEDIATION SHALL BE CLEARLY MARKED AND SHALL HAVE THEIR LOCATION REPORTED TO THE OWNER IN PROJECT REPORT DOCUMENTS.

(F) CEILING SECTIONS (TILE): THE CONTRACTOR MAY REMOVE AND REINSTALL CEILING SECTIONS TO GAIN ACCESS TO HVAC SYSTEMS DURING THE CLEANING PROCESS.

(G) AIR DISTRIBUTION DEVICES (REGISTERS, GRILLES & DIFFUSERS): THE CONTRACTOR SHALL CLEAN ALL AIR DISTRIBUTION DEVICES.

(H) DUCT SYSTEMS. CONTRACTOR SHALL:

1. CREATE SERVICE OPENINGS IN THE SYSTEM AS NECESSARY IN ORDER TO ACCOMMODATE CLEANING OF OTHERWISE INACCESSIBLE AREAS.
2. MECHANICALLY CLEAN ALL DUCT SYSTEMS TO REMOVE ALL VISIBLE CONTAMINANTS, SUCH THAT THE SYSTEMS ARE CAPABLE OF PASSING CLEANING VERIFICATION TESTS (SEE NADCA STANDARDS).

2.04 HEALTH AND SAFETY

(A) SAFETY STANDARDS: CLEANING CONTRACTORS SHALL COMPLY WITH APPLICABLE FEDERAL, STATE, AND LOCAL REQUIREMENTS FOR PROTECTING THE SAFETY OF THE CONTRACTOR'S EMPLOYEES, BUILDING OCCUPANTS, AND THE ENVIRONMENT. IN PARTICULAR, ALL APPLICABLE STANDARDS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) SHALL BE FOLLOWED WHEN WORKING IN ACCORDANCE WITH THIS SPECIFICATION.

(B) OCCUPANT SAFETY: NO PROCESSES OR MATERIALS SHALL BE EMPLOYED IN SUCH A MANNER THAT THEY WILL INTRODUCE ADDITIONAL HAZARDS INTO OCCUPIED SPACES.

(C) DISPOSAL OF DEBRIS: ALL DEBRIS REMOVED FROM THE HVAC SYSTEM SHALL BE DISPOSED OF IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL REQUIREMENTS.

2.05 MECHANICAL CLEANING METHODOLOGY

(A) SOURCE REMOVAL CLEANING METHODS: THE HVAC SYSTEM SHALL BE CLEANED USING SOURCE REMOVAL MECHANICAL CLEANING METHODS DESIGNED TO EXTRACT CONTAMINANTS FROM WITHIN THE HVAC SYSTEM AND SAFELY REMOVE CONTAMINANTS FROM THE FACILITY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SELECT SOURCE REMOVAL METHODS THAT WILL RENDER THE HVAC SYSTEM VISIBLY CLEAN AND CAPABLE OF PASSING CLEANING VERIFICATION METHODS (SEE APPLICABLE NADCA STANDARDS) AND OTHER SPECIFIED TESTS, IN ACCORDANCE WITH ALL GENERAL REQUIREMENTS. NO CLEANING METHOD, OR COMBINATION OF METHODS, SHALL BE USED WHICH COULD POTENTIALLY DAMAGE COMPONENTS OF THE HVAC SYSTEM OR NEGATIVELY ALTER THE INTEGRITY OF THE SYSTEM.

1. ALL METHODS USED SHALL INCORPORATE THE USE OF VACUUM COLLECTION DEVICES THAT ARE OPERATED CONTINUOUSLY DURING CLEANING. A VACUUM DEVICE SHALL BE CONNECTED TO THE DOWNSTREAM END OF THE SECTION BEING CLEANED THROUGH A PREDETERMINED OPENING. THE VACUUM COLLECTION DEVICE MUST BE OF SUFFICIENT POWER TO RENDER ALL AREAS BEING CLEANED UNDER NEGATIVE PRESSURE, SUCH THAT CONTAINMENT OF DEBRIS AND THE PROTECTION OF THE INDOOR ENVIRONMENT ARE ASSURED.
2. ALL VACUUM DEVICES EXHAUSTING AIR INSIDE THE BUILDING SHALL BE EQUIPPED WITH HEPA FILTERS (MINIMUM EFFICIENCY), INCLUDING HAND-HELD VACUUMS AND WET-VACUUMS.
3. ALL VACUUM DEVICES EXHAUSTING AIR OUTSIDE THE FACILITY SHALL BE EQUIPPED WITH PARTICULATE COLLECTION INCLUDING ADEQUATE FILTRATION TO CONTAIN DEBRIS REMOVED FROM THE HVAC SYSTEM. SUCH DEVICES SHALL EXHAUST IN A MANNER THAT WILL NOT ALLOW CONTAMINANTS TO RE-ENTER THE FACILITY. RELEASE OF DEBRIS OUTDOORS MUST NOT VIOLATE ANY OUTDOOR ENVIRONMENTAL STANDARDS, CODES OR REGULATIONS.
4. ALL METHODS REQUIRE MECHANICAL AGITATION DEVICES TO DISLODGE DEBRIS ADHERED TO INTERIOR HVAC SYSTEM SURFACES, SUCH THAT DEBRIS MAY BE SAFELY CONVEYED TO VACUUM COLLECTION DEVICES. ACCEPTABLE METHODS WILL INCLUDE THOSE, WHICH WILL NOT POTENTIALLY DAMAGE THE INTEGRITY OF THE DUCTWORK, NOR DAMAGE POROUS SURFACE MATERIALS SUCH AS LINERS INSIDE THE DUCTWORK OR SYSTEM COMPONENTS.

(B) METHODS OF CLEANING FIBROUS GLASS INSULATED COMPONENTS

1. FIBROUS GLASS THERMAL OR ACOUSTICAL INSULATION ELEMENTS PRESENT IN ANY EQUIPMENT OR DUCTWORK SHALL BE THOROUGHLY CLEANED WITH HEPA VACUUMING EQUIPMENT, WHILE THE HVAC SYSTEM IS UNDER CONSTANT NEGATIVE PRESSURE, AND NOT PERMITTED TO GET WET IN ACCORDANCE WITH APPLICABLE NADCA AND NAIMA STANDARDS AND RECOMMENDATIONS.
2. CLEANING METHODS USED SHALL NOT CAUSE DAMAGE TO FIBROUS GLASS COMPONENTS AND WILL RENDER THE SYSTEM CAPABLE OF PASSING CLEANING VERIFICATION TESTS (SEE NADCA STANDARDS).

(C) DAMAGED FIBROUS GLASS MATERIAL

1. EVIDENCE OF DAMAGE: IF THERE IS ANY EVIDENCE OF DAMAGE, DETERIORATION, DELAMINATING, FRIABLE MATERIAL, MOLD OR FUNGUS GROWTH, OR MOISTURE SUCH THAT FIBROUS GLASS MATERIALS CANNOT BE RESTORED BY CLEANING OR RESURFACING WITH AN ACCEPTABLE INSULATION REPAIR COATING, THEY SHALL BE IDENTIFIED FOR REPLACEMENT.
2. REPLACEMENT: WHEN REQUESTED OR SPECIFIED, CONTRACTOR MUST BE CAPABLE OF REMEDIATING EXPOSED DAMAGED INSULATION IN AIR HANDLERS AND/OR DUCTWORK REQUIRING REPLACEMENT.
3. REPLACEMENT MATERIAL: IN THE EVENT FIBER GLASS MATERIALS MUST BE REPLACED, ALL MATERIALS SHALL CONFORM TO APPLICABLE INDUSTRY CODES AND STANDARDS, INCLUDING THOSE OF UL AND SMACNA. REPLACEMENT OF DAMAGED INSULATION IS NOT COVERED BY THIS SPECIFICATION.

(D) ANTIMICROBIAL AGENTS AND COATINGS

1. ANTIMICROBIAL AGENTS SHALL ONLY BE APPLIED IF ACTIVE FUNGAL GROWTH IS REASONABLY SUSPECTED, OR WHERE UNACCEPTABLE LEVELS OF FUNGAL CONTAMINATION HAVE BEEN VERIFIED THROUGH TESTING.
2. APPLICATION OF ANY ANTIMICROBIAL AGENTS USED TO CONTROL THE GROWTH OF FUNGAL OR BACTERIOLOGICAL CONTAMINANTS SHALL BE PERFORMED AFTER THE REMOVAL OF SURFACE DEPOSITS AND DEBRIS.
3. WHEN USED, ANTIMICROBIAL TREATMENTS AND COATINGS SHALL BE APPLIED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S WRITTEN RECOMMENDATIONS AND EPA REGISTRATION LISTING.
4. ANTIMICROBIAL COATINGS SHALL BE APPLIED ACCORDING TO THE MANUFACTURER'S WRITTEN INSTRUCTIONS. COATINGS SHALL BE SPRAYED DIRECTLY ONTO INTERIOR DUCTWORK SURFACES, RATHER THAN "FOGGED" DOWNSTREAM ONTO SURFACES.

2.06 CLEANLINESS VERIFICATION

(A) GENERAL: VERIFICATION OF HVAC SYSTEM CLEANLINESS WILL BE DETERMINED AFTER MECHANICAL CLEANING AND BEFORE THE APPLICATION OF ANY TREATMENT OR INTRODUCTION OF ANY TREATMENT-RELATED SUBSTANCE TO THE HVAC SYSTEM, INCLUDING BIOCIDAL AGENTS AND COATINGS.

(B) VISUAL INSPECTION: THE HVAC SYSTEM SHALL BE INSPECTED VISUALLY TO ENSURE THAT NO VISIBLE CONTAMINANTS ARE PRESENT.

1. IF NO CONTAMINANTS ARE EVIDENT THROUGH VISUAL INSPECTION, THE HVAC SYSTEM SHALL BE CONSIDERED CLEAN; HOWEVER, THE OWNER RESERVES THE RIGHT TO FURTHER VERIFY SYSTEM CLEANLINESS THROUGH SURFACE COMPARISON TESTING OR THE NADCA VACUUM TEST SPECIFIED IN THE NADCA STANDARDS.
2. IF VISIBLE CONTAMINANTS ARE EVIDENT THROUGH VISUAL INSPECTION, THOSE PORTIONS OF THE SYSTEM WHERE CONTAMINANTS ARE VISIBLE SHALL BE RECLEANED AND SUBJECTED TO RE-INSPECTION FOR CLEANLINESS.
3. NADCA VACUUM TEST ANALYSIS SHOULD BE PERFORMED BY A QUALIFIED THIRD PARTY EXPERIENCED IN TESTING OF THIS NATURE.

2.07 PRE-EXISTING SYSTEM DAMAGE

(A) CONTRACTOR IS NOT RESPONSIBLE FOR PROBLEMS RESULTING FROM PRIOR INAPPROPRIATE OR CARELESS CLEANING TECHNIQUES OF OTHERS.

2.08 POST-PROJECT REPORT

(A) AT THE CONCLUSION OF THE PROJECT, THE CONTRACTOR SHALL PROVIDE A REPORT TO THE OWNER INDICATING THE FOLLOWING:
1. SUCCESS OF THE CLEANING PROJECT, AS VERIFIED THROUGH VISUAL INSPECTION AND/OR GRAVIMETRIC ANALYSIS.
2. AREAS OF THE SYSTEM FOUND TO BE DAMAGED AND/OR IN NEED OF REPAIR.

PROFESSIONAL SEAL

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