

FIRE / SMOKE BARRIER DESIGNATIONS	
THE SYMBOLS SHOWN ARE FOR THE CONVENIENCE OF THE CONTRACTOR. THE CONTRACTOR SHALL VERIFY RATINGS WITH THE LATEST SET OF ARCHITECTURAL PLANS AND FURNISH ALL MATERIALS REQUIRED TO COMPLY WITH THOSE RATINGS WHETHER SHOWN OR NOT.	
ALL FLOOR ASSEMBLIES SHALL BE DESIGNATED AS 2 HOUR FIRE BARRIER(S), UNLESS NOTED OTHERWISE ON THE PLANS. RATINGS WERE ACQUIRED FROM THE ARCHITECTURAL PLANS.	
1 HOUR FIRE BARRIER	-----
2 HOUR FIRE BARRIER	-----
SMOKE BARRIER	-----

- MECHANICAL DEMOLITION NOTES:**
- THE DRAWINGS ARE INTENDED TO INDICATE THE SCOPE OF DEMOLITION WORK REQUIRED AND DO NOT INDICATE EVERY PIPE, DUCT, OR PIECE OF EQUIPMENT THAT MUST BE REMOVED. ACCESSIBILITY OF EQUIPMENT AND SYSTEMS IS NOT SHOWN NOR SHOULD IT BE INFERRED. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING A BID AND VERIFY EXISTING CONDITIONS.
 - CONTRACTOR IS RESPONSIBLE FOR ALL COST ASSOCIATED WITH CEILING SYSTEM DISASSEMBLY AND REASSEMBLY TO ACCOMMODATE THIS WORK. CONTRACTOR TO SALVAGE, STORE, AND REINSTALL ALL CEILING MOUNTED DEVICES.
 - CONTRACTOR TO COORDINATE WITH OWNER FOR ALL MECHANICAL SERVICE OUTAGES. EXISTING WATER SYSTEM MAINTAIN EXISTING SYSTEM IN SERVICE UNTIL NEW SYSTEM IS COMPLETE AND READY FOR SERVICE. DRAIN SYSTEM ONLY TO MAKE SWITCH OVERS AND CONNECTIONS. OBTAIN PERMISSION FROM OWNER AT LEAST 72 HOURS BEFORE PARTIALLY OR COMPLETELY DRAINING SYSTEM. MINIMIZE OUTAGE DURING OPERATION. CONTRACTOR IS RESPONSIBLE FOR PATCHING ALL PENETRATIONS CREATED BY REMOVAL OF EQUIPMENT, DUCTWORK, PIPING, ETC. TO MATCH EXISTING. REPAIR ADJACENT CONSTRUCTION AND FINISHES DAMAGED DURING DEMOLITION AND EXTENSION WORK. PATCH TO MATCH ORIGINAL CONSTRUCTION. VERIFY ALTERNATIVE OR SPECIAL REPAIR METHODS WITH ARCHITECT/ENGINEER BEFORE PROCEEDING WITH DEMOLITION.
 - CONTRACTOR IS RESPONSIBLE FOR ALL MODIFICATIONS TO THE EXISTING HVAC PIPING AND DUCTWORK NECESSARY TO PERMIT THE INSTALLATION OF NEW WORK.
 - PROVIDE TEMPORARY CONNECTIONS TO MAINTAIN EXISTING SYSTEMS IN SERVICE DURING CONSTRUCTION. WHEN WORK MUST BE PERFORMED ON OPERATING EQUIPMENT, USE PERSONNEL EXPERIENCED IN SUCH OPERATIONS.
 - EXTEND EXISTING INSTALLATIONS USING MATERIAL AND METHODS COMPATIBLE WITH EXISTING MECHANICAL INSTALLATIONS, OR AS SPECIFIED FOR INTENDED SERVICE.
 - ALL SYSTEM CHANGEOVERS BE COMPLETED IN OVERTIME, NOT DURING NORMAL WORKING HOURS.
 - REMOVE, RELOCATE, AND EXTEND EXISTING INSTALLATIONS TO ACCOMMODATE NEW CONSTRUCTION.
 - REMOVE ABANDONED DUCTS AND PIPING TO SOURCE OF SUPPLY AND/OR MAIN LINES AND CAP OR MAKE READY FOR RECONNECTION IF SERVICE IS EXTENDED AS PART OF NEW WORK.
 - REMOVE EXPOSED ABANDONED PIPING AND DUCTS, INCLUDING ABANDONED PIPING AND DUCTS ABOVE ACCESSIBLE CEILING FINISHES. CUT DUCTS FLUSH WITH WALLS AND FLOORS. CAP DUCT THAT REMAINS, AND PATCH SURFACES. CUT PIPING ABOVE CEILINGS, BELOW FLOORS, AND BEHIND WALLS. CAP REMAINING LINES. REMOVE ALL ASSOCIATED CLAMPS, HANGERS, SUPPORTS, ETC., ASSOCIATED WITH PIPING AND DUCT REMOVAL.
 - DISCONNECT AND REMOVE MECHANICAL DEVICES AND EQUIPMENT SERVING EQUIPMENT THAT HAS BEEN REMOVED.
 - MAINTAIN ACCESS TO EXISTING MECHANICAL INSTALLATIONS WHICH REMAIN ACTIVE. MODIFY INSTALLATION OR PROVIDE ACCESS PANEL AS APPROPRIATE.
 - MECHANICAL ITEMS REMOVED AND NOT RELOCATED REMAIN THE PROPERTY OF THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISPOSAL OF MATERIAL THE OWNER DOES NOT WANT TO REUSE OR RETAIN FOR MAINTENANCE PURPOSES.

- GENERAL MECHANICAL NOTES:**
- DRAWINGS SHOWING LOCATIONS OF EQUIPMENT, DUCTWORK, PIPING, ETC. ARE DIAGRAMMATIC AND MAY NOT ALWAYS REFLECT ACTUAL INSTALLATION CONDITIONS. DRAWINGS SHOW THE GENERAL ARRANGEMENT OF ALL DUCTWORK, PIPING, EQUIPMENT, ETC. AND MAY NOT INCLUDE ALL OFFSETS AND FITTINGS REQUIRED FOR COMPLETE INSTALLATION. THE DRAWINGS SHALL BE FOLLOWED AS CLOSELY AS ACTUAL BUILDING CONSTRUCTION AND THE WORK OF OTHERS WILL PERMIT.
 - DO NOT SCALE DRAWINGS. VERIFY ALL DIMENSIONS AND CLEARANCES FROM ARCHITECTURAL STRUCTURAL, SUBMITTALS, AND OTHER APPROPRIATE DRAWINGS OR PHYSICALLY AT SITE. READ ALL SPECIFICATIONS. REVIEW ALL DRAWINGS, INCLUDING THOSE OF OTHER TRADES.
 - LAYOUT AND COORDINATE ALL WORK WITH ALL OTHER TRADES PRIOR TO INSTALLATION TO PROVIDE CLEARANCES REQUIRED FOR OPERATION, MAINTENANCE, CODE COMPLIANCE, AND TO VERIFY NON-INTERFERENCE WITH OTHER WORK. DO NOT FABRICATE PRIOR TO VERIFICATION OF NECESSARY CLEARANCES FOR ALL TRADES. BRING ANY INTERFERENCES OR CONFLICTS TO THE ATTENTION OF THE ARCHITECT/ENGINEER BEFORE PROCEEDING WITH ANY FABRICATION OR EQUIPMENT ORDERS.
 - CONTRACTOR IS RESPONSIBLE FOR REVIEW OF SPACE REQUIREMENTS OF EQUIPMENT SPECIFIED OR SUBSTITUTED AND MAKING REASONABLE ACCOMMODATIONS IN LAYOUT AND POSITIONING TO PROVIDE PROPER ACCESS.
 - ANY CHANGES THAT ARE REQUIRED TO ELIMINATE CONFLICTS OR RESULT FROM A FAILURE TO COORDINATE SHALL BE MADE BY THE CONTRACTOR WITHOUT ADDITIONAL COST OR EXPENSE TO THE OWNER.
 - CAULK ALL PIPE AND DUCT PENETRATIONS OF FULL HEIGHT NON FIRE RATED WALLS, PARTITIONS, FLOORS AND ROOF ASSEMBLIES. THIS IS ESSENTIAL TO PREVENT NOISE TRANSMISSION FROM ONE ROOM TO ANOTHER AND TO PROVIDE THE DESIRED NC LEVELS WITHIN THE ROOMS.
 - CONTRACTOR IS RESPONSIBLE FOR ALL COST ASSOCIATED WITH ELECTRICAL CHANGES REQUIRED FOR EQUIPMENT DIFFERENT THAN THE BASIS OF DESIGN.
 - REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATIONS OF ALL CEILING MOUNTED DEVICES.
 - TERMINAL AIR BOX (TAB) NUMBER OR REHEAT COIL NUMBER IS SHOWN ADJACENT TO THERMOSTAT ONLY WHEN THE TAB OR COIL WHICH THE THERMOSTAT IS CONTROL LING IS AMBIGUOUS.
 - ALIGN LIGHT SWITCHES AND TEMPERATURE SENSORS WHEN IN CLOSE PROXIMITY TO EACH OTHER.
 - PROVIDE ACCESS DOORS AT ALL DUCT MOUNTED EQUIPMENT.

DESIGN CODES:

DESCRIPTION:	YEAR:
INTERNATIONAL BUILDING CODE	2012
INTERNATIONAL MECHANICAL CODE	2012
INTERNATIONAL PLUMBING CODE	2012
INTERNATIONAL FIRE CODE	2012

CONTACT PERSONS

DESCRIPTION:	PERSON:
PROJECT MANAGER	DAVID LARSON
MECHANICAL ENGINEER	NATE JACQUES

VENTILATION SYMBOLS LIST

SYMBOL:	DESCRIPTION:
	EXISTING DUCT TO REMAIN
	EXISTING DUCT TO BE REMOVED
	NEW DUCT
	FLEXIBLE DUCT
	DIRECTION OF AIR FLOW
	MANUAL VOLUME DAMPER
	DUCT CAP
	DUCT DOWN
	DUCT UP
	SUPPLY/OUTSIDE AIR DUCT SECTION
	RETURN AIR DUCT SECTION
	EXHAUST/RELIEF AIR DUCT SECTION
	SD-1 6/115 TERMINAL PROPERTIES SYMBOL NECK SIZE/CFM
	TERMINAL AIR BOX (REFER TO SCHEDULE)
	TERMINAL AIR BOX W/REHEAT COIL (REFER TO SCHEDULE)
	HUMIDIFIER
	OPPOSED BLADE DAMPER (REFER TO SCHEDULE)
	PARALLEL BLADE DAMPER (REFER TO SCHEDULE)
	CARBON MONOXIDE SENSOR
	CARBON DIOXIDE SENSOR
	HUMIDISTAT SENSOR
	HUMIDISTAT/SENSOR (DUCT MOUNTED)
	PRESSURE SENSOR/MONITOR
	PRESSURE SENSOR (DUCT MOUNTED)
	THERMOSTAT/SENSOR
	TEMPERATURE SENSOR (DUCT MOUNTED)
	THERMOSTAT/SENSOR W/HEAVY DUTY ENCLOSURE
	AD ACCESS DOOR
	AFF ABOVE FINISHED FLOOR
	EA EXHAUST/RELIEF AIR
	E.C. ELECTRICAL CONTRACTOR
	FD FIRE DAMPER
	FSD FIRE/SMOKE DAMPER
	FMCS FACILITY MANAGEMENT CONTROL SYSTEM
	G.C. GENERAL CONTRACTOR
	H.C. HEATING CONTRACTOR
	MA MIXED AIR
	M.C. MECHANICAL CONTRACTOR
	NC NEW CONNECTION
	OA OUTSIDE AIR
	RA RETURN AIR
	SA SUPPLY AIR
	SD SMOKE DAMPER
	V.C. VENTILATION CONTRACTOR
	T.C.C. TEMPERATURE CONTROLS CONTRACTOR

Revisions:	Date
REVISED FOR BIDDING	10/27/15

CONSULTANTS:
HEALTHCARE PLANNERS: VOA ARCHITECTS
MEPPF + TECH + STRUCT: KJWW CONSULTING ENGINEERS
CIVIL ENGINEER: JD ENGINEERING
COST ESTIMATING: MOSS CONSTRUCTION COST MANAGEMENT
INDUSTRIAL HYGIENE: JOHN A. JURGIEL & ASSOCIATES, INC.



ARCHITECT:
MICHAEL ROTH & ASSOCIATES, ARCHITECTS & PLANNERS, INC.
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Drawing Title
 VENTILATION COVER SHEET

Approved: Project Director

Project Title RENOVATE AND EXPAND AMBULATORY CARE AND LAB. SAM RAYBURN MEMORIAL VETERANS CENTER

Project Number 549-130

Building Number 1

Drawing Number MH001

Date APRIL 13, 2015

Checked DAVING

Drawn NATJAC

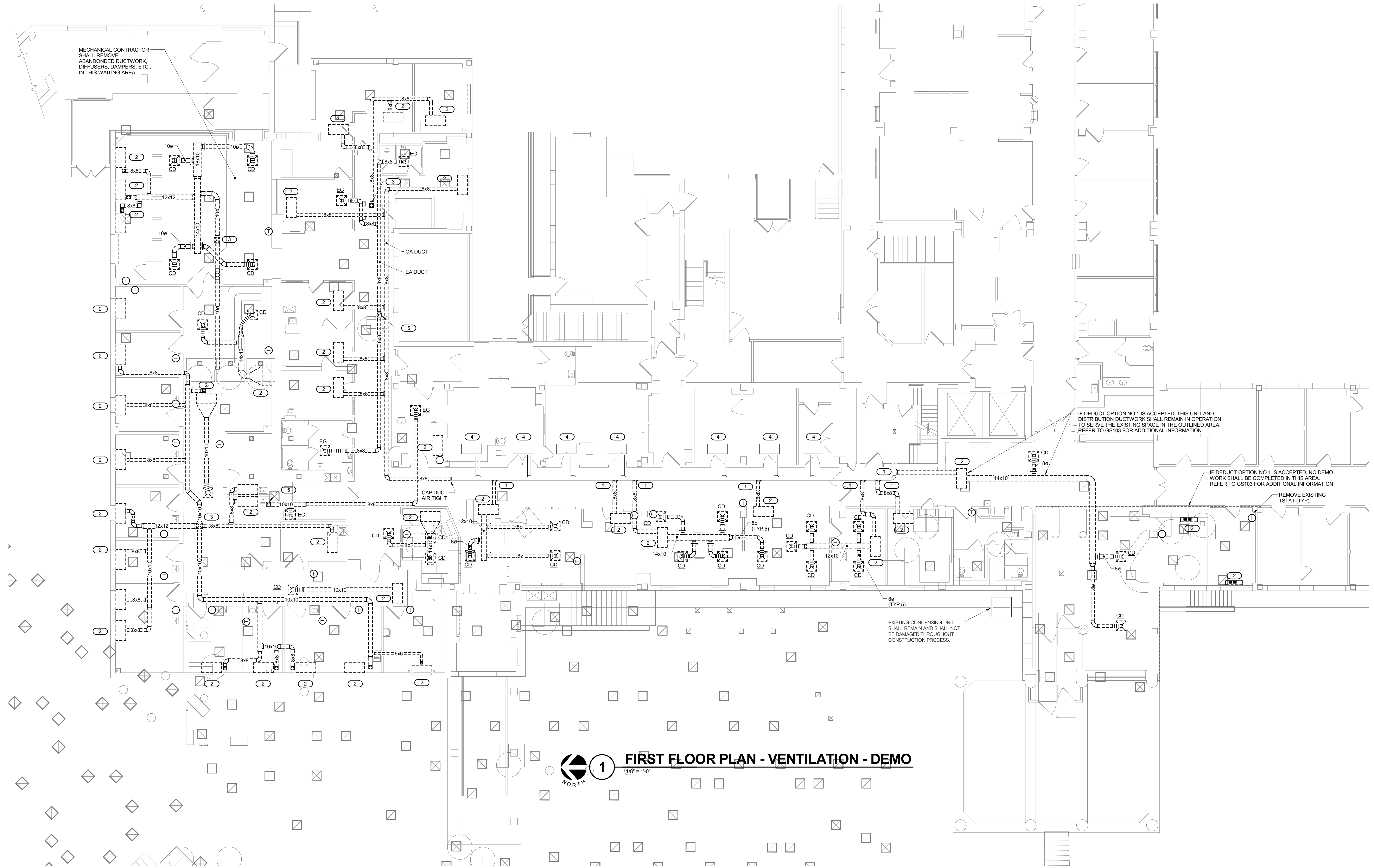
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Office of Facilities Management

Department of Veterans Affairs

- GENERAL NOTES:**
- EXISTING CONDITIONS ARE SHOWN BASED ON FIELD OBSERVATIONS AND EXISTING DOCUMENTS. CONTRACTOR SHALL FIELD VERIFY CONDITIONS AND CONTACT ENGINEER IF ANY DISCREPANCIES ARISE PRIOR TO COMPLETING WORK.
 - REFER TO DETAIL 3MH301 FOR LONGITUDINAL SEAMS DETAIL.
 - REFER TO DETAIL 4MH301 FOR DUCT REINFORCEMENT DETAIL.
 - REFER TO DETAIL 5MH301 AND 6MH301 FOR ELBOW CONSTRUCTION AND BRANCH CONNECTIONS RESPECTIVELY.

- KEYNOTES:**
- CAP DUCT OPENING AIR TIGHT.
 - REMOVE EXISTING FAN COIL UNIT AND VALVING AND PIPING BACK TO MAIN.
 - REMOVE OUTDOOR AIR DUCTING AND INTAKE GOOSENECK ON ROOF. PATCH PENETRATION THROUGH ROOF TO MATCH EXISTING. COORDINATE ROOF PATCHING WITH GENERAL CONTRACTOR.
 - FAN COIL TO REMAIN.
 - REMOVE EXISTING EXHAUST FAN ON ROOF. PATCH PENETRATION THROUGH ROOF TO MATCH EXISTING. COORDINATE ROOF PATCHING WITH GENERAL CONTRACTOR.



1 FIRST FLOOR PLAN - VENTILATION - DEMO
1/8" = 1'-0"

REVISED FOR BIDDING	10/27/15
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CONSULTANTS:
HEALTHCARE PLANNERS: VOA ARCHITECTS
MEPPP + TECH + STRUCT: KJWW CONSULTING ENGINEERS
CIVIL ENGINEER: JD ENGINEERING
COST ESTIMATING: MOSS CONSTRUCTION COST MANAGEMENT
INDUSTRIAL HYGIENE: JOHN A. JURGIEL & ASSOCIATES, INC.

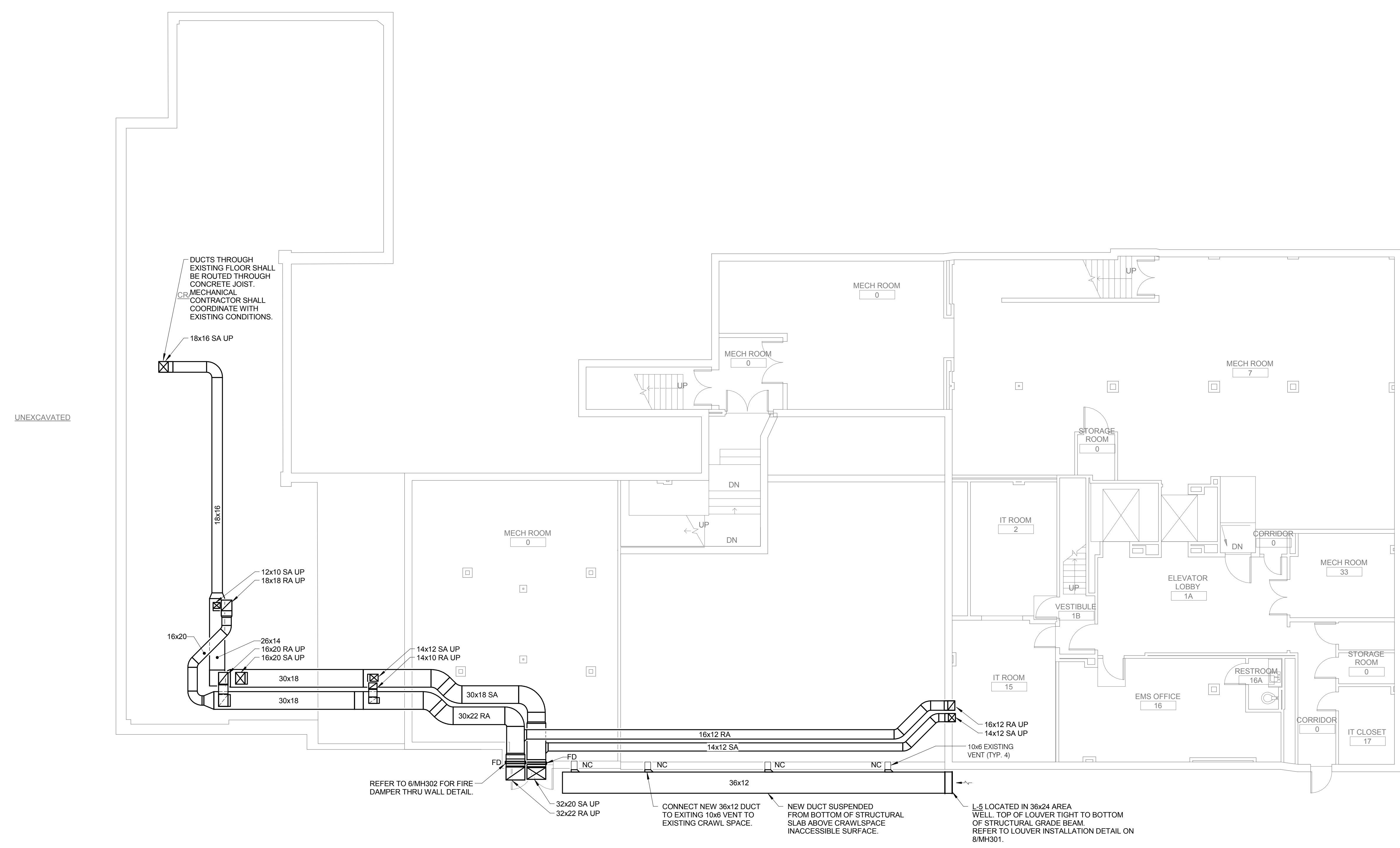
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Drawing Title
FIRST FLOOR PLAN - VENTILATION - DEMO
 Approved: Project Director

Project Title **RENOVATE AND EXPAND AMBULATORY CARE AND LAB. SAM RAYBURN MEMORIAL VETERANS CENTER**
 Project Number 549-130
 Building Number 1
 Drawing Number MH101
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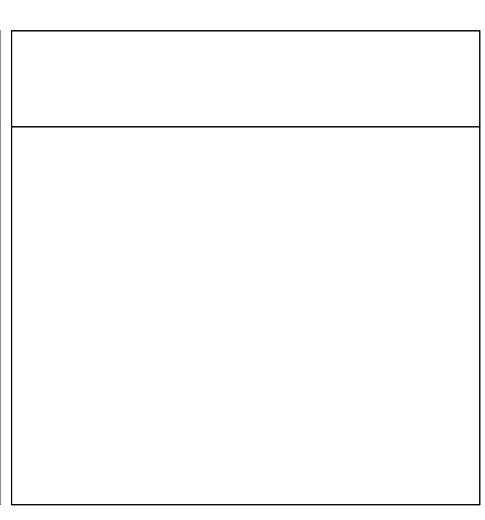
Office of Facilities Management
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1 BASEMENT FLOOR PLAN - VENTILATION
1/8" = 1'-0"

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Revisions:	Date

CONSULTANTS:
 HEALTHCARE PLANNERS: VOA ARCHITECTS
 MEPFP + TECH + STRUCT: KJWW CONSULTING ENGINEERS
 CIVIL ENGINEER: JD ENGINEERING
 COST ESTIMATING: MOSS CONSTRUCTION COST MANAGEMENT
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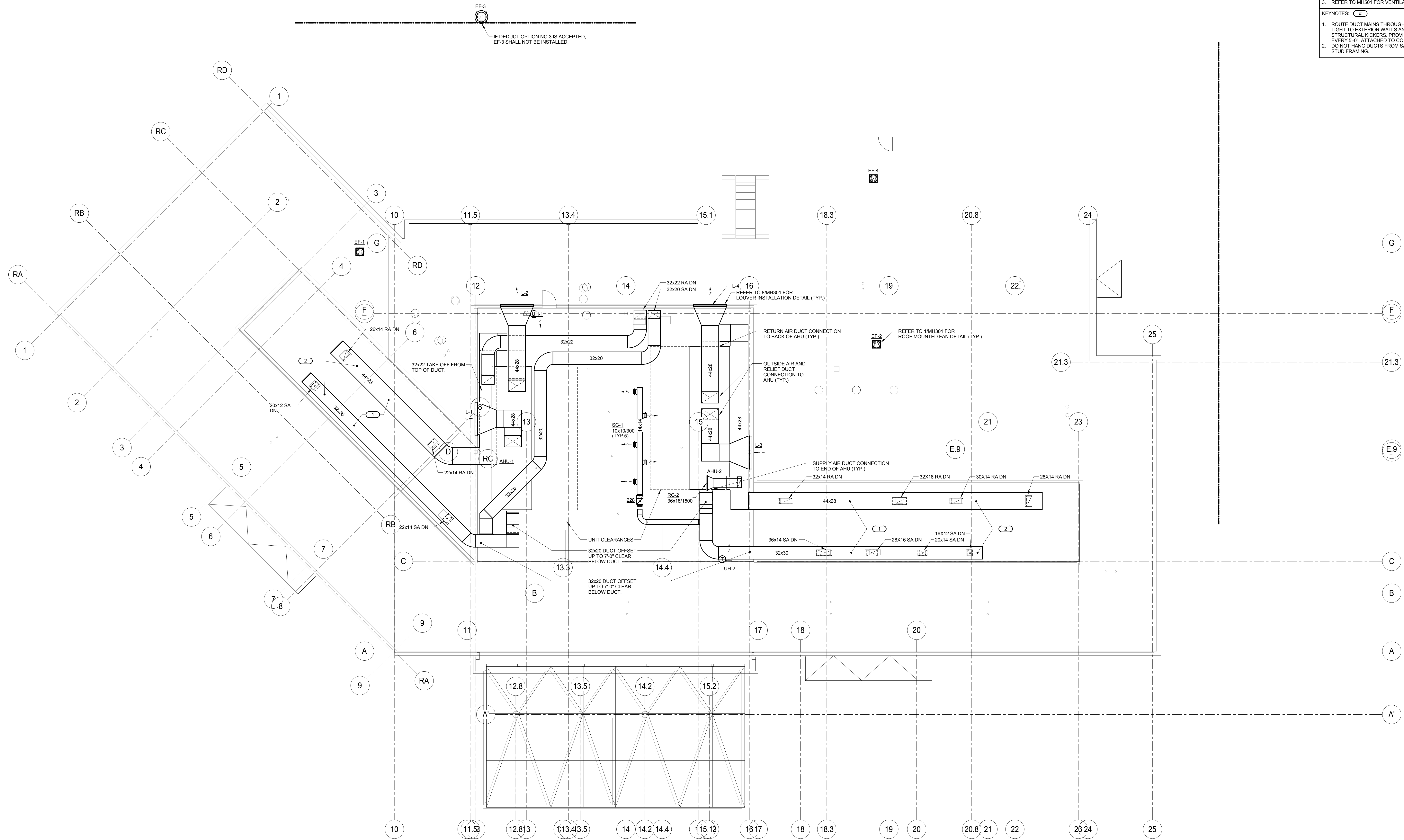
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 200 SOUTH HANLEY ROAD, STE. 1105, CLAYTON, MISSOURI 63105, 314-862-2112

Drawing Title
 BASEMENT FLOOR PLAN - VENTILATION
Approved: Project Director

Project Title RENOVATE AND EXPAND AMBULATORY CARE AND LAB. SAM RAYBURN MEMORIAL VETERANS CENTER			Project Number 549-130
Location BONHAM, TEXAS			Building Number 1
Date APRIL 13, 2015	Checked DAVING	Drawn NATJAC	Drawing Number MH102
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Office of Facilities Management
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- GENERAL NOTES:**
1. PROVIDE DUCT ACCESS DOORS EVERY 20' TO ALLOW FOR VIA REQUIRED DUCT CLEANINGS.
 2. REFER TO MH601 FOR CONTROL DIAGRAMS.
 3. REFER TO MH501 FOR VENTILATION SCHEDULES.
- KEYNOTES:**
1. ROUTE DUCT MAINS THROUGH DOG-HOUSES TIGHT TO EXTERIOR WALLS AND BELOW STRUCTURAL KICKERS. PROVIDE HANGERS EVERY 5'-0". ATTACHED TO COLD FORM STUDS. DO NOT HANG DUCTS FROM SAME COLD FORM STUD FRAMING.



1 PENTHOUSE AND ROOF PLAN - VENTILATION
 1/8" = 1'-0"

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Revisions:	Date

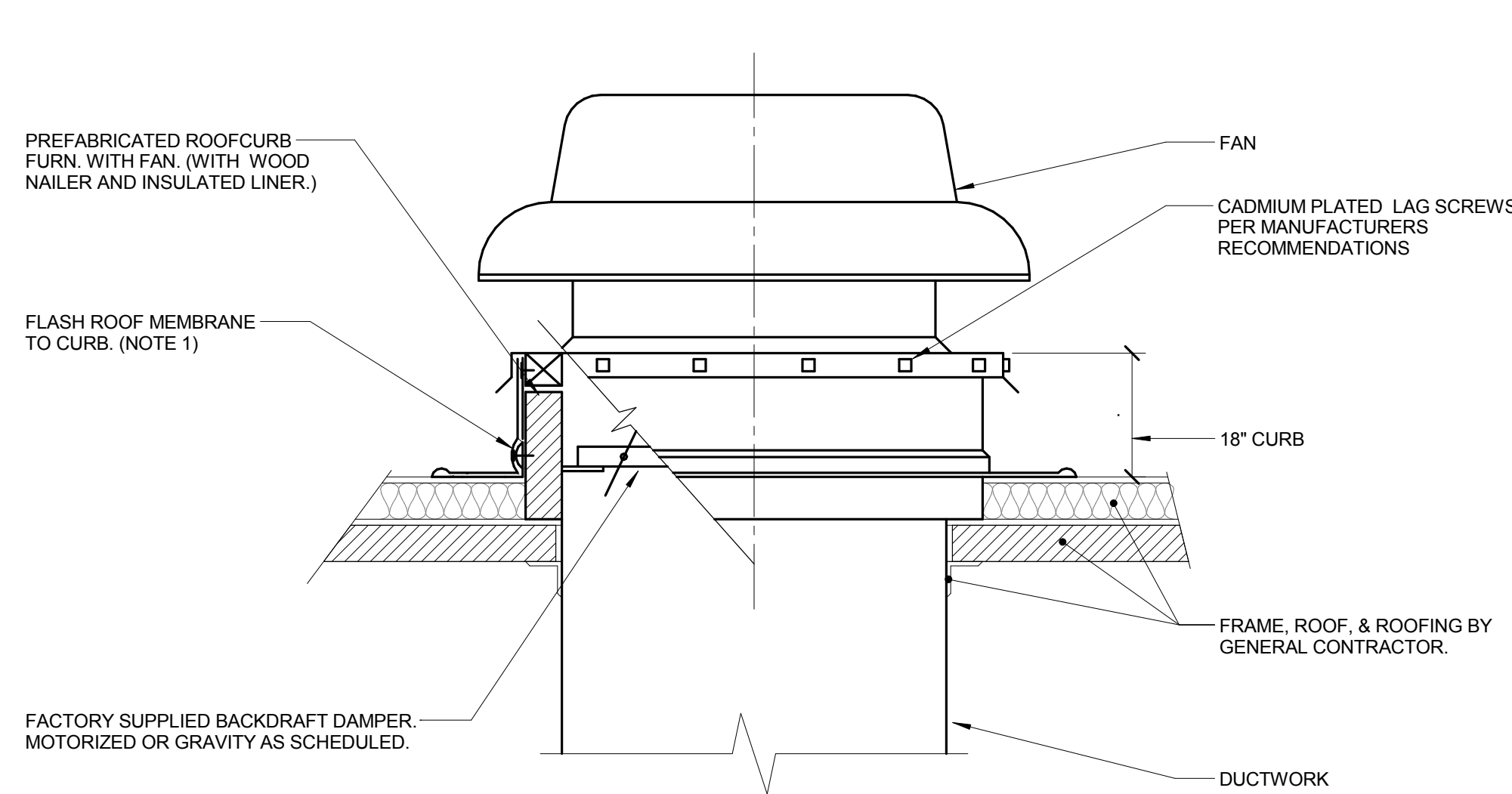
CONSULTANTS:
 HEALTHCARE PLANNERS: VOA ARCHITECTS
 MEPFP + TECH + STRUCT: KJWW CONSULTING ENGINEERS
 CIVIL ENGINEER: JD ENGINEERING
 COST ESTIMATING: MOSS CONSTRUCTION COST MANAGEMENT
 INDUSTRIAL HYGIENE: JOHN A. JURGIEL & ASSOCIATES, INC.

ARCHITECT:
 **MICHAEL ROTH & ASSOCIATES, ARCHITECTS & PLANNERS, INC.**
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Drawing Title
PENTHOUSE AND ROOF PLAN - VENTILATION
 Approved: Project Director

Project Title **RENOVATE AND EXPAND AMBULATORY CARE AND LAB. SAM RAYBURN MEMORIAL VETERANS CENTER**
 Project Number 549-130
 Building Number 1
 Drawing Number MH106
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Office of Facilities Management
 Department of Veterans Affairs

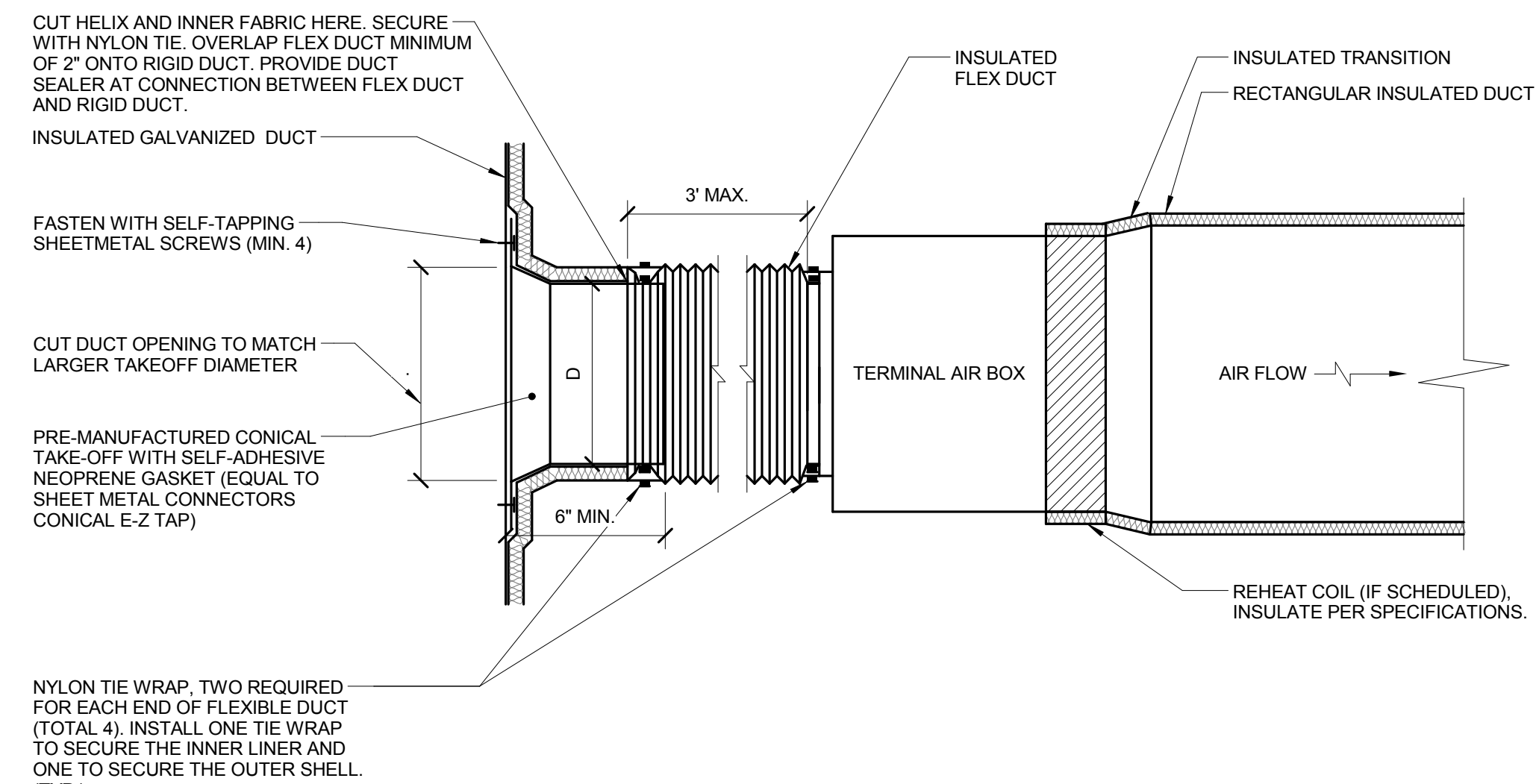


1 ROOF MOUNTED FAN/HOOD (MEMBRANE ROOF)

NO SCALE

NOTES:

- ALL ROOF FLASHING SHALL BE PER ROOFING MANUFACTURERS RECOMMENDATIONS.

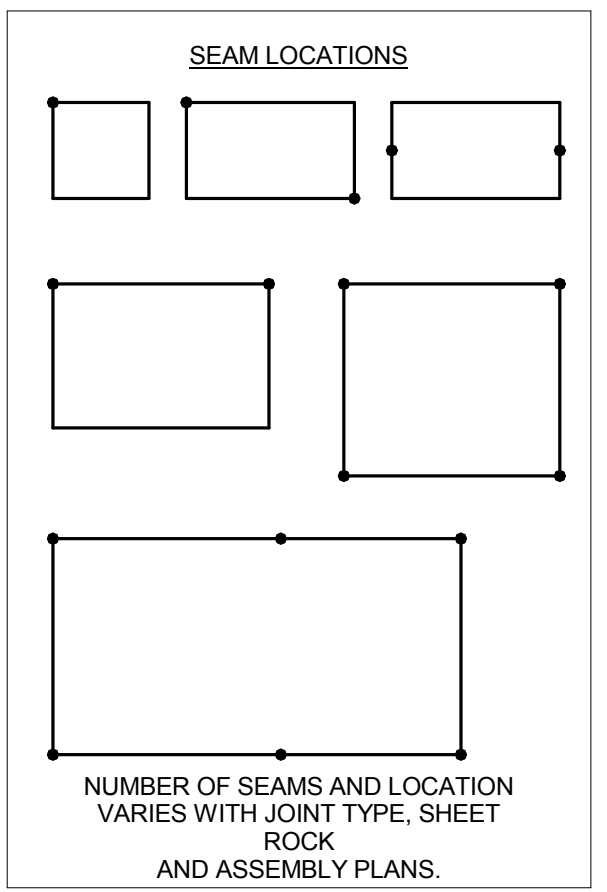
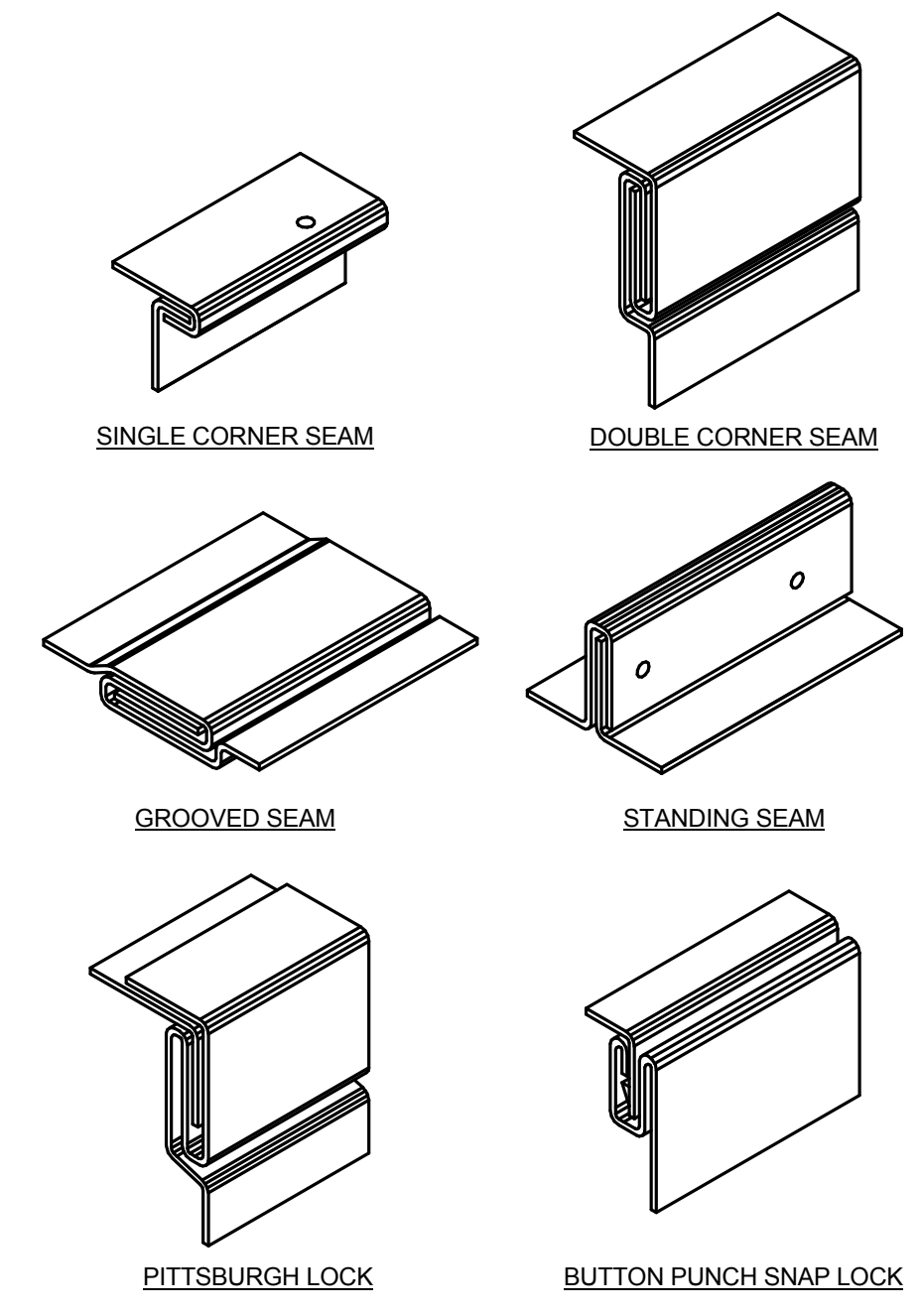


2 TERMINAL AIR BOX DETAIL (WRAPPED MAIN)

NO SCALE

NOTES:

- THIS DETAIL APPLIES ONLY TO TAPS OFF WRAPPED DUCTS.
- THIS DETAIL APPLIES TO TERMINAL AIR BOXES WITH ROUND INLETS AND RECTANGULAR OUTLETS.
- DUCT LEADING TO TAB INLET MUST BE STRAIGHT FOR 1.5 DIAMETER UPSTREAM.
- MAINTAIN VAPOR BARRIER FROM MAIN TO BRANCH DUCT.

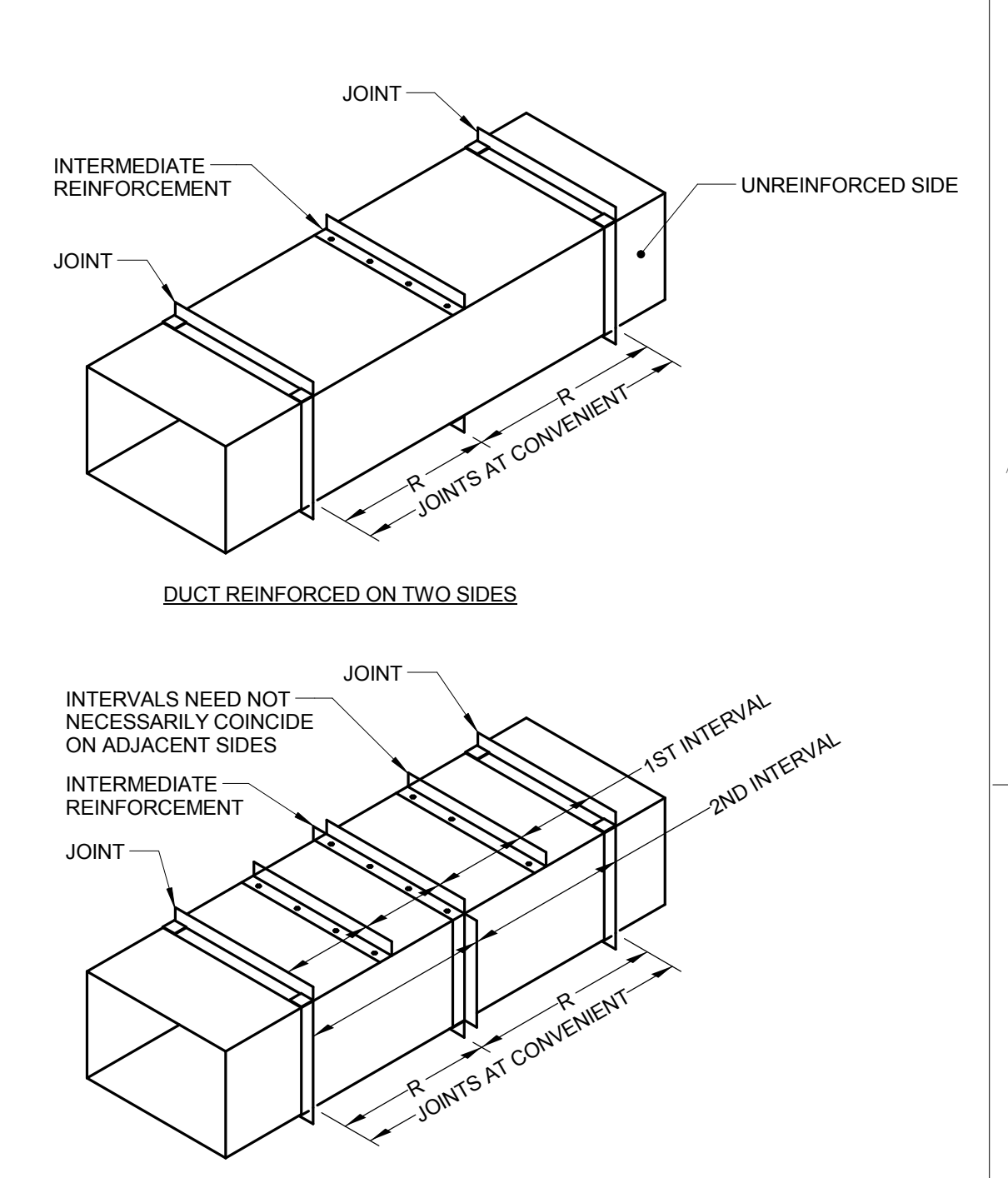


3 LONGITUDINAL SEAMS - RECTANGULAR DUCT

NO SCALE

NOTES:

- SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.

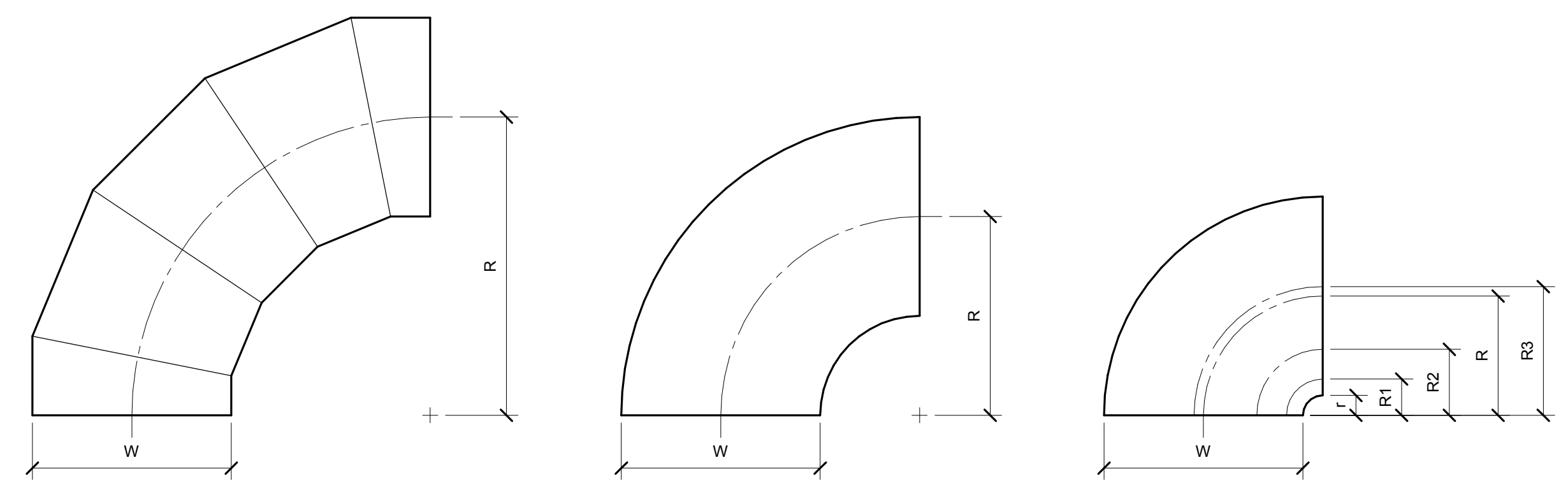


4 DUCT REINFORCEMENT DETAIL

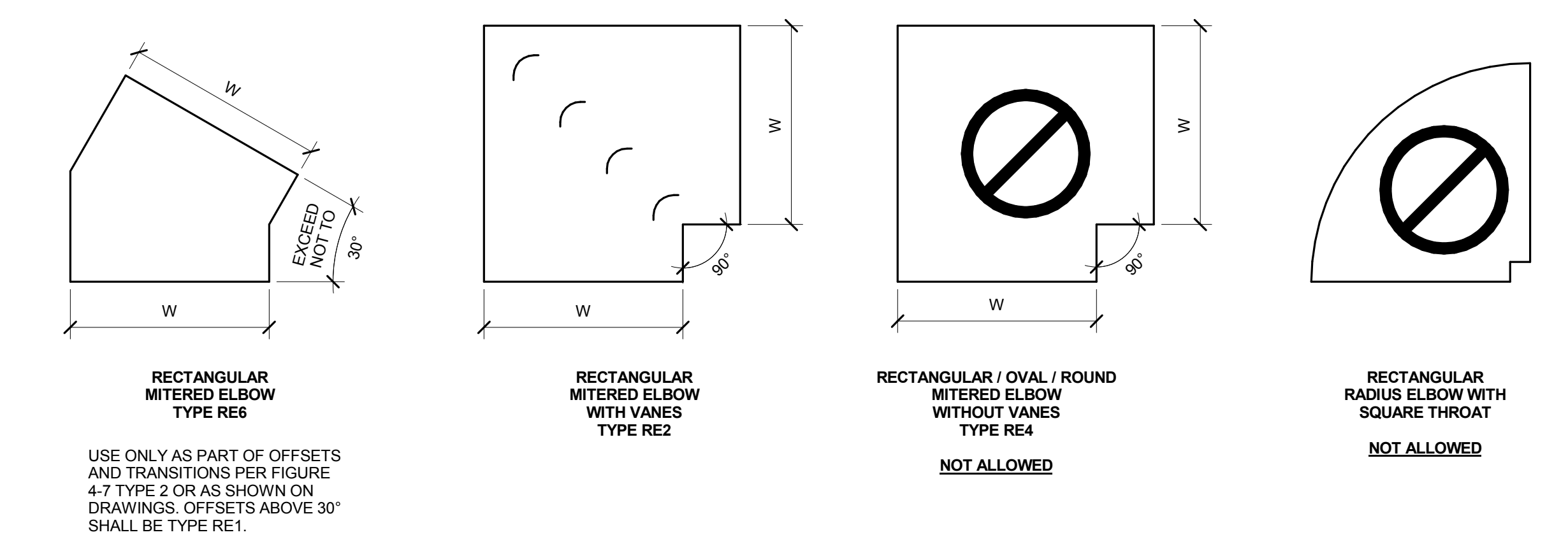
NO SCALE

NOTES:

- 'R' IS AN ALLOWABLE REINFORCEMENT INTERVAL.
- TOP AND BOTTOM JOINTS MUST QUALIFY AS REINFORCEMENT.
- DUCT SIZES THAT ARE 18 INCHES (463 mm) AND OVER ARE 20 GAUGE (1.00 mm) OR LESS, WITH MORE THAN 10 SQUARE FEET (0.93 SQUARE METERS) OF UNBRACED PANEL AREA, SHALL BE CROSSBROKEN OR BEADED UNLESS THEY ARE LINED OR EXTERNALLY INSULATED. DUCTS THAT ARE OF HEAVIER GAGE, SMALLER DIMENSIONS, AND SMALLER PANEL AREA AND THOSE THAT ARE EXTERNALLY INSULATED ARE NOT REQUIRED TO HAVE CROSSBROKEN OR BEADING.
- SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.



REFER TO SMACNA HVAC SYSTEMS DUCT DESIGN MANUAL, FOURTH EDITION, SECTION 5.14 "SPLITTER VANES" AND SMACNA HVAC DUCT CONSTRUCTION STANDARDS, THIRD EDITION, FIGURES 4-2 AND 4-9 AND CHARTS 4-1 AND 4-1M. ELBOW SHALL HAVE THREE SPLITTER VANES AND $R/W = 0.10$ ($R/W = 0.60$) UNLESS NOTED OTHERWISE.

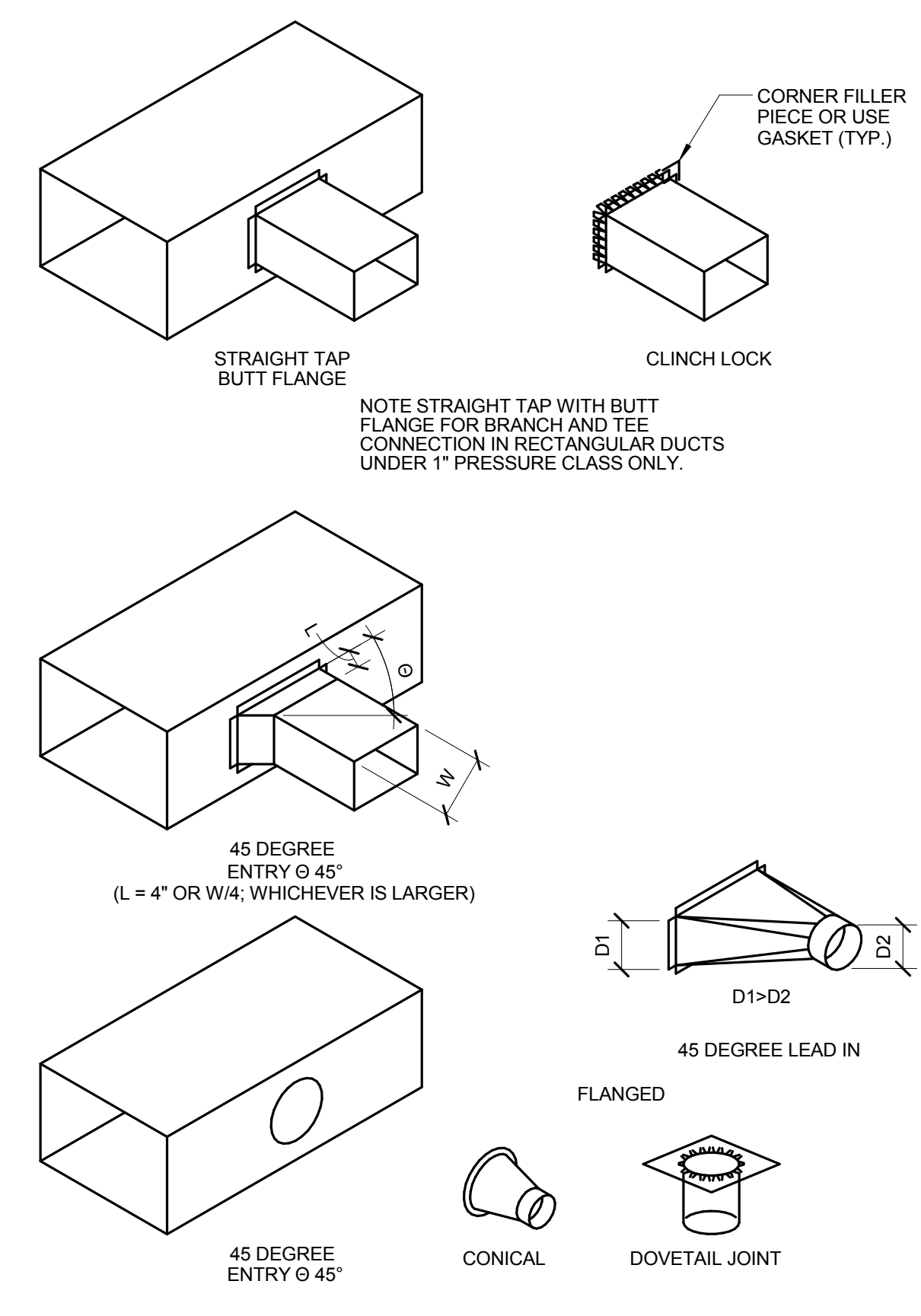


5 ELBOW CONSTRUCTION

NO SCALE

NOTES:

- BEAD, CROSSBREAK, AND REINFORCE FLAT SURFACES AS IN STRAIGHT DUCT.
- REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- DEFAULT ELBOW SHALL BE TYPE "RE1".
- ELBOW TYPES SHALL BE INSTALLED AS SHOWN AND NOT BE SUBSTITUTED WITHOUT PERMISSION. EXCEPTION: RE1 OR RE3 MAY BE SUBSTITUTED FOR RE2.

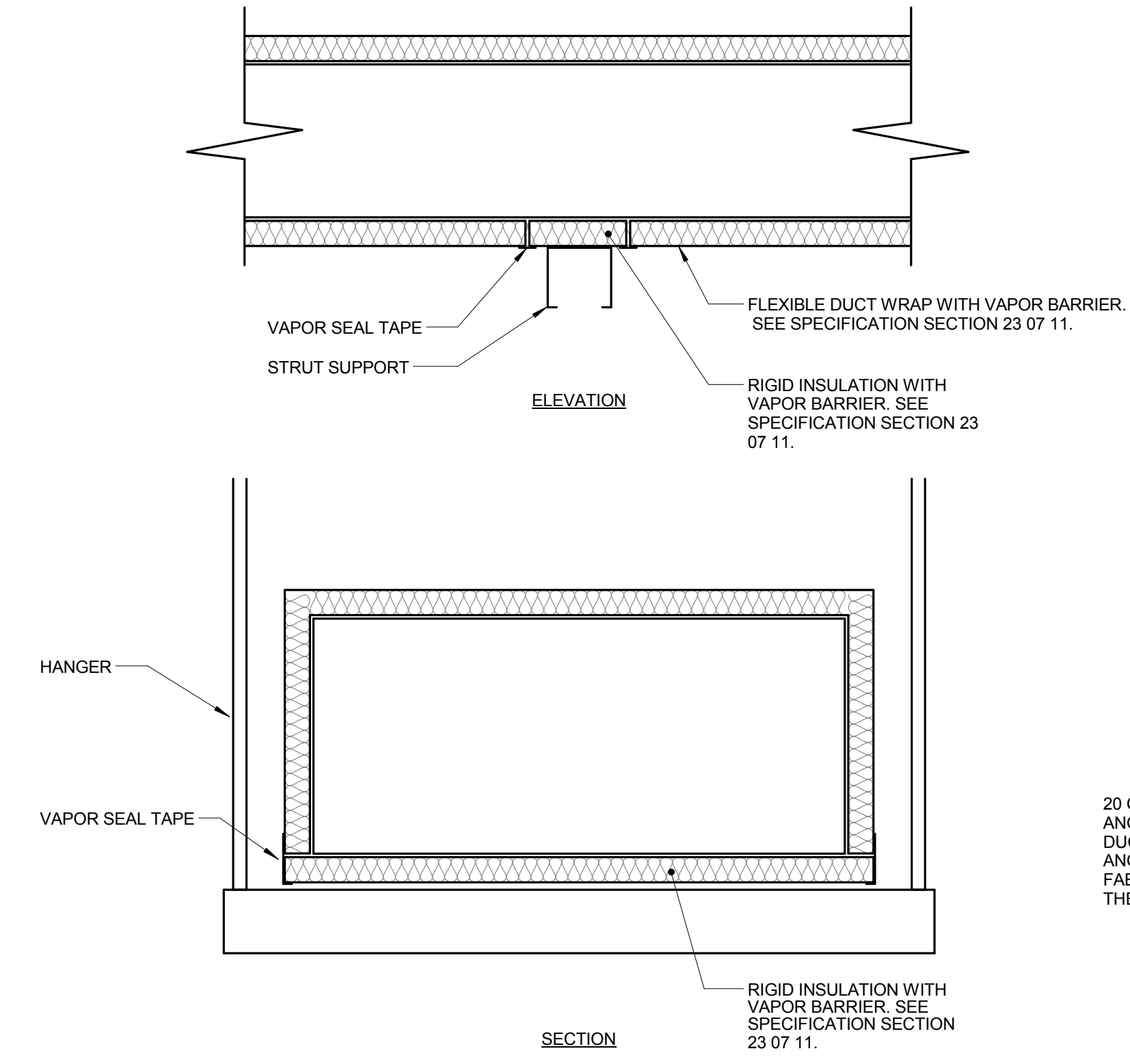


6 BRANCH CONNECTIONS

NO SCALE

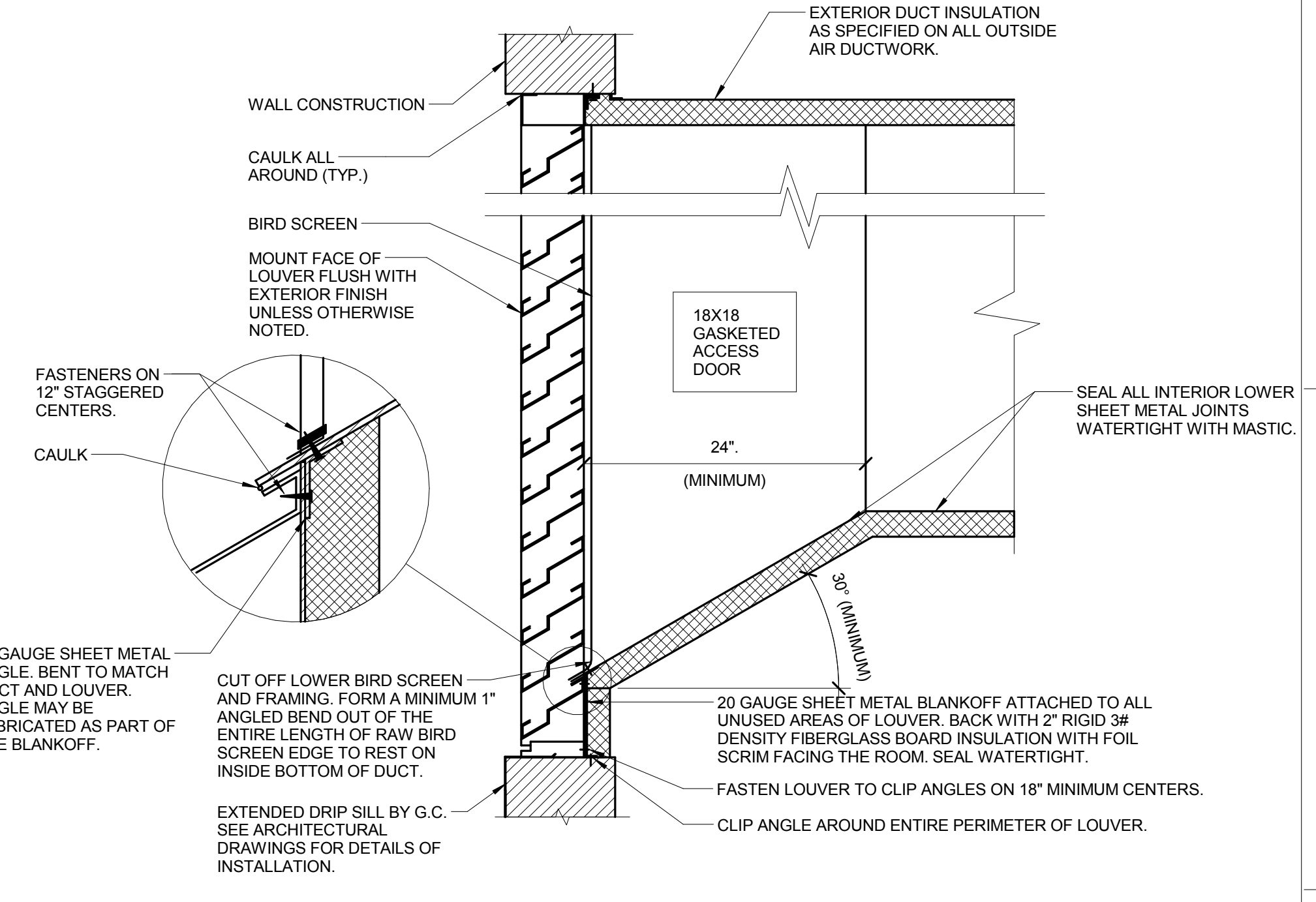
NOTES:

- DO NOT USE CONNECTIONS WITH SCOOPS.
- FIT ALL CONNECTIONS TO AVOID VISIBLE OPENINGS AND SECURE THEM SUITABLY FOR THE PRESSURE CLASS.
- ADDITIONAL MECHANICAL FASTENERS ARE REQUIRED FOR 4"W, G, AND OVER.
- SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.



7 TRAPEZE HANGER DUCT WRAP VAPOR SEAL

NO SCALE



8 LOUVER INSTALLATION DETAIL

NO SCALE

NOTES:

- SEAL ALL JOINTS ON BOTTOM INTERIOR SURFACE OF DUCT WITHIN 6" OF THE LOUVER WATER TIGHT.
- MOUNT BOTTOM OF INTAKE LOUVERS AT LEAST 40" ABOVE GRADE OR ROOF ELEVATION TO MINIMIZE CHANCES OF SNOW DRIFTING INTO THE LOUVER.
- CAULK SHEETMETAL SCREWS WHERE THEY PENETRATE METAL.

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CONSULTANTS:

HEALTHCARE PLANNERS: VOA ARCHITECTS
 MEPFP + TECH + STRUCT: KJWW CONSULTING ENGINEERS
 CIVIL ENGINEER: JD ENGINEERING
 COST ESTIMATING: MOSS CONSTRUCTION COST MANAGEMENT
 INDUSTRIAL HYGIENE: JOHN A. JURGIEL & ASSOCIATES, INC.

ARCHITECT:

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Drawing Title
DETAILS - VENTILATION

Approved: Project Director

Project Title **RENOVATE AND EXPAND AMBULATORY CARE AND LAB. SAM RAYBURN MEMORIAL VETERANS CENTER**

Project Number **549-130**

Building Number **1**

Location **BONHAM, TEXAS**

Date **APRIL 13, 2015**

Checked **DAVING**

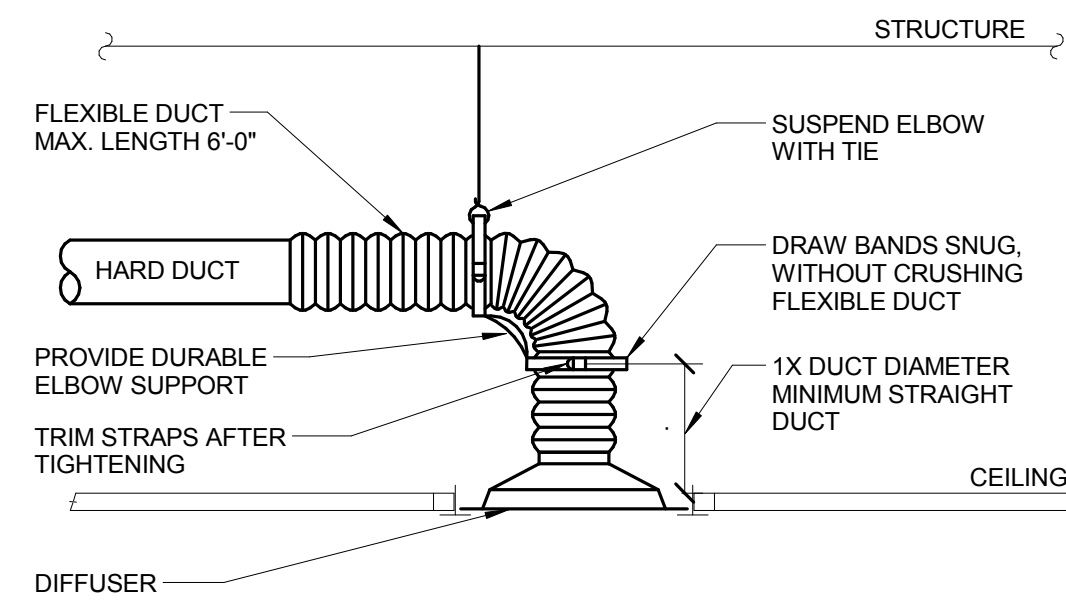
Drawn **NATJAC**

Drawing Number **MH301**

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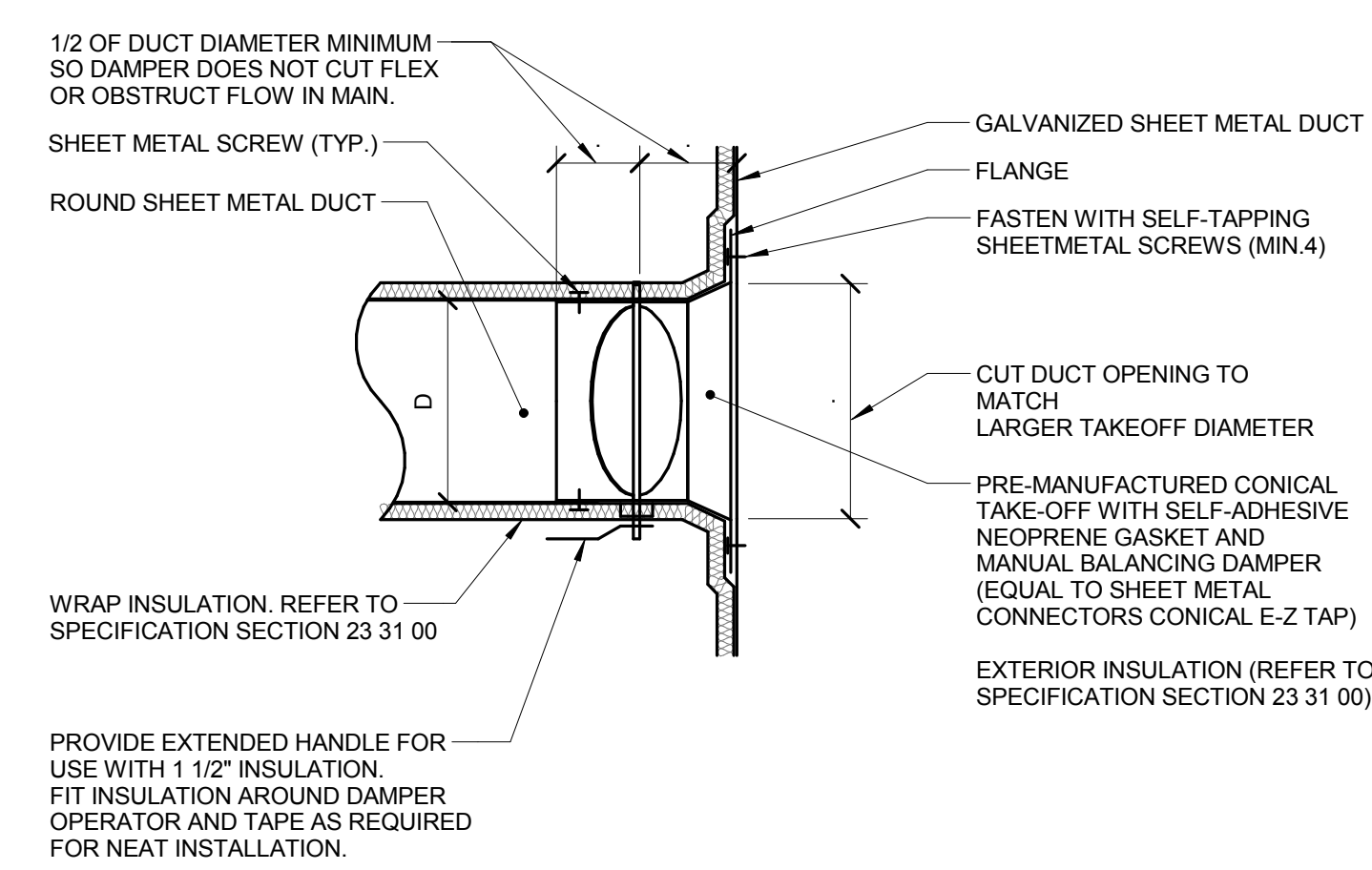
Office of Facilities Management

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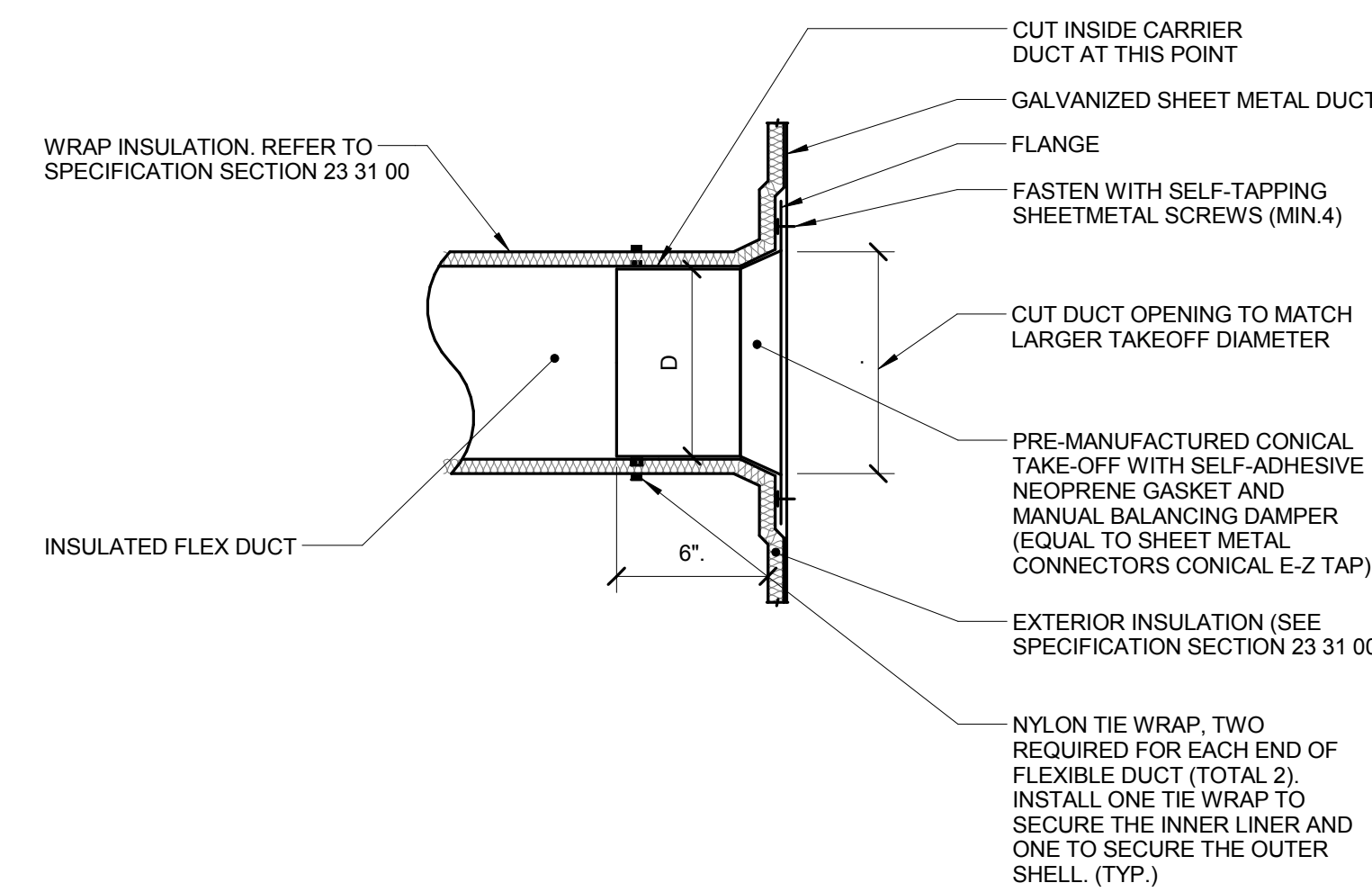
DIFFUSER CONNECTION DETAIL (W/ RADIUS FORMING ELBOW)

1. TO ATTACH FLEX DUCT TO THE HARD DUCT, TAPE THE INNER LINER TO THE HARD DUCT THEN ATTACH WITH TWO NYLON TIE WRAPS, ONE FOR THE INNER LINER AND ONE FOR THE OUTER SHELL. FOLD THE OUTER SHELL INSIDE ITSELF SO IT HAS NEAT EDGES PRIOR TO THE WRAPPING.
2. "SMARTFLOW" ELBOW (WWW.HARTANDCOOLEY.COM), THERMAFLEX "FLEXFLOW" (WWW.THERMAFLEX.BE/IFLEXFLOW_ELBOW.COM) AND "FLEXRIGHT" (WWW.TITUS-HVAC.COM) ARE ACCEPTABLE PRODUCTS FOR DURABLE ELBOW SUPPORT.



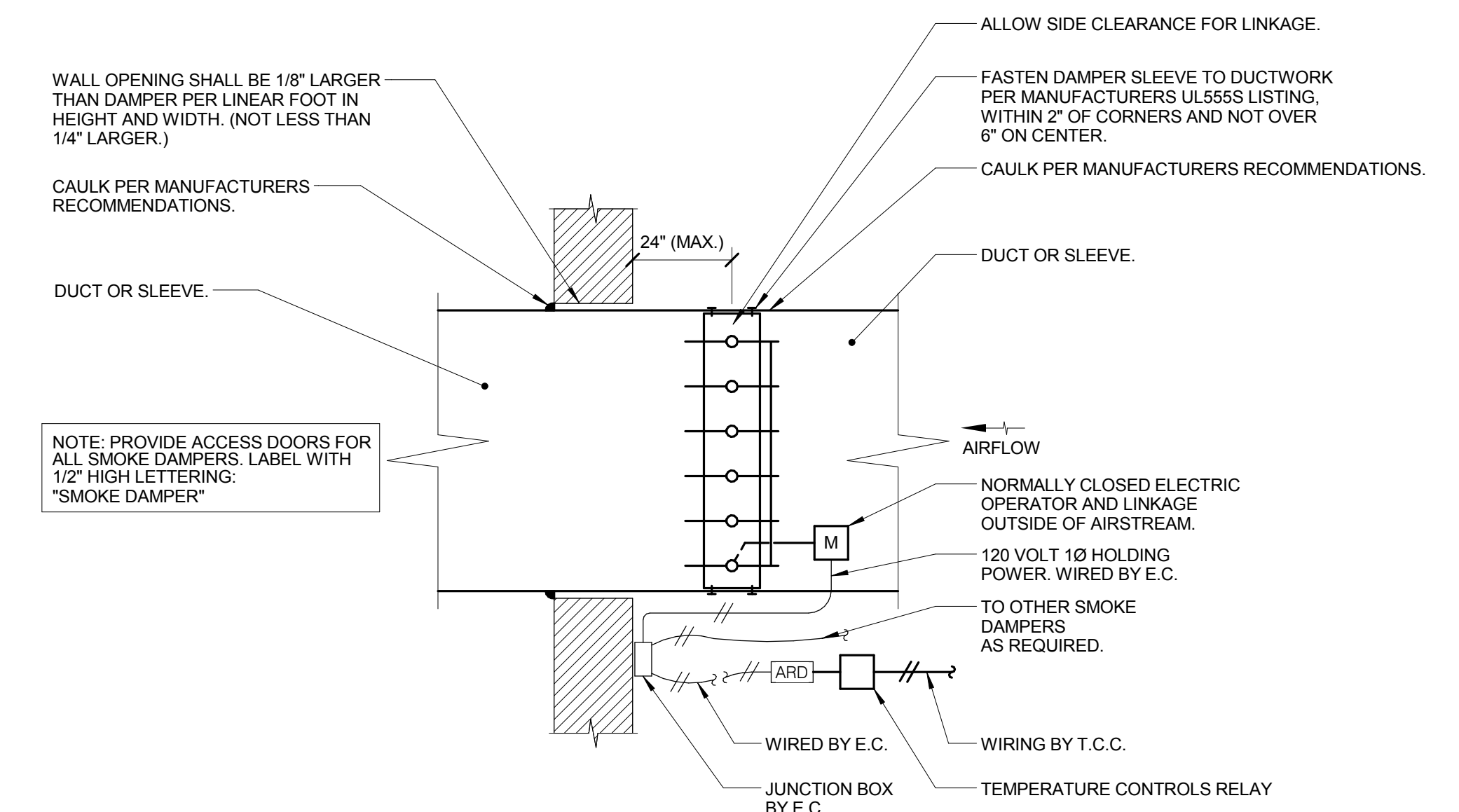
ROUND DUCT TAP CONNECTION (CONICAL/WAPPED)

1. THIS DETAIL APPLIES ONLY TO TAPS OFF UNLINED DUCTS.
2. TAP DOES NOT NEED TO BE CONICAL IF THE TAP IS NOT LOCATED BETWEEN FANS AND TERMINAL AIR BOXES. DUCT IS NOT OVER 2" PRESSURE CLASS, AND ROUND DUCT IS NOT OVER 12" DIAMETER.
3. MANUFACTURED TAP/DAMPER COMBINATIONS WITH LESS THAN 1/2 DUCT DIAMETER SPACING BETWEEN THE MAIN DUCT AND THE DAMPER SHAFT ARE ACCEPTABLE ONLY IF THE DAMPER SHAFT IS INSTALLED PARALLEL TO THE AIR FLOW IN THE MAIN DUCT.



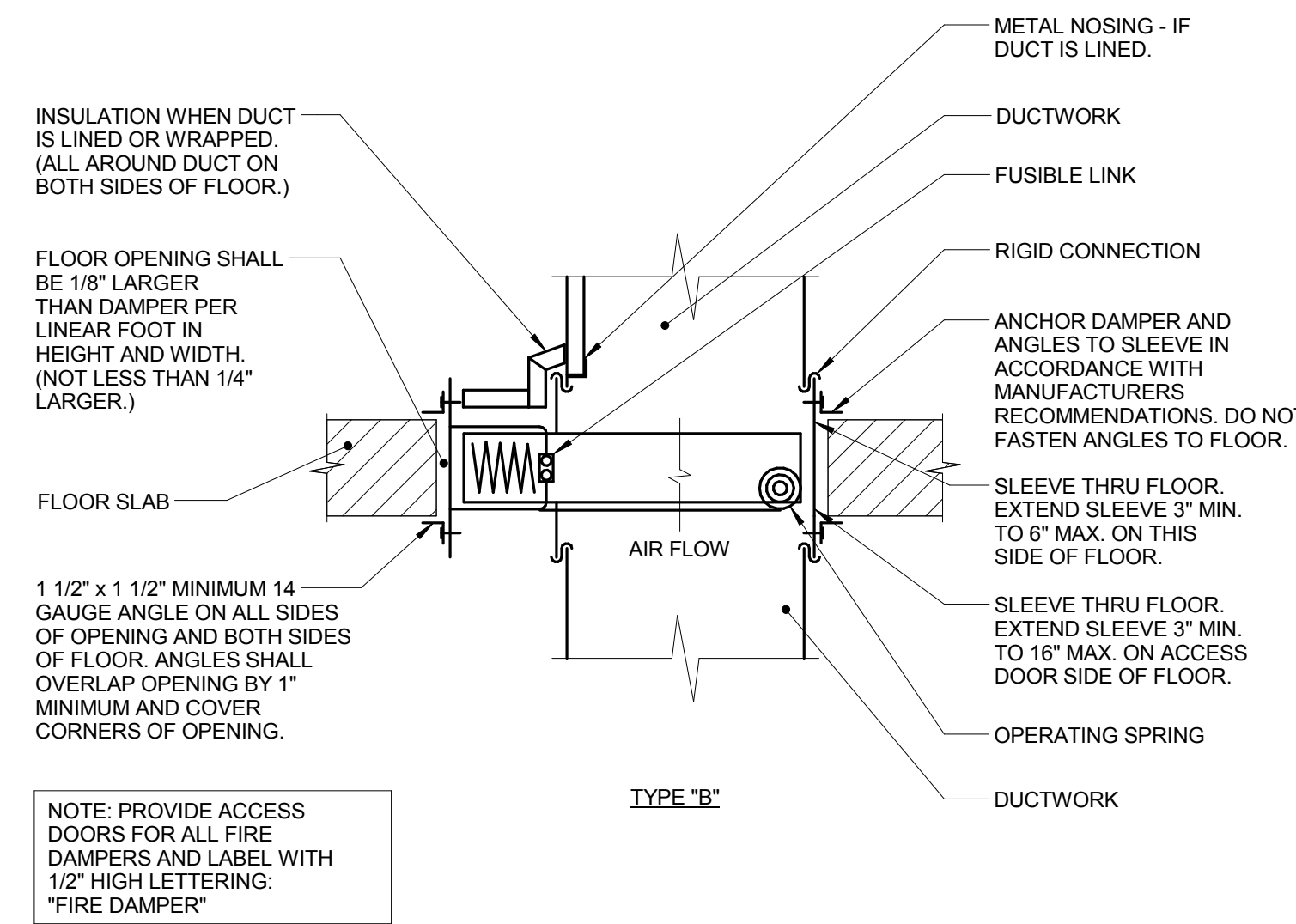
FLEX DUCT CONNECTION (CONICAL/WAPPED)

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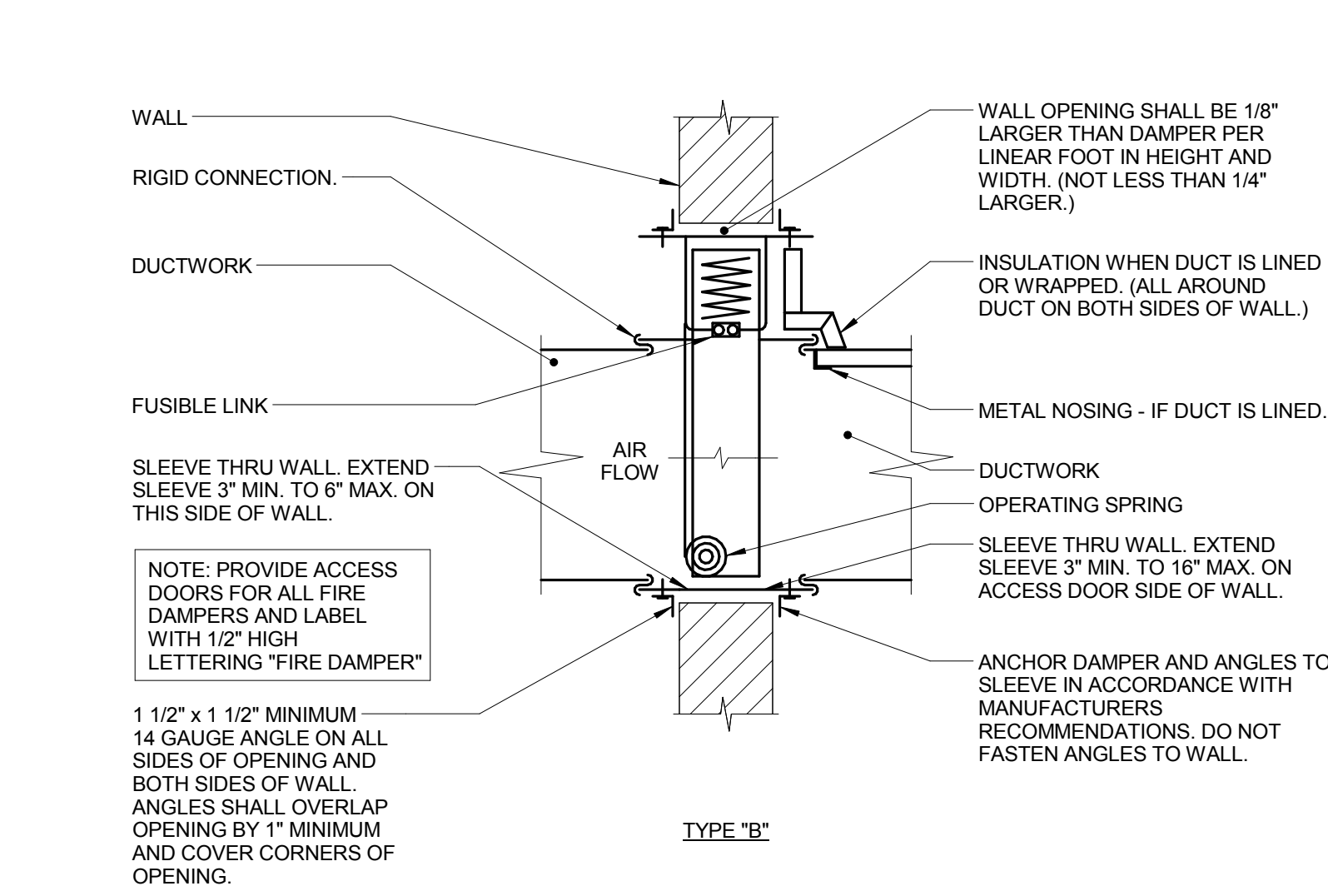
SMOKE DAMPER DETAIL (ELECTRIC)

1. SMOKE DAMPER TO BE COMPLETE WITH MOTOR AND LINKAGE.
2. SEE SMOKE DAMPER CONTROLLER SCHEMATIC DETAIL ON ELECTRICAL DRAWINGS FOR WIRING DETAILS. TCC SHALL PROVIDE RELAYS TO CLOSE FIRE SMOKE DAMPERS IN NON-FIRE EVENTS. REFER TO ELECTRICAL DRAWINGS FOR ARD LOCATIONS.



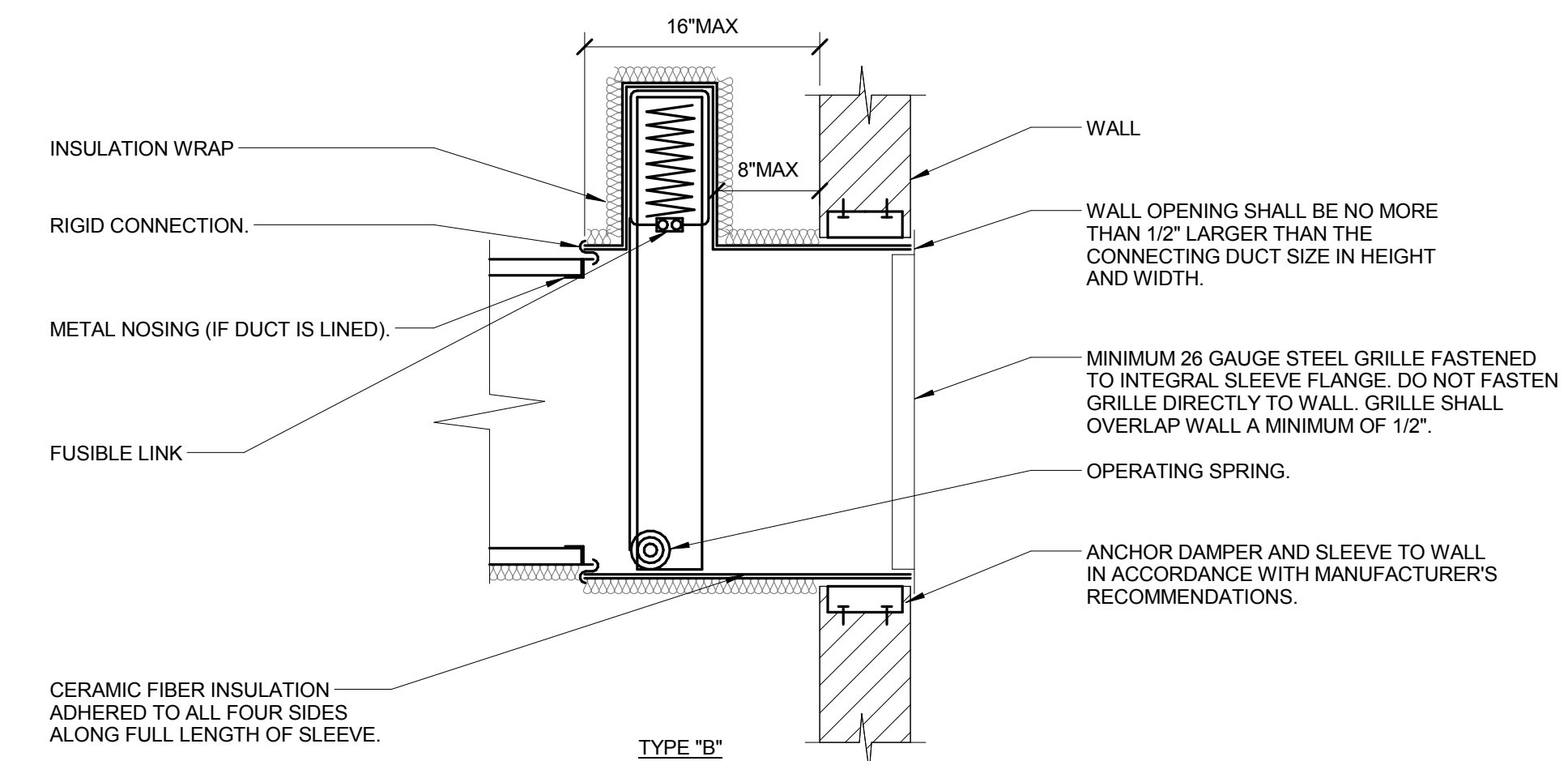
FIRE DAMPER THRU FLOOR DETAIL (TYPE B)

- NOTE: PROVIDE ACCESS DOORS FOR ALL FIRE DAMPERS AND LABEL WITH 1/2" HIGH LETTERING: "FIRE DAMPER"



FIRE DAMPER THRU WALL DETAIL (TYPE B)

- NOTE: PROVIDE ACCESS DOORS FOR ALL FIRE DAMPERS AND LABEL WITH 1/2" HIGH LETTERING "FIRE DAMPER"



FIRE DAMPER - GRILLE ACCESS (TYPE B)

- NOTE: PROVIDE ACCESS DOORS FOR ALL FIRE DAMPERS AND LABEL WITH 1/2" HIGH LETTERING: "FIRE DAMPER"

REVISED FOR BIDDING	10/27/15
Revisions:	Date


CONSULTANTS:
HEALTHCARE PLANNERS: VOA ARCHITECTS
MEPPP + TECH + STRUCT: KJWW CONSULTING ENGINEERS
CIVIL ENGINEER: JD ENGINEERING
COST ESTIMATING: MOSS CONSTRUCTION COST MANAGEMENT
INDUSTRIAL HYGIENE: JOHN A. JURGIEL & ASSOCIATES, INC.

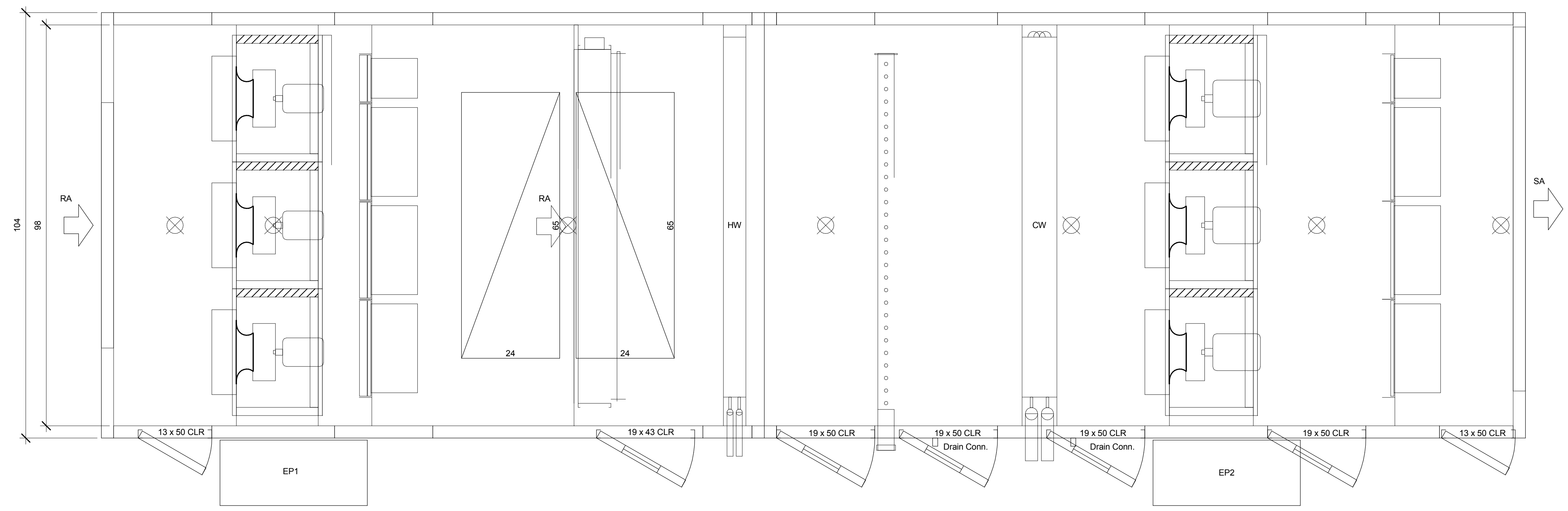
ARCHITECT:

MICHAEL ROTH & ASSOCIATES, ARCHITECTS & PLANNERS, INC.
 200 SOUTH HANLEY ROAD, STE. 1105, CLAYTON, MISSOURI 63105, 314-862-2112

Drawing Title
DETAILS - VENTILATION
 Approved: Project Director

Project Title **RENOVATE AND EXPAND AMBULATORY CARE AND LAB. SAM RAYBURN MEMORIAL VETERANS CENTER**
 Project Number **549-130**
 Building Number **1**
 Drawing Number **MH302**
 Dwg. 67 of 142

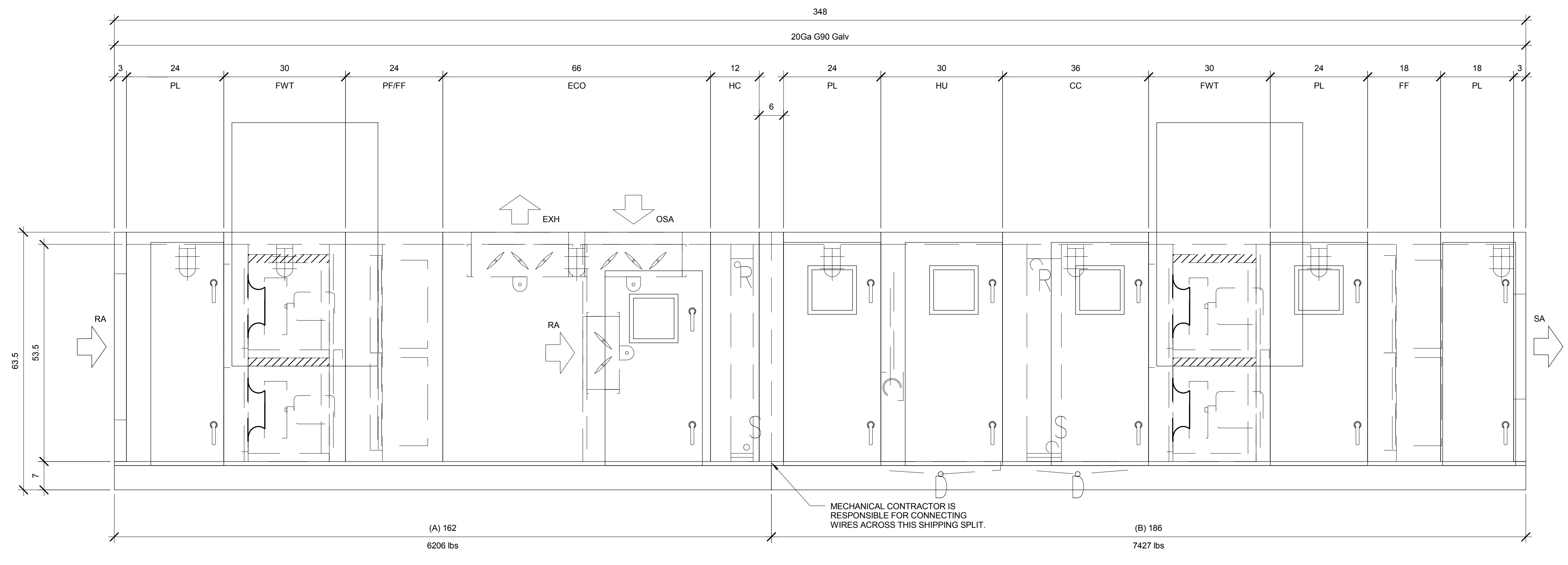
Office of Facilities Management




1 ENLARGED AHU-1 & AHU-2 DETAIL - PLAN VIEW
 3/4" = 1'-0"

NOTES:
 1. AHU-1 SHALL HAVE MAINTENANCE CLEARANCE AND ACCESS ON THE TOP SIDE OF THE PLAN VIEW. AHU-2 SHALL HAVE MAINTENANCE CLEARANCE AND ACCESS ON THE BOTTOM SIDE OF THE PLAN VIEW.

RTU COMPONENTS		
SYMBOL	DESCRIPTION	REMARKS
(A)	SUPPLY AIR DUCT CONNECTION	SIZE: 70x32
(B)	FINAL FILTERS	12" MERV 14
(C)	SUPPLY FAN	PLENUM TYPE, MIN. 6
(D)	FAN INLET ISOLATION PLATE	SUPPLY FAN INLET ISOLATION PLATE PER SECTION 23 73 23
(E)	COOLING COIL	PROVIDE DRAIN PAN IN SECTION
(F)	STEAM HUMIDIFIER	PROVIDE DRAIN PAN IN SECTION
(G)	STEAM DISTRIBUTION COIL	CONDENSATE RETURN OUTLET MINIMUM OF 24" ABOVE BOTTOM OF BASE RAIL
(H)	PRE-FILTERS	2" MERV 8
(I)	AIR BLENDER	REFER TO AIR BLENDER SCHEDULE FOR BYPASS DAMPER REQUIREMENTS
(J)	OUTSIDE AIR DAMPER	ECONOMIZER, 52x36
(K)	MINIMUM OUTSIDE AIR DAMPER	26x36
(L)	RETURN AIR DAMPER	78x36
(M)	EXHAUST AIR DAMPER	78x36
(N)	FAN INLET ISOLATION PLATE	RETURN FAN INLET ISOLATION PLATE PER SECTION 23 73 23
(O)	RETURN FAN	PLENUM TYPE, MIN. 6
(P)	RETURN AIR INLET FLOOR OPENING	PROVIDE WALKABLE GRATE OVER OPENING. PROVIDE MIN. OF 28 SF OF FREE AREA.
(Q)	BRASS DAMPER	18x78
(R)	12"x12" PRESSURE RELIEF DOOR	PROVIDE PRESSURE RELIEF DOOR QUALITY SHOWN
(S)	VDF/CONTROL PANEL	DUAL VFD WITH BACNET CONTROLLER
(T)	UV LIGHTS	PROVIDE AS ADD ALTERNATE #1



2 ENLARGED AHU-1 & AHU-2 DETAIL - ELEVATION VIEW
 3/4" = 1'-0"

REVISED FOR BIDDING 10/27/15 REVISIONS: _____ DATE: _____	CONSULTANTS: HEALTHCARE PLANNERS: VOA ARCHITECTS MEPFP + TECH + STRUCT: KJWW CONSULTING ENGINEERS CIVIL ENGINEER: JD ENGINEERING COST ESTIMATING: MOSS CONSTRUCTION COST MANAGEMENT INDUSTRIAL HYGIENE: JOHN A. JURGIEL & ASSOCIATES, INC.	ARCHITECT:  MICHAEL ROTH & ASSOCIATES, ARCHITECTS & PLANNERS, INC. 200 SOUTH HANLEY ROAD, STE. 1105, CLAYTON, MISSOURI 63105, 314-862-2112	Drawing Title ENLARGED AIR HANDLING UNIT PLAN Approved: Project Director	Project Title RENOVATE AND EXPAND AMBULATORY CARE AND LAB. SAM RAYBURN MEMORIAL VETERANS CENTER Location BONHAM, TEXAS Date APRIL 13, 2015 Checked DAVING Drawn NATJAC	Project Number 549-130 Building Number 1 Drawing Number MH303 Dwg. 68 of 142	Office of Facilities Management  Department of Veterans Affairs
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PENTHOUSE AIR HANDLING UNIT SCHEDULE - HOT/CHILLED WATER

NOTES: 1. OA, EA, RA DAMPER ACTUATOR PROVIDED BY T.C.C. COORDINATE WIRING OF OA, EA, RA DAMPER ACTUATOR WITH T.C.C AND E.C. 2. REFER TO MP-501 FOR HUMIDIFIER MANFOLD SCHEDULE. HUMIDIFIER SHALL BE FACTORY INSTALLED.

TAG NAME	AREA SERVED	SUPPLY FAN					RETURN FAN					HEATING COIL - HOT WATER					COOLING COIL - CHILLED WATER					FILTER			VIBRATION ISOLATION			ELECTRICAL					CONTROLLER/STARTER			MANUFACTURER	MODEL	NOTES								
		CFM	EXT. S.P.	RPM (NOTE D)	BHP (NOTE E)	MHP (NOTE E)	CFM	EXT. S.P.	RPM (NOTE D)	BHP (NOTE E)	MHP (NOTE E)	MIN. O.A. CFM	EAT 'F	LAT 'F	EW'T 'F	LWT 'F	GPM	TOTAL MBH	MAX. A.P.D. IN. W.C.	W.P.D. FEET HEAD	EAT 'F DB	EAT 'F WB	MAX. LAT 'F DB	LAT 'F WB	EW'T 'F GPM	LWT 'F GPM	TOTAL MBH	MAX. A.P.D. IN. W.C.	W.P.D. FEET HEAD	TYPE	VELOCITY	DEFL.	VOLTAGE	PHASES	FLA				MCA	DISCONNECT (NOTE A)	BY (NOTE A)	TYPE (NOTE B)	BY (NOTE A)	TYPE (NOTE C)		
AHU-1	EXISTING & NEW	13000	2.5	3500	9.6	10	11400	1.0	1725	2.2	2.5	4335	45.0	70.0	180	149	25.0	380	0.05	4.7	83.5	69.0	53.7	52.7	40.0	47.6	165.0	627.2	0.480	8.14	MERV 7	443	0.000	460	3	55.2	67.7	MFR	NF	MFR	NF	MFR	VFD	TEMPROL	ITF	1, 2
AHU-2	ADDITION	13000	2.5	3500	9.6	10	11400	1.0	1725	2.2	2.5	4335	45.0	70.0	180	149	25.0	380	0.05	4.7	83.5	69.0	53.7	52.7	40.0	47.6	165.0	627.2	0.480	8.14	MERV 7	443	0.000	460	3	55.2	67.7	MFR	NF	MFR	NF	MFR	VFD	TEMPROL	ITF	1, 2

SCHEDULE GENERAL NOTES

Key Name
A. DISCONNECT AND CONTROLLER STARTER FURNISHED AND INSTALLED BY:
MFR = MANUFACTURER
EC = ELECTRICAL CONTRACTOR
B. DISCONNECT TYPE:
NF = NON-FUSED
C. CONTROLLER STARTER TYPE:
FM = FULL VOLTAGE
VFD = VARIABLE FREQUENCY DRIVE
D. FAN RPM SHALL NOT EXCEED 110% OF SCHEDULED VALUE WITH THE SCHEDULED WHEEL TYPE. SUBSTITUTION OF BI OR BIA FANS FOR FC IS ACCEPTABLE IF EFFICIENCY IS NOT LOWER.
E. NO EQUIPMENT SHALL BE SELECTED ABOVE 90% OF MOTOR NAME PLATE RATING.
F. MUST BE WITHIN +/- 10% OF SCHEDULED RPM.
G. CURB TYPE:
MFR = STANDARD CURB BY MANUFACTURER

GENERAL SHEET NOTE:
1. REFER TO MP501 FOR AIR COOLED CHILLER AND OTHER PIPING EQUIPMENT SCHEDULES.

FAN COIL UNIT SCHEDULE - HYDRONIC

NOTE: 1. REFER TO MH601 FOR FCU-A CONTROL SEQUENCE.

TAG NAME	AREA SERVED	CFM	EXT. S.P. IN W.C.	EAT		TOTAL MBH	COOLING COIL					HEATING COIL					ELECTRICAL					CONTROLLER/STARTER	MANUFACTURER	MODEL	NOTES					
				DB 'F	WB 'F		SENSIBLE MBH	GPM	EW'T 'F	LWT 'F	W.P.D. FT. HD	TOTAL MBH	GPM	EW'T 'F	LWT 'F	W.P.D. FT. HD	HP	RPM	VOLTAGE	PHASES	BY (NOTE A)					TYPE (NOTE B)	TYPE (NOTE A)			
FCU-1	VESTIBULE G100A	600	0.30	80.0	67.0	16	15	3.8	40	48	4.10	17	180	150	6.30	0.22	1080	208	1	MFR	NF	MFR	NF	MFR	NF	MFR	VFD	TRANE	FCO060	1

FAN SCHEDULE

NOTES: 1. PROVIDE SHAFT GROUNDING AS REQUIRED IN THE MOTOR SPECIFICATION ---23 05 12. 2. REFER TO MH-601 FOR FAN-A CONTROL SEQUENCE. 3. EXHAUST FAN SHALL NOT BE INSTALLED IF DEDUCT OPTION NO 2 IS ACCEPTED.

TAG NAME	AREA SERVED	CFM	S.P. IN. W.C.	WHEEL DIA. INCHES	FAN RPM (NOTE F)	DRIVE TYPE	MAX. AMCA SONES	BACKDRAFT DAMPER TYPE	CURB TYPE (NOTE G)	BHP	MHP	VOLTAGE	PHASES	DISCONNECT			CONTROLLER/STARTER			MANUFACTURER	MODEL	NOTES
														BY (NOTE A)	TYPE (NOTE B)	BY (NOTE A)	TYPE (NOTE C)	BY (NOTE A)	TYPE (NOTE C)			
EF-1	GENERAL EXHAUST NORTH	675	0.25	9	1550	DIRECT	9	GRAVITY	MFR	0.11	0.125	115	1	MFR	NF	EC	FV	COOK	ACED	NOTES 1, 2, 3		
EF-2	GENERAL EXHAUST SOUTH	600	0.25	9	1550	DIRECT	9	GRAVITY	MFR	0.11	0.125	115	1	MFR	NF	EC	FV	COOK	ACED	NOTES 1, 2, 3		
EF-3	GENERAL EXHAUST LAB	1900	0.25	13.5	1650	DIRECT	15.7	GRAVITY	MFR	0.44	0.5	115	1	MFR	NF	EC	FV	COOK	ACED	NOTES 1, 2, 3		
EF-4	GENERAL EXHAUST G119/G116	900	0.25	9	1550	DIRECT	9	GRAVITY	MFR	0.11	0.125	115	1	MFR	NF	EC	FV	COOK	ACED	NOTES 1, 2, 3		

TERMINAL AIR BOX SCHEDULE - SINGLE DUCT REHEAT - AHU-1

NOTES: 1. NEITHER RADIATED NOR DISCHARGE SOUND LEVELS SHALL EXCEED NC 35 AT 1.5' INLET STATIC PRESSURE WHEN TESTED PER ARI STANDARD 885-96 USING 50" 20-LB DENSITY MINERAL FIBER CEILING TILE. 2. TOTAL AIR PRESSURE DROP OF TAB AND REHEAT COIL SHALL NOT EXCEED 0.50" WC. 3. REFER TO MH-601 FOR DESCRIPTION OF CONTROL TYPE. 4. SENSOR TYPES: 2- SENSOR WITH ADJUSTMENT AND OVERRIDE. 5. HEATING COIL IS BASED ON HEATING AIR FLOW WATER PRESSURE DROP OF REHEAT COILS SHALL NOT EXCEED 5'. PROVIDE REHEAT COILS SEPARATE FROM BOXES IF REQUIRED TO MEET WATER PRESSURE DROP REQUIREMENTS. 6. HEATING COIL SELECTION SHALL BE BASED ON A FIXED LEAVING AIR TEMPERATURE AND VARIABLE FLOW (GPM). PROVIDE FINAL MAXIMUM FLOW RATE (GPM) TO TEST & BALANCE TEMPERATURE CONTROLS CONTRACTORS. 7. TERMINAL AIR BOX SHALL NOT BE INSTALLED IF DEDUCT OPTION NO. 1 IS ACCEPTED. 8. TERMINAL AIR BOX SHALL NOT BE INSTALLED IF DEDUCT OPTION NO. 2 IS ACCEPTED. 9. TERMINAL AIR BOX SHALL NOT BE INSTALLED IF DEDUCT OPTION NO. 3 IS ACCEPTED.

TAG NAME	AREA SERVED	COOLING MAX.	HEATING MAX.	MIN.	EAT 'F	LAT 'F	HEATING COIL (NOTES 5 & 6)			MIN. INLET SIZE (IN.)	CONTROL TYPE (NOTE 3)	SENSOR TYPE (NOTE 4)	MANUFACTURER	MODEL	NOTES
							MAX. GPM	MAX. 2PM	DIA.						
101	B111-EXAM ROOM	470	465	410	55.0	95.0	180	2.1	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
102	B113-MD	250	230	220	55.0	95.0	180	2.1	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
103	G104-MENS TOILET NORTH	450	415	415	55.0	85.0	180	1.4	8"	TAB-A	2	TITUS	DESV	NOTES 1, 2, 9	
104	A101-WAITING	605	340	340	55.0	85.0	180	1.2	8"	TAB-A	2	TITUS	DESV	NOTES 1, 2, 9	
105	B108-LVN	495	495	405	55.0	95.0	180	2.5	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
106	B106-MD	250	215	215	55.0	85.0	180	0.7	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
107	B105-LVN	460	400	400	55.0	85.0	180	1.3	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
108	B103-SOCIAL WORKER	320	295	295	55.0	85.0	180	1.0	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
109	B101-COPY	615	600	600	55.0	85.0	180	2.0	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
110	A106-EXAM ROOM	375	360	325	55.0	95.0	180	1.6	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
111	A103-MD	360	360	360	55.0	95.0	180	1.6	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
112	G107-CLASSROOM	230	230	230	55.0	85.0	180	0.8	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
113	G109-VSO	190	150	150	55.0	85.0	180	0.5	6"	TAB-A	2	TITUS	DESV	NOTES 1, 2, 9	
114	G111-AOD, OPERATIONS	385	330	330	55.0	85.0	180	1.1	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
115	G113-CONFERENCE	220	215	215	55.0	85.0	180	0.8	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
116	F102-HOLDING	360	360	305	55.0	95.0	180	1.6	6"	TAB-A	2	TITUS	DESV	NOTES 1, 2, 7	
117	F105-OFFICE	860	845	845	55.0	95.0	180	4.2	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 7	
118	H105-BLOOD DRAW	460	450	450	55.0	85.0	180	1.5	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 8	
119	H111-STORAGE	175	175	175	55.0	85.0	180	0.6	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 8	
120	H100-WAITING	550	550	550	55.0	95.0	180	2.4	8"	TAB-A	2	TITUS	DESV	NOTES 1, 2, 8	
121	H122-PATHOLOGY LAB	1500	1305	1305	55.0	85.0	180	4.3	12"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 8	
122	H115-CHIEF OFFICE	170	135	135	55.0	85.0	180	0.6	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
123	H120-CORRIDOR	475	475	475	55.0	95.0	180	2.4	8"	TAB-A	2	TITUS	DESV	NOTES 1, 2, 9	
124	H119-CONF LOCKER LOUNGE	660	660	510	55.0	95.0	180	3.3	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 9	
125	G148-EXISTING CORRIDOR	2275	2145	660	55.0	95.0	180	9.3	16"	TAB-A	2	TITUS	DESV	NOTES 1, 2, 9	

TERMINAL AIR BOX SCHEDULE - SINGLE DUCT- REHEAT - AHU-2

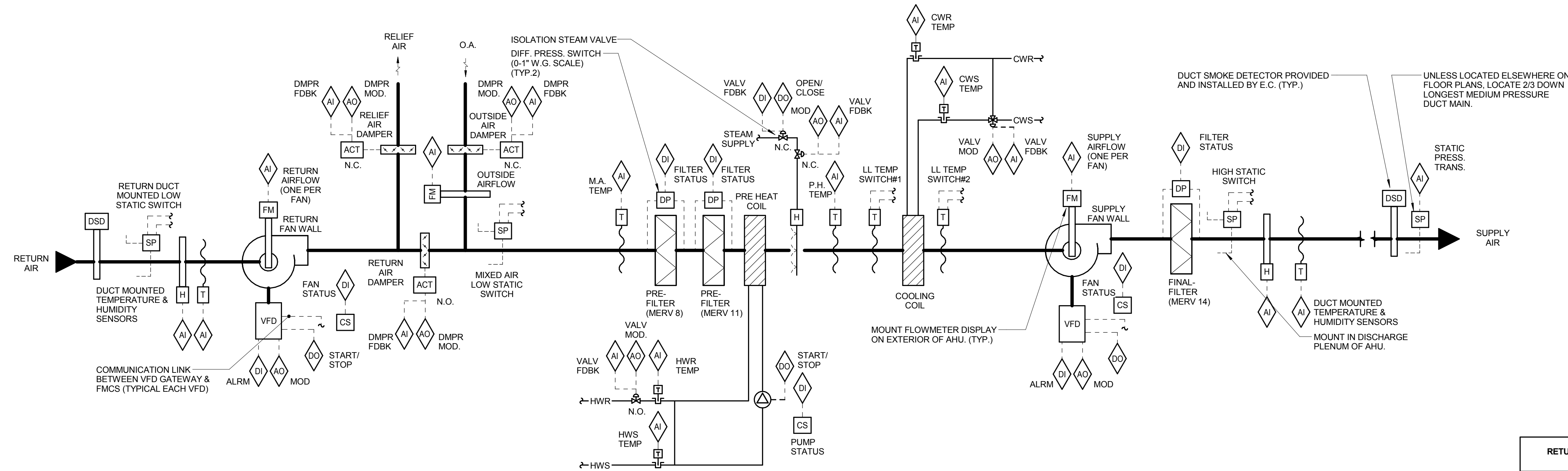
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TAG NAME	AREA SERVED	COOLING MAX.	HEATING MAX.	MIN.	EAT 'F	LAT 'F	HEATING COIL (NOTES 5 & 6)			MIN. INLET SIZE (IN.)	CONTROL TYPE (NOTE 3)	SENSOR TYPE (NOTE 4)	MANUFACTURER	MODEL	NOTES
							MAX. GPM	MAX. 2PM	DIA.						
201	G142-WHEEL CHAIR STORAGE	1135	1135	575	55.0	95.0	180	5.0	12"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
202	C103-MD	250	230	220	55.0	95.0	180	2.1	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
203	C105-LVN	230	210	200	55.0	95.0	180	0.9	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
204	C108-LVN	335	315	290	55.0	95.0	180	1.4	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
205	D108-LVN	105	95	90	55.0	95.0	180	0.5	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
206	D106-LVN	600	520	520	55.0	85.0	180	1.8	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
207	D104-MD	420	365	365	55.0	85.0	180	1.2	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
208	D102-MENTAL HEALTH PROFESSIONAL	880	880	880	55.0	85.0	180	2.9	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
209	D116-NURSE MED	775	515	515	55.0	85.0	180	1.7	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
210	D113-MD	480	415	415	55.0	85.0	180	1.4	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
211	D109-EXAM ROOM	790	785	430	55.0	95.0	180	3.5	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
212	G135-SOILED UTILITY	450	450	440	55.0	85.0	180	1.5	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
213	G130-BILLING	255	200	200	55.0	85.0	180	0.7	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
214	G128-ERK	250	230	230	55.0	85.0	180	0.8	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
215	G100B-RECEPTION LOBBY	900	315	315	55.0	85.0	180	1.1	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
216	G108-WAITING	520	490	490	55.0	85.0	180	1.7	8"	TAB-A	2	TITUS	DESV	NOTES 1, 2	
217	G126-CORRIDOR	1085	825	825	55.0	85.0	180	2.8	8"	TAB-A	2	TITUS	DESV	NOTES 1, 2	
218	G132-CLEAN SUPPLY	105	100	100	55.0	85.0	180	0.5	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
219	G122-LEAD MED SUPERVISOR	160	155	155	55.0	85.0	180	0.5	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
220	NEW-IT	810	175	175	55.0	85.0	180	0.6	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
221	G138-VENDING	550	505	505	55.0	85.0	180	1.7	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
222	G106-PHARMACY	300	300	300	55.0	85.0	180	1.0	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
223	E101-WAITING	435	275	275	55.0	85.0	180	0.9	8"	TAB-A	2	TITUS	DESV	NOTES 1, 2	
224	E106-SOCIAL WORKER	225	175	175	55.0	85.0	180	0.6	6"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
225	G141-TOILET	275	70	70	55.0	85.0	180	0.5	6"	TAB-A	2	TITUS	DESV	NOTES 1, 2	
226	B118-ACOS	580	575	350	55.0	95.0	180	2.5	8"	TAB-A	4	TITUS	DESV	NOTES 1, 2, 7	
227	B114-WAITING	885	985	985	55.0	95.0	180	4.3	8"	TAB-A	2	TITUS	DESV	NOTES 1, 2	
228	PENTHOUSE	1500	1500	1500	55.0	85.0	180	6.6	12"	TAB-A	4	TITUS	DESV	NOTES 1, 2	
229	ENTRANCE CORRIDOR	500	500	250	55.0	95.0	180	1.7	8"	TAB-A	2	TITUS	DESV	NOTES 1, 2	

LINEAR DIFFUSER SCHEDULE

NOTES: 1. CONTRACTOR SHALL DETERMINE PROPER MARGIN STYLE TO MATCH CEILING CONSTRUCTION. 2. PROVIDE WITH CONCEALED FASTENERS. 3. DIRECT ALL SLOTS STRAIGHT DOWN TO WASH EXTERIOR.

TAG NAME	MATERIAL	SLOT WIDTH	NUMBER OF SLOTS	WIDTH	LENGTH	PLENUM REQUIRED	PLENUM INSULATION TYPE	PLE
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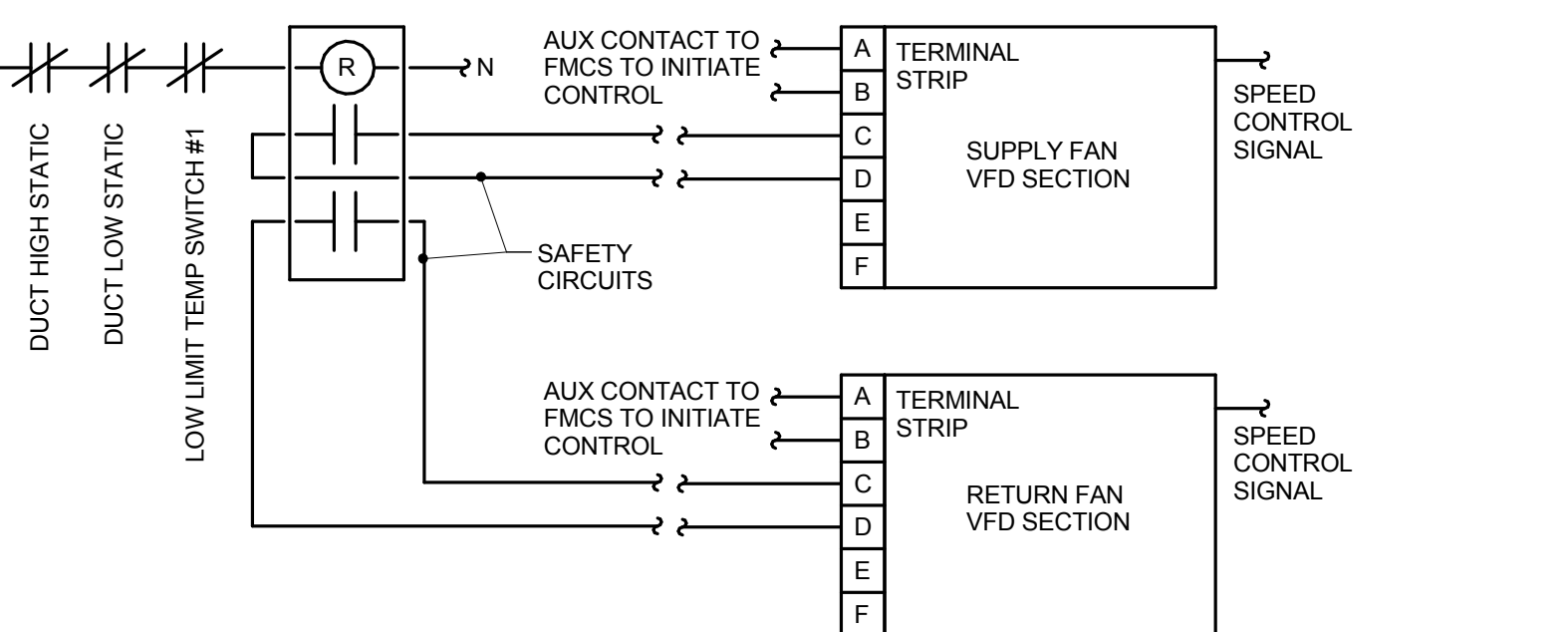


RETURN FAN AIRFLOW SCHEDULE				
SYSTEM	SUPPLY CFM (MAX)	EXHAUST FANS	PRESSURIZATION CFM	REMARKS
AHU-1	13,000	EF-1, EF-3, EF-4	500	NOTES 1,2,3,4
AHU-2	13,000	EF-2	500	NOTES 1,2,3,4

- NOTES:**
- RETURN FAN AIRFLOW SETPOINT SHALL BE THE SUPPLY FAN AIRFLOW (AS MEASURED BY THE SPENS) MINUS THE SUM OF THE EXHAUST FAN AIRFLOWS MINUS THE PRESSURIZATION CFM.
 - THE RETURN FAN VFD SHALL MODULATE THE RETURN AIRFLOW TO MAINTAIN THE 500 CFM PRESSURIZATION CFM AS THE SUPPLY FAN VFD MODULATES THE SUPPLY AIRFLOW.
 - FMCS SHALL DETERMINE THE OPERATIONAL STATUS OF EACH EXHAUST FAN VIA THE CURRENT SENSING RELAY TO DETERMINE WHETHER THE CFM ASSOCIATED WITH THAT FAN SHOULD BE INCLUDED IN THE RETURN FAN AIRFLOW CALCULATION.
 - EXHAUST FAN AIRFLOWS SHALL NOT BE THE CFM INDICATED ON THE FAN SCHEDULE, BUT SHALL BE THE AIRFLOW INDICATED IN THE FINAL TAB REPORT.

FAN INTERLOCK SCHEDULE		
SYSTEM	INTERLOCKED EXHAUST FANS	REMARKS
AHU-1	EF-1, EF-3, EF-4	NOTE 1
AHU-2	EF-2	NOTE 1

- NOTES:**
- INTERLOCK EXHAUST FAN OPERATION THROUGH THE FMCS WITH RESPECTIVE AHU IN ACCORDANCE WITH AHU SEQUENCE OF OPERATION.



AHU REPORT GENERATION:
 DDC FMCS SHALL MONITOR THE FOLLOWING POINTS ON 10 MINUTE (ADJ.) INTERVALS WITHIN A SINGLE TRENDS. THE TRENDS SHALL RUN FOR A 100-DAY (ADJ.) DURATION AT WHICH POINT THE NEWEST VALUES SHALL AUTOMATICALLY OVERWRITE THE OLDEST VALUES:

- DATE
- TIME
- GLOBAL OUTSIDE AIR TEMP [°F]
- GLOBAL OUTSIDE AIR DEWPOINT [°F]
- GLOBAL OUTSIDE AIR HUMIDITY [%RH]
- SUPPLY AIRFLOW [CFM]
- SUPPLY AIR TEMP [SAT] [°F]
- SUPPLY AIR TEMP SETPOINT [°F]
- SUPPLY AIR RELATIVE HUMIDITY [%]
- SUPPLY AIR DEWPOINT [°F]
- SUPPLY AIR DEWPOINT SETPOINT [°F]
- RETURN AIRFLOW [CFM]
- RETURN AIR TEMP [SAT] [°F]
- RETURN AIR RELATIVE HUMIDITY [%]
- MIXED AIR TEMP [°F]
- PREHEAT COIL DISCHARGE AIR TEMP [°F]
- PRE-FILTER LOADING (MERV-8) [INCHES W.G.]
- PRE-FILTER LOADING (MERV-11) [INCHES W.G.]
- FINAL FILTER LOADING (MERV 14) [INCHES W.G.]
- HEATING WATER VALVE POSITION [% OPEN]
- HEATING PUMP [ON/OFF]
- CHILLED WATER VALVE POSITION [% OPEN]
- HUMIDIFIER VALVE POSITION [% OPEN]
- HUMIDIFIER ISOLATION VALVE [OPEN/CLOSED]
- SUPPLY DUCT STATIC PRESSURE SETPOINT [INCHES W.G.]
- SUPPLY DUCT STATIC PRESSURE [INCHES W.G.]
- SUPPLY FAN VFD OUTPUT [% FULL SPEED]
- RETURN FAN VFD OUTPUT [% FULL SPEED]
- OUTSIDE AIR DAMPER POSITION [% OPEN]
- RETURN AIR DAMPER POSITION [% OPEN]
- RELIEF AIR DAMPER POSITION [% OPEN]

THIS INFORMATION SHALL BE ACCESSIBLE TO VIEW IN GRAPHICAL FORM ON THE FMCS OPERATOR WORKSTATION.

ONCE PER MONTH, THE DDC FMCS SHALL RECORD THE LARGEST AHU AIRFLOW WHICH OCCURRED DURING THAT MONTH. THE DATE, TIME, OUTSIDE AIR TEMP (AND ALL OTHER VALUES LISTED ABOVE) THAT COINCIDED WITH THAT EVENT SHALL ALSO BE RECORDED. THIS INFORMATION SHALL BE STORED TO A MEMORY LOCATION ON THE FMCS OPERATOR WORKSTATION THAT IS MAINTAINED (NOT AUTOMATICALLY OVERRITTEN).

SEQUENCE OF OPERATION:

WHEN AHU IS INDEXED TO RUN, THE FOLLOWING SHALL OCCUR:

- SMOKE DAMPERS SHALL OPEN.
- AFTER A 30 SECOND DELAY (ADJ.) TO ALLOW FOR OPENING OF SMOKE DAMPERS, SUPPLY FAN SHALL BE ENABLED TO RUN.
- WHEN THE SUPPLY FAN HAS STARTED THE RETURN FAN AND INTERLOCKED EXHAUST FANS SHALL START AS SHOWN IN THE FAN INTERLOCK SCHEDULE.

SUPPLY FAN OPERATION:
 FMCS SHALL MODULATE SIGNAL TO SUPPLY FAN VFD AS REQUIRED TO MAINTAIN DUCT STATIC PRESSURE AS MEASURED BY STATIC PRESSURE TRANSMITTER. FMCS SHALL RESET SUPPLY DUCT STATIC PRESSURE SETPOINT AS REQUIRED TO MAINTAIN AT LEAST ONE SUPPLY TAB DAMPER 95% (ADJ.) OPEN. FMCS SHALL UTILIZE COMMAND TO ALL SUPPLY TERMINAL AIR BOX POSITIONS TO RESET THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE.

RETURN FAN OPERATION:
 RETURN FAN SHALL BE INDEXED TO RUN WHENEVER THE SUPPLY FAN IS INDEXED TO RUN. FMCS SHALL MODULATE SIGNAL TO RETURN FAN VFD AS REQUIRED TO MAINTAIN THE AIRFLOW OFFSET AS INDICATED IN THE RETURN FAN AIRFLOW SCHEDULE.

DISCHARGE AIR TEMPERATURE SET POINT:
 DISCHARGE AIR SET POINT SHALL BE 55°F (ADJ.).

DISCHARGE AIR TEMPERATURE RESET:
 RESET DISCHARGE AIR TEMPERATURE BASED ON THE ZONE WITH THE GREATEST CALL FOR COOLING. RESET THE TEMPERATURE AS FOLLOWS:

- WHEN WORST CASE TAB IS OPEN ABOVE 90% (ADJ.) FOR TEN MINUTES (ADJ.) THEN THE DISCHARGE AIR TEMPERATURE SHALL DROP BY 1°F (ADJ.). THIS SHALL CONTINUE UNTIL AHU MINIMUM DISCHARGE AIR TEMPERATURE OF 50°F (ADJ.) IS ACHIEVED.
- WHEN WORST CASE TAB IS OPEN BELOW 80% (ADJ.) FOR TEN MINUTES (ADJ.) THEN THE DISCHARGE AIR TEMPERATURE SHALL RAISE BY 1°F (ADJ.). THIS SHALL CONTINUE UNTIL AHU MAXIMUM DISCHARGE AIR TEMPERATURE OF 60°F (ADJ.) IS ACHIEVED.
- THE MAXIMUM RETURN AIR HUMIDITY SETPOINT SHALL BE 60% (ADJ.) IF RETURN AIR HUMIDITY IS GREATER THAN SETPOINT, RESET DISCHARGE AIR TEMPERATURE TO 55°F UNTIL RETURN AIR HUMIDITY IS 5% LESS THAN MAXIMUM SETPOINT.

USER TOGGLE - STATIC PRESSURE AND DISCHARGE AIR TEMPERATURE RESETS:
 PROVIDE USER WITH OPTION TO USE EITHER STATIC PRESSURE RESET OR DISCHARGE AIR TEMPERATURE RESET. ONLY ONE CONTROL OPTION SHALL BE USED AT A TIME. GRAPHIC ON AHU SCREEN SHALL ALLOW USER TO TOGGLE FROM EITHER TEMPERATURE OR STATIC PRESSURE RESET.

VENTILATION AIR CONTROL:
 WHENEVER THE AIR HANDLING UNIT IS IN OCCUPIED MODE, THE OUTSIDE AIR DAMPER SHALL BE FULLY OPEN. THE RETURN AIR AND RELIEF AIR DAMPER SHALL MODULATE IN OPPOSITION TO MAINTAIN THE MINIMUM OUTSIDE AIR FLOW RATE PER AHU SCHEDULE, OR TO SATISFY THE ECONOMIZER DISCHARGE AIR SEQUENCE.

COOLING COIL OPERATION:
 WHEN IN MINIMUM OUTSIDE AIR MODE, FMCS SHALL MODULATE CHILLED WATER CONTROL VALVE AS REQUIRED TO MAINTAIN DISCHARGE AIR TEMPERATURE SET POINT.

WHEN IN ECONOMIZER MODE, FMCS SHALL NOT MODULATE COOLING CONTROL VALVE UNLESS RETURN AIR DAMPER IS 5% (ADJ.) OPEN AND RELIEF AIR DAMPER IS 95% (ADJ.) OPEN.

PREHEAT COIL OPERATION:
 PREHEAT COIL CONTROLS SHALL BE ENABLED WHEN OUTSIDE AIR TEMP DROPS BELOW 50°F (ADJ.). PREHEAT COIL CONTROLS SHALL BE DISABLED WHEN OUTSIDE AIR TEMP RISES ABOVE 54°F (ADJ.).

WHEN OUTSIDE AIR TEMPERATURE RISES ABOVE 38°F (ADJ.) FOR 10 MINUTES (ADJ.) HEATING WATER COIL CIRCULATION PUMP SHALL OPERATE ONLY WHEN HEATING IS CALLED FOR (HEATING WATER VALVE IS COMMANDED TO OPEN). WHEN OUTSIDE AIR TEMP DROPS BELOW 38°F (ADJ.) HEATING WATER COIL CIRCULATION PUMP SHALL OPERATE CONTINUOUSLY. ONCE ENERGIZED, HEATING WATER COIL CIRCULATION PUMP SHALL REMAIN IN OPERATION FOR MINIMUM 5 MINUTES (ADJ.) TO PREVENT SHORT CYCLING.

FMCS SHALL MODULATE HEATING WATER CONTROL VALVE AS REQUIRED TO MAINTAIN DISCHARGE AIR TEMPERATURE SET POINT.

ECONOMIZER OPERATION:
 WHEN THE OUTSIDE AIR DRY BULB TEMPERATURE IS LESS THAN THE RETURN AIR DRY BULB TEMPERATURE THE FMCS SHALL ENABLE ECONOMIZER CONTROLS. WHEN OUTSIDE AIR DRY BULB TEMPERATURE IS GREATER THAN THE RETURN AIR DRY BULB TEMPERATURE FOR 10 MINUTES THE FMCS SHALL DISABLE ECONOMIZER CONTROLS AND SHALL RETURN THE UNIT TO MINIMUM OUTSIDE AIR MODE. ONCE ECONOMIZER CONTROLS HAVE BEEN ENABLED OR DISABLED, THE UNIT SHALL CONTINUE TO OPERATE IN THAT MODE FOR A MINIMUM OF 10 MINUTES (ADJ.) BEFORE BEING ALLOWED TO SWITCH BACK (TO PREVENT SHORT CYCLING).

IN ECONOMIZER MODE THE FMCS SHALL MODULATE THE RETURN AND RELIEF DAMPERS AS REQUIRED TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

HUMIDIFIER CONTROLS:
 HUMIDIFIER CONTROLS AND ALARMS SHALL BE ENABLED WHEN OUTSIDE AIR TEMPERATURE DROPS BELOW 48°F (ADJ.) AT WHICH POINT THE ISOLATION STEAM VALVE SHALL FULLY OPEN. HUMIDIFIER CONTROLS AND ALARMS SHALL BE DISABLED WHEN OUTSIDE AIR TEMPERATURE RISES ABOVE 48°F (ADJ.) FOR 10 MINUTES (ADJ.) AT WHICH POINT THE ISOLATION STEAM VALVE SHALL FULLY CLOSE.

WHEN HUMIDIFIER CONTROLS ARE ENABLED, FMCS CONTROLLER SHALL MODULATE STEAM VALVE AS REQUIRED TO MAINTAIN 43°F WB (ADJ.) IN THE SUPPLY AIR DUCT. DUCT MOUNTED HUMIDITY TRANSMITTER AT FAN DISCHARGE SHALL PREVENT SUPPLY AIR RELATIVE HUMIDITY FROM EXCEEDING 80% (ADJ.).

ALARMS, INTERLOCKS, AND SAFETIES:
 WHEN FIRE ALARM CONTROL PANEL INDICATES AN ALARM CONDITION, AHU SHALL BE SHUTDOWN.

THE FOLLOWING CONDITIONS SHALL SHUTDOWN THE AHU AND SHALL INDICATE AN ALARM CONDITION AT THE FMCS WORKSTATION:

- LOW STATIC PRESSURE SWITCH INDICATES RETURN DUCT PRESSURE LESS THAN THE SPECIFIED DUCT PRESSURE CLASS.
- LOW STATIC PRESSURE SWITCH INDICATES MIXED AIR PRESSURE LESS THAN THE SPECIFIED DUCT PRESSURE CLASS OF THE OUTSIDE AIR DUCTWORK.
- HIGH STATIC PRESSURE SWITCH INDICATES SUPPLY DUCT STATIC PRESSURE GREATER THAN THE SPECIFIED DUCT PRESSURE CLASS.
- SHOULD ANY ONE FOOT SECTION OF THE MANUAL RESET LOW LIMIT TEMPERATURE SWITCH #1 SENSE AIR TEMP <34°F (ADJ.), IF MULTIPLE FREEZE STATS ARE REQUIRED, WIRE ALL TO A COMMON RESET SWITCH.

THE FOLLOWING CONDITIONS SHALL INDICATE AN ALARM AT THE FMCS, HOWEVER AHU SHALL CONTINUE TO OPERATE:

- HEATING COIL CIRCULATION PUMP IS COMMANDED TO RUN AND CURRENT RELAY INDICATES INSUFFICIENT CURRENT FLOW.
- AN ALARM IS INDICATED AT ANY SUPPLY FAN VFD OR RETURN FAN VFD.
- DIFFERENTIAL PRESSURE SWITCH ACROSS PRE-FILTER (MERV 11) BANK EXCEEDS 0.6 INCHES W.G. (ADJ.)
- DIFFERENTIAL PRESSURE SWITCH ACROSS PRE-FILTER (MERV 8) BANK EXCEEDS 0.8 INCHES W.G. (ADJ.)
- DIFFERENTIAL PRESSURE SWITCH ACROSS FINAL FILTER BANK EXCEEDS 1.0 INCHES W.G. (ADJ.)
- THE TOTAL DIFFERENTIAL PRESSURE ACROSS ALL FILTER BANKS EXCEEDS 2.0 INCHES W.G. (ADJ.)
- RELATIVE HUMIDITY OF SUPPLY AIR EXCEEDS 80% RH (ADJ.) AS MEASURED BY AUTOMATIC RESET HUMIDITY SWITCH. WHEN HUMIDITY SWITCH TRIPS, STEAM CONTROL VALVE SHALL FULLY CLOSE UNTIL ALARM IS MANUALLY RESET AT FMCS WORKSTATION. AN ALARM SHALL NOT INDICATE AT THE FMCS WORKSTATION UNLESS HUMIDIFIER CONTROLS ARE ENABLED.
- WHEN DUCTWORK SUPPLY AIR HUMIDITY EXCEEDS 90% RH A SEPARATE DUCT MOUNTED HUMIDITY SWITCH (MANUAL RESET) SHALL DISABLE HUMIDIFIER CONTROLS AND SHALL FULLY CLOSE STEAM ISOLATION VALVE. AN IDENTIFIABLE ALARM CONDITION SHALL BE DISPLAYED AT THE OPERATOR WORKSTATION.
- SHOULD ANY ONE FOOT SECTION OF THE AUTO RESET LOW LIMIT TEMPERATURE SWITCH #2 SENSE AIR TEMPERATURE <38°F (ADJ.) THE FOLLOWING SHALL OCCUR:
- THE RETURN AIR DAMPER SHALL FULLY OPEN.
- THE OUTSIDE AIR AND RELIEF DAMPERS SHALL FULLY CLOSE.
- THIS ACTION SHALL OCCUR INDEPENDENT OF THE FMCS AHU CONTROLLER. ONCE THE LOW LIMIT TEMPERATURE SWITCH #2 AIR TEMPERATURE RISES ABOVE SET POINT, OPERATION OF THE OUTSIDE AIR, RELIEF AIR, AND RETURN AIR DAMPERS SHALL BE RESTORED. HOWEVER, THE ALARM SHALL CONTINUE UNTIL ACKNOWLEDGED AND MANUALLY RESET BY THE FMCS OPERATOR.
- SEND AN ALARM TO THE FMCS OPERATOR INTERFACE IF THE DISCHARGE AIR TEMPERATURE IS MORE THAN 5°F (ADJ.) ABOVE OR BELOW SETPOINT.

IN THE EVENT SUPPLY FAN IS NOT RUNNING (AS INDICATED BY THE CURRENT SENSING RELAYS) RETURN AIR FAN SHALL BE DE-ENERGIZED.

WHENEVER AHURTU IS SHUTDOWN THE FOLLOWING SHALL OCCUR:

- THE OUTSIDE AIR DAMPER AND RELIEF AIR DAMPER SHALL FULLY CLOSE.
- RETURN AIR DAMPER SHALL FULLY OPEN.
- PREHEAT COIL, HEATING WATER CIRCULATION PUMP AND HEATING WATER CONTROL VALVE SHALL REMAIN UNDER CONTROL OF ITS INPUT SENSOR.
- ALL SMOKE DAMPERS SHALL FULLY CLOSE.
- CHILLED WATER CONTROL VALVE SHALL FULLY CLOSE.
- ISOLATION STEAM VALVE SHALL FULLY CLOSE.
- SUPPLY FAN AND RETURN FAN VFDs SHALL BE DE-ENERGIZED.
- INTERLOCKED EXHAUST FANS SHALL BE DE-ENERGIZED.

UNOCCUPIED MODE:
 PROVIDE TIME OF DAY SCHEDULE TO ALLOW AHU TO ENTER UNOCCUPIED MODE PER SCHEDULE. COORDINATE SCHEDULE WITH OWNER.

- THE SUPPLY AND RETURN FANS SHALL CONTINUE RUNNING. WHEN USING CONSTANT VOLUME OFFSET FOR RETURN AIR FAN CONTROL, THE OFFSET SHALL GO TO ZERO AND THE SUPPLY FAN SHALL BE LIMITED TO THE MAXIMUM RETURN FAN AIRFLOW.
- THE OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL CLOSE AND THE RETURN AIR DAMPER SHALL OPEN. ECONOMIZER CYCLE SHALL TAKE PRECEDENCE OVER DAMPER POSITION.
- ALL SPACE TEMPERATURES SHALL BE ALLOWED TO VARY +/- 10°F (ADJ.) FROM OCCUPIED SETPOINT.

HEATING OPTIMUM START-UP:

- THIS CYCLE SHALL OVERRIDE THE UNOCCUPIED CYCLE. IF THE SYSTEM WAS OPERATING AS A RESULT OF THE UNOCCUPIED CYCLE, THE SYSTEM SHALL CONTINUE TO OPERATE. THE DDC SYSTEM SHALL DETERMINE THE MINIMUM RUNTIME TO WARM THE SPACES TO THEIR SETPOINT WHEN THE COMPUTED START TIME IS REACHED. THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SHALL BE MAINTAINED AT A SETPOINT OF 60°F (ADJ.). THE SYSTEM SHALL CONTINUE TO OPERATE IN THIS MODE UNTIL ALL TEMPERATURES EXCEED A SETPOINT OF 68°F (ADJ.). AT THAT TIME, THE DDC SYSTEM SHALL SWITCH TO OCCUPIED CONTROL.

COOLING OPTIMUM START-UP:

- THIS CYCLE SHALL OVERRIDE THE UNOCCUPIED CYCLE. IF THE SYSTEM WAS OPERATING AS A RESULT OF THE UNOCCUPIED CYCLE, THE SYSTEM SHALL CONTINUE TO OPERATE. THE DDC SYSTEM SHALL DETERMINE THE MINIMUM RUNTIME TO COOL THE SPACES TO THEIR SETPOINT WHEN THE COMPUTED START TIME IS REACHED. THE AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SHALL BE MAINTAINED AT A SETPOINT OF 55°F (ADJ.). THE SYSTEM SHALL CONTINUE TO OPERATE IN THIS MODE UNTIL ALL TEMPERATURES ARE LESS THAN A SETPOINT OF 75°F (ADJ.). AT THAT TIME, THE DDC SYSTEM SHALL SWITCH TO OCCUPIED CONTROL.

GRAPHICAL DISPLAY:
 DISPLAY THE GLOBAL OUTSIDE AIR TEMPERATURE AND HUMIDITY ON AHU GRAPHIC PAGE.

1 AIR HANDLING UNIT CONTROL - AHU-1 & AHU-2

NO SCALE

SUPPLY & RETURN FAN VFD CONTROL

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