



COLLEGE of **SAN MATEO**

San Mateo Community College District
College of San Mateo – Building 36

Assessment on Existing Mechanical System

August 19, 2014

Alfa Tech Project Number 214317

Prepared By



August 19, 2014

Ms. Paula Reyes
San Mateo Community College District
3401 College of San Mateo Drive
San Mateo, CA 94402

Regarding: College of San Mateo – Building 36

Subject: Assessment on Excess Capacity for Existing Equipment

Dear Ms. Paula Reyes,

On July 24, 2014, we conducted a survey of the laboratory spaces and rooftop HVAC equipment to determine the capability of the existing mechanical infrastructure to support new equipment. In addition to the field survey, we reviewed the existing HVAC drawings for Building 36 to determine what the airflow quantities were for the equipment and spaces in question. We looked at laboratory rooms 36-321, 36-329, and 36-324, and adding (2) new 8'-0" hood 1,700 CFM EA.

We have worked with the Energy Lab manufacturer and received an assessment of the air handler units (AHU-1 size at 25,000CFM & AHU-2 size at 40,000CFM). After our survey, and preliminary air flow calibration review, and manufacturer assessment, we found that AHU-1 and AHU-2 are performing at maximum capacity by reviewing the balance report and VAV schedule, and do not have sufficient bandwidth to serve the space if two additional laboratory fume hoods are added (3,400CFM) to the system. The manufacturer's assessment noted the BHP and the fan RPM have reached maximum capacity (see Fan Curve AHU-1 and Fan Curve AHU-2).

On the exhaust side, however, EF-1 and EF-2 have a capacity of 40,000 CFM with a surplus capacity of 3,210 CFM, and are able to support two additional fume hoods. This determination is based off of each new fume hood being 8 ft. wide and exhausting a volume of 1,700 CFM each, while applying a small diversity factor for the rest of the system.

Moving forward, it is our recommendation that we connect the new fume hoods to the existing exhaust system. Certain modifications, albeit small, will need to be made to the existing duct distribution system to provide functional exhaust capabilities to the new equipment. These modifications include adding control valves (Triatek Venturi) to the ductwork serving the new fume hoods, modifying small portions of ductwork in the ceiling, adding a new variable air volume (VAV) rooftop mounted make-up air unit to compensate for the new volume being exhausted, and modifying a portion of the rooftop exhaust duct to accommodate the new airflow. This information is outlined in the attached floor plans and cut-sheets.

Please review the attached documents, and provide feedback as you see fit. Feel free to call or email me if you have any questions.

Respectfully,

Reza Zare
Partner
ALFA TECH
Direct: (408) 487-1221
Email: Reza.Zare@atce.com



College of San Mateo - Building 36

AHU-1 Airflow Study

Floor	VAV #	Service	Design CFM	Actual CFM	Remarks
3rd	301	Supply	350	430	
3rd	302	Supply	285	290	
3rd	303	Supply	390	390	
3rd	304	Supply	360	370	
3rd	305	Supply	345	345	
3rd	306	Supply	330	340	
3rd	307	Supply	580	590	
3rd	310	Supply	300	300	
3rd	311	Supply	3,255	3,255	No information included on air-balance report; design CFM used as actual
3rd	312	Supply	3,255	3,255	No information included on air-balance report; design CFM used as actual
3rd	313	Supply	3,255	3,255	No information included on air-balance report; design CFM used as actual
3rd	315	Supply	3,025	3,010	No information included on air-balance report; design CFM used as actual
3rd	316	Supply	2,560	2,560	No information included on air-balance report; design CFM used as actual
3rd	317	Supply	2,560	2,560	
3rd	319	Supply	200	200	
3rd	320	Supply	2,220	2,195	
3rd	322	Supply	1,675	1,325	
3rd	323	Supply	2,070	2,060	
Totals			27,015	26,730	
Total Capacity of AHU-1				25,000	
Total Available Capacity				-1,730	



College of San Mateo - Building 36

AHU-2 Airflow Study

Floor	VAV #	Service	Design CFM	Actual CFM	Remarks
1st	101	Supply	540	540	
1st	102	Supply	1620	1600	
1st	103	Supply	435	440	
1st	104	Supply	1650	1625	
1st	105	Supply	1225	1225	No information included on air-balance report; design CFM used as actual
1st	106	Supply	2220	2190	
1st	107	Supply	1050	1120	Assume this is under AHU2
1st	108	Supply	1680	1680	No information included on air-balance report; design CFM used as actual
1st	109	Supply	1740	1730	
1st	110	Supply	1500	1500	
1st	111	Supply	900	900	No information included on air-balance report; design CFM used as actual
1st	112	Supply	1770	1760	
1st	113	Supply	400	410	
1st	114	Supply	610	610	
1st	115	Supply	475	470	
1st	116	Supply	300	290	
1st	117	Supply	290	290	
1st	118	Supply	800	800	
2nd	201	Supply	2145	2095	
2nd	202	Supply	160	155	
2nd	203	Supply	170	315	
2nd	204	Supply	460	460	Assume this is under AHU-2
2nd	205	Supply	1700	1670	
2nd	206	Supply	1700	1735	
2nd	207	Supply	270	270	
2nd	208	Supply	1890	1865	
2nd	209	Supply	305	310	
2nd	210	Supply	330	320	Assume this is under AHU-2
2nd	211	Supply	2370	2400	
2nd	212	Supply	500	500	
2nd	213	Supply	1710	1710	
2nd	214	Supply	300	300	Assume this is under AHU-2
2nd	215	Supply	2380	2290	
2nd	216	Supply	1680	1665	
2nd	217	Supply	1520	1360	
2nd	218	Supply	335	330	
2nd	219	Supply	685	480	
2nd	229	Supply	360	360	
3rd	308	Supply	840	830	
3rd	309	Supply	2125	2130	
3rd	325	Supply	540	530	
3rd	326	Supply	1890	1860	
Totals			45,570	45,120	
Total Capacity of AHU-2					40,000
Total Available Capacity					-5,120



College of San Mateo - Building 36

Exhaust Fans Airflow Study

Floor	EXV/VAV #	Service	Design CFM	Remarks	
2nd	VAV-221	Exhaust	1650	No information included on air-balance report; design CFM used as actual	
2nd	VAV-222	Exhaust	320		
2nd	VAV-223	Exhaust	760		
1st/2nd	VAV-220	Exhaust	1500		
2nd	VAV-224	Exhaust	640		
2nd	VAV-225	Exhaust	2100		
2nd	EXV-202	Exhaust	900		
2nd	VAV-226	Exhaust	305		
2nd	EXV-201	Exhaust	900		
2nd	VAV-228	Exhaust	1770		
2nd	VAV-227	Exhaust	480		
3rd	EXV-321	Exhaust	900		
3rd	VAV-324	Exhaust	1170		
3rd	VAV-321	Exhaust	2070		
3rd	VAV-318	Exhaust	1320		
3rd	EXV-320	Exhaust	900		
3rd	EXV-314	Exhaust	900		
3rd	EXV-315	Exhaust	900		
3rd	EXV-316	Exhaust	900		
3rd	EXV-317	Exhaust	900		
3rd	EXV-318	Exhaust	900		
3rd	EXV-319	Exhaust	900		
3rd	EXV-313	Exhaust	900		
3rd	VAV-314	Exhaust	2005		
3rd	EXV-301	Exhaust	900		
3rd	EXV-302	Exhaust	900		
3rd	EXV-303	Exhaust	900		
3rd	EXV-304	Exhaust	900		
3rd	EXV-305	Exhaust	900		
3rd	EXV-306	Exhaust	900		
3rd	EXV-307	Exhaust	900		
3rd	EXV-308	Exhaust	900		
3rd	EXV-309	Exhaust	900		
3rd	EXV-310	Exhaust	900		
3rd	EXV-311	Exhaust	900		
3rd	EXV-312	Exhaust	900		
Totals			36,790		
Total Capacity of EF-1/EF-2			40,000		
Total Available Capacity			3,210		



Job Number:
Unit Tag: AHU-1

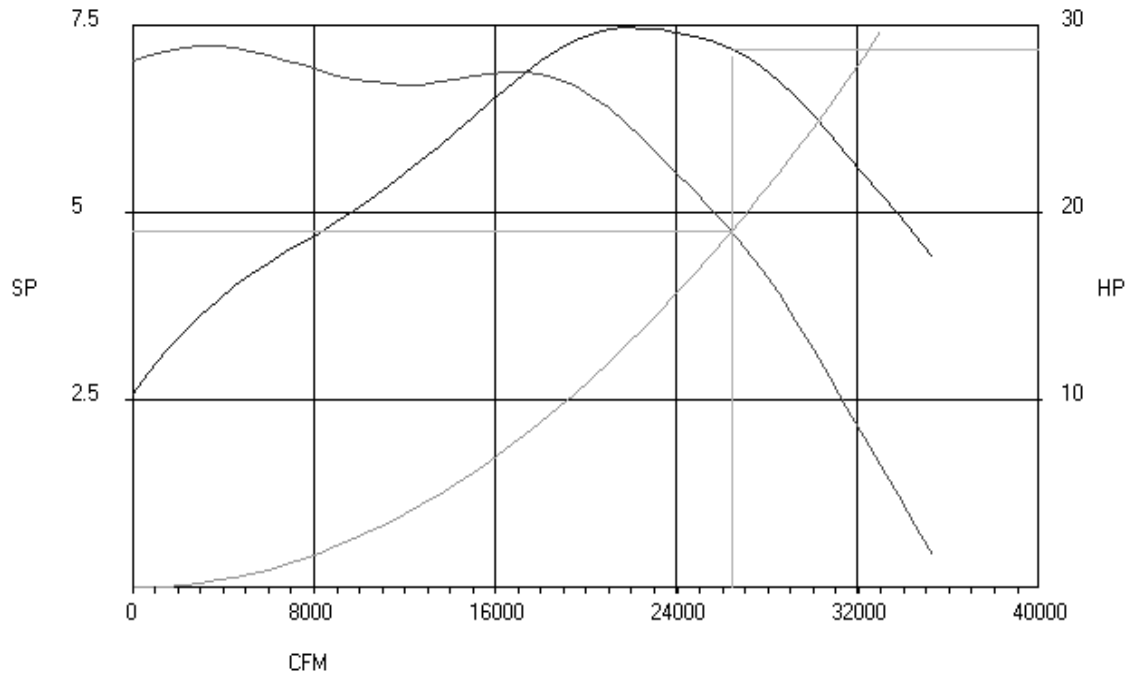
AHU-1

FAN CURVE

Ver. 6.24 May, 2010

Fan Duty: Supply
Fan Size: 365
Fan Model: ELPF
Fan Class: 2
Wheel Width: 100%

Wheel Type: Aluminum
Manufacturer: ENERGY LABS
Maximum RPM: 1401
Qty of Fans: 1
Report Type: Individual Fan



Operating:

CFM	SP	BHP	Dr HP	RPM	ALT	TEMP	SE
26500	4.76	28.76	N/A	1279	0	70	69

Standard:

4.76	28.76	0	70
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Sound

	63	125	250	500	1 K	2 K	4 K	8 K
Outlet	87	97	103	97	90	97	90	82
Inlet	86	96	102	87	85	90	81	77

Power:



AMCA International Licensed for Sound and Air Performance

- Energy Labs Inc. certifies that the model ELPF shown herein is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311, and comply with the requirements of the AMCA certified ratings program.
- Operating performance and Sound information is for individual fans
- Power rating (BHP) does not include transmission losses.
- Performance ratings do not include the effects of appurtenances (accessories)
- Performance certified is for installation type A: Free inlet, Free outlet
- The sound power level ratings shown are in decibels, referred to 1E-12 watts, calculated per AMCA Standard 301.
- Sound power levels shown are for installation type A: Free inlet, Free outlet
- Only outlet sound power levels (Lwo) are certified in accordance with AMCA 311

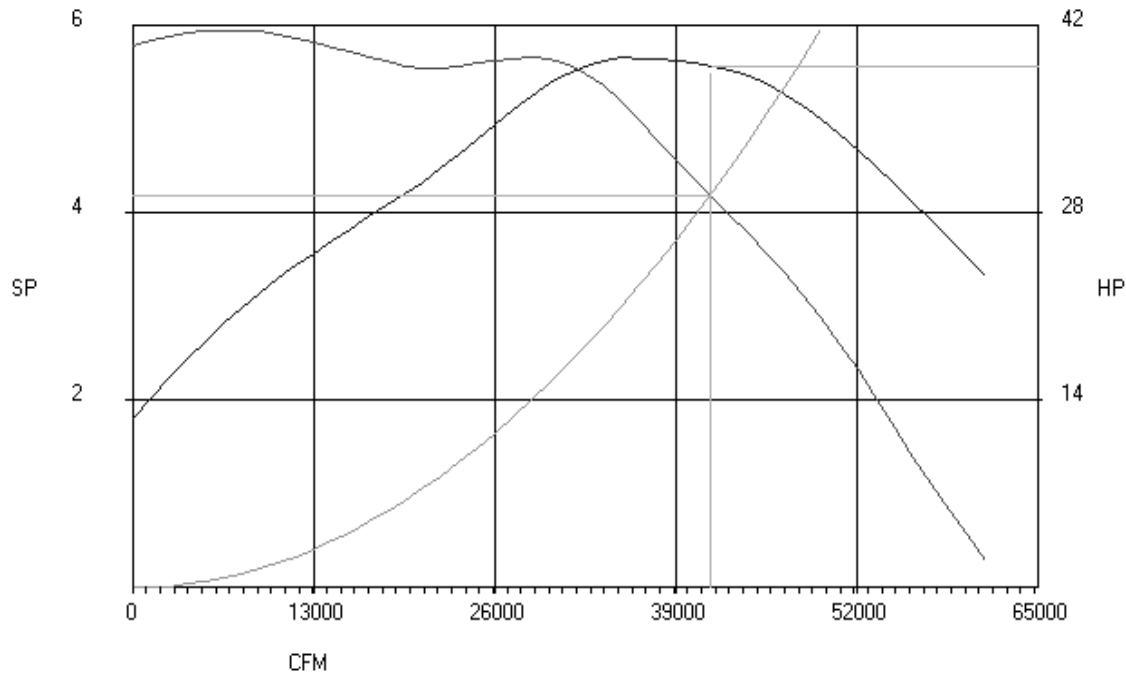
AHU-2

FAN CURVE

Ver. 6.24 May, 2010

Fan Duty: Supply
Fan Size: 490
Fan Model: ELPF
Fan Class: 2
Wheel Width: 100%

Wheel Type: Aluminum
Manufacturer: ENERGY LABS
Maximum RPM: 1043
Qty of Fans: 1
Report Type: Individual Fan



Operating:

CFM	SP	BHP	Dr HP	RPM	ALT	TEMP	SE
41500	4.19	39	N/A	870	0	70	70.1

Standard:

4.19	39.00	0	70
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Sound

	63	125	250	500	1 K	2 K	4 K	8 K
Outlet	94	105	97	93	90	90	86	80
Inlet	91	105	90	85	84	84	81	77

Power:



AMCA International Licensed for Sound and Air Performance

- Energy Labs Inc. certifies that the model ELPF shown herein is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311, and comply with the requirements of the AMCA certified ratings program.
- Operating performance and Sound information is for individual fans
- Power rating (BHP) does not include transmission losses.
- Performance ratings do not include the effects of appurtenances (accessories)
- Performance certified is for installation type A: Free inlet, Free outlet
- The sound power level ratings shown are in decibels, referred to 1E-12 watts, calculated per AMCA Standard 301.
- Sound power levels shown are for installation type A: Free inlet, Free outlet
- Only outlet sound power levels (Lwo) are certified in accordance with AMCA 311



**Quick Ship Product
Specification Catalog**

Inspiring progress.



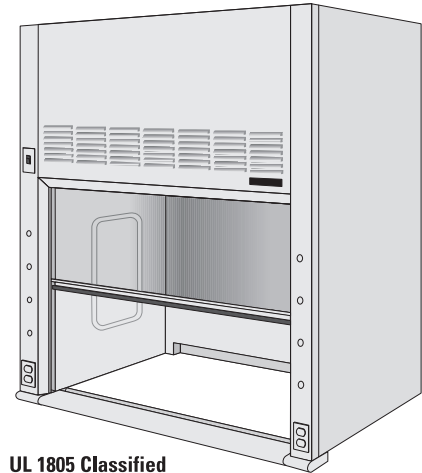
Hamilton Scientific Steel Laboratory Furniture

Fume Hood Superstructures

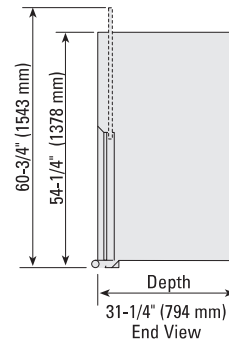
SafeAire II Bypass Superstructure

For Use With Constant Volume Exhaust Systems

- Designed for installation on 30" (762 mm) to 36" (914 mm) deep work surface
- Incorporates double bypass to maintain constant exhaust volume at all sash positions
- Designed to permit exact balancing of room ventilation system with fume hood exhaust volume
- Field-convertible to restricted bypass fume hood
- Vertical sash is full-view, laminated safety glass with full-width recessed pull
- 28-1/2" (724 mm) high opening for set-up
- Two-tube (T-8) fluorescent light fixture, black light switch and flush plate, and two black duplex 120 VAC receptacles and flush plates
- 96" (2439 mm) wide units have two light fixtures
- Pre-wired fume hoods include plugged holes for future service fixture installation standard on both posts; specify fixtures from page 38
- Remote baffle adjustment
- Shipped assembled
- Installation required
- Fume hoods are either pre-wired only or both pre-wired and pre-plumbed
- Pre-wired GFI outlets, light and alarm (model 54LFA1000)
- For work surfaces see pages 36-37



UL 1805 Classified



Pre-wired

Product Number	Width	Required Transition	Recommended Blower*
HM54L2591POE	48" (1219 mm)	HM54L90200	HM55L76100
HM54L2594POE	60" (1524 mm)	HM54L90300	HM55L76900
HM54L2597POE	72" (1829 mm)	HM54L90300	HM55L76900
HM54L2600POE	96" (2429 mm)	HM54L90400	HM55L81300

Pre-wired and Pre-plumbed**

Product Number	Width	Required Transition	Recommended Blower*
HM54L2591POP	48" (1219 mm)	HM54L90200	HM55L76100
HM54L2594POP	60" (1524 mm)	HM54L90300	HM55L76900
HM54L2597POP	72" (1829 mm)	HM54L90300	HM55L76900
HM54L2600POP	96" (2429 mm)	HM54L90400	HM55L81300

Not Pre-wired; not Pre-plumbed

Product Number	Width	Required Transition	Recommended Blower*
HM54L2591POB	48" (1219 mm)	HM54L90200	HM55L76100
HM54L2594POB	60" (1524 mm)	HM54L90300	HM55L76900
HM54L2597POB	72" (1829 mm)	HM54L90300	HM55L76900
HM54L2600POB	96" (2429 mm)	HM54L90400	HM55L81300

* Blowers sized for system with approximately 35 feet (10068 mm) of straight duct with one 90° elbow – 100 FPM Face Velocity.

** Pre-plumbed for gas, air, vac, and CW on the left post

Exhaust Volumes	Fume Hood Size	Collar Size	100 FPM at 28-1/2" (724mm)* Sash Opening		100 FPM at 18" (457mm)* Sash Opening	
			CFM	SP	CFM	SP
	48" (1219 mm)	6" x 15" (152 x 381 mm)	760	.18	485	.09
	60" (1524 mm)	6" x 23" (152 x 584 mm)	1000	.18	660	.09
	72" (1829 mm)	6" x 23" (152 x 584 mm)	1250	.27	785	.13
	96" (2439 mm)	6" x 30" (152 x 762 mm)	1710	.26	1081	.09

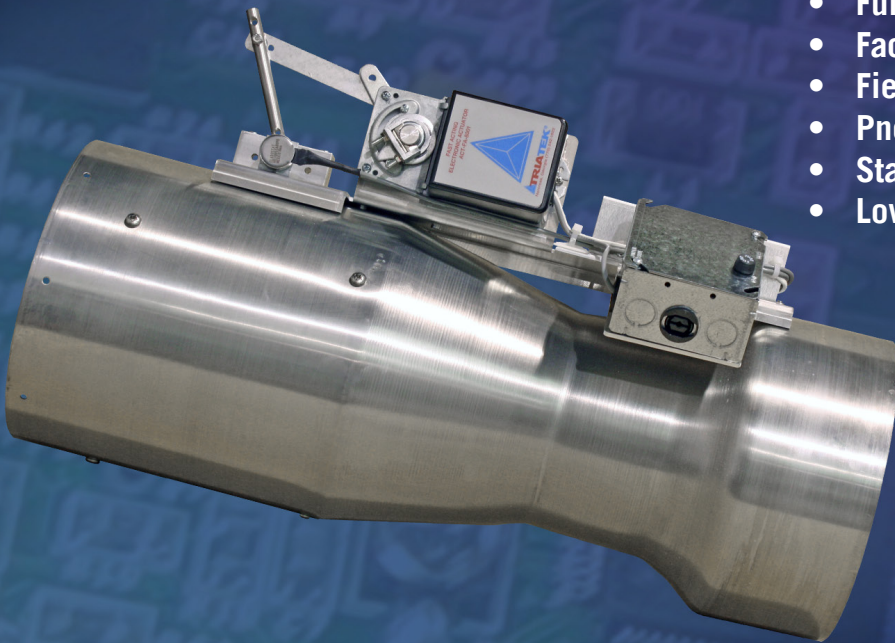
New 8' fume hood

* 28-1/2" (724 mm) opening for set-up only; 18" (457 mm) opening for operating position.

TRIA TEK VV SERIES

VV Series Air Valve Benefits:

- Fully pressure independent
- Factory calibrated flow
- Field adjustable
- Pneumatic or electric actuator
- Standard aluminum or optional stainless steel
- Low pressure drop



Triatek VV Series Venturi Air Valve



Shown with ACT-FA-8001 Actuator

PRESSURE INDEPENDENT, CONSTANT FLOW DESIGN

Available in aluminum or stainless steel, the Triatek VV Series Venturi Valve is ideal for controlling air flow for both supply and return or exhaust ducts based on the CFM flow set by the actuator.

Pressure independent, the Triatek Venturi Valve maintains a constant CFM at a specific actuator position over a range of 0.6 to 3"WC. As static pressure increases, the internal components adjust to maintain the constant volume of air. A decrease of the static pressure results in the internal components adjusting to increase the annular area; thereby maintaining the constant volume. In its normal operating

mode, the valve is pressure independent so that the flow is constant based on the specific actuator position.

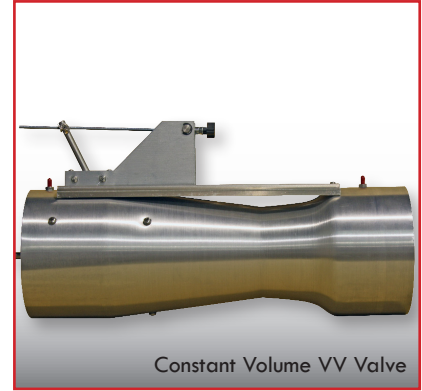
Other features include:

- Constant flow control
- Sound attenuated models available
- 6", 8", 10", 12" & 14" diameter models
- Can be ganged for increased flow

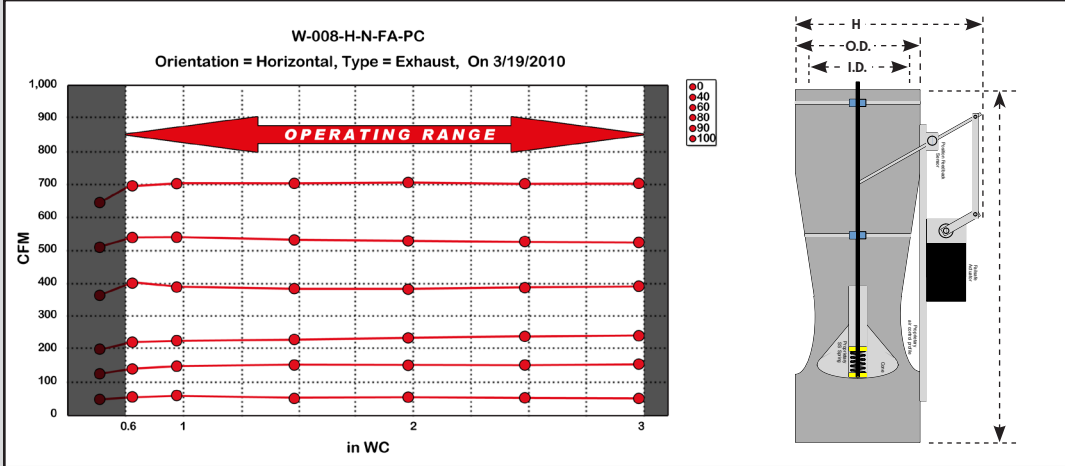
New control valve
for ductwork

TRIA TEK VV SERIES

Specifications										
Aluminum Thickness										0.060"
Stainless Steel Thickness										0.040"
Accuracy										+/- 5%
Internal Assembly Construction Materials										Stainless steel shaft and struts with Teflon® bearings
Individual Valves										
Unit Size	Inside Dia.		Outside Dia.		Length		Clearance Height		Min./Max Flow*	
	in.	mm	in.	mm	in.	mm	in.	mm	cfm	ltr/sec
6"	5.80	147	5.93	151	19.50	495	10.89	277	30 - 250	17 - 117
8"	7.75	197	7.88	200	23.00	584	12.88	327	35 - 700	17 - 329
10"	9.72	247	9.85	250	26.00	660	14.88	377	50 - 1000	24 - 472
12"	11.55	293	11.68	297	27.80	681	16.88	428	90 - 1500	42 - 705
14"	13.49	343	13.62	346	29.87	759	22.00	559	175 - 2100	82 - 991



Ganged Valves (valves can be ganged together in any combination up to 6 valves)											
Unit Size & Number	Length		Width		Collar Height		Clearance Height		Min./Max. Flow (CFM)*		
	in.	mm	in.	mm	in.	mm	in.	mm	cfm	ltr/sec	
10"	2	30.00	762	22.50	572	11.50	292	17.00	432	100 - 2000	47 - 944
	3	30.00	762	33.75	857	11.50	292	17.00	432	150 - 3000	71 - 1416
	4	30.00	762	22.50	572	23.00	584	34.00	864	200 - 4000	94 - 1888
	6	30.00	762	33.75	857	23.00	584	34.00	864	300 - 6000	41 - 2832
12"	2	31.00	787	26.75	679	13.50	343	19.00	483	180 - 3000	85 - 1410
	3	31.00	787	40.00	1016	13.50	343	19.00	483	270 - 4500	127 - 2115
	4	31.00	787	26.75	679	27.12	689	38.00	965	360 - 6000	170 - 2820
	6	31.00	787	40.00	1016	27.12	689	38.00	965	540 - 9000	254 - 4230
14	2	34.50	876	32.15	817	16.00	406	24.00	610	350 - 4200	164 - 1982



* Flow rates shown above are for partially closed, medium pressure valves only. Contact Triatek for other valve flow rates.



Refer to the Valve Ordering Guide for part numbers and corresponding flow specifications.



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Phone: (770) 242-1922 • www.triatek.com

Product specifications are subject to change without notice. TRIATEK is a registered trademark of Triatek LLC. 030512

VAV BOX SCHEDULE

Table with columns: NO., MANUFACTURER & MODEL NO., SERVICE, BOX SIZE, COOLING CFM (MAX, MIN), HEATING CFM (MAX, MIN), AIR T.P.D., HOT WATER REHEAT COIL (EAT, LAT, CAPACITY, EWT, LWT, GPM, ROWS), H2O T.P.D., CONTROL VALVE (TYPE, SIZE, Cv), OPER WGT, REMARKS. Rows include VAV 101 through VAV 307.

VAV BOX SCHEDULE

Table with columns: NO., MANUFACTURER & MODEL NO., SERVICE, BOX SIZE, COOLING CFM (MAX, MIN), HEATING CFM (MAX, MIN), AIR T.P.D., HOT WATER REHEAT COIL (EAT, LAT, CAPACITY, EWT, LWT, GPM, ROWS), H2O T.P.D., CONTROL VALVE (TYPE, SIZE, Cv), OPER WGT, REMARKS. Rows include VAV 308 through VAV 326.

COMBINATION FIRE SMOKE DAMPER SCHEDULE

Table with columns: NO., MANUFACTURER & MODEL NO., SIZE, INLET, OUTLET, SLEEVE, SERVICE, UNIT, LEAKAGE CLASS, TEMP RATING, FIRE RATING, ACTUATOR (TYPE, FAIL, SIDE), REMARKS. Rows include FSD 218 through FSD 311.

FIRE DAMPER SCHEDULE

Table with columns: NO., MANUFACTURER & MODEL NO., SIZE, INLET, OUTLET, SLEEVE, SERVICE, UNIT, FUSSIBLE TEMP RATING, FIRE RATING, REMARKS. Rows include FD 101 through FD 103.



MCCARTHY LPA
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Planning
Interior Design
Landscape Architecture
Graphics

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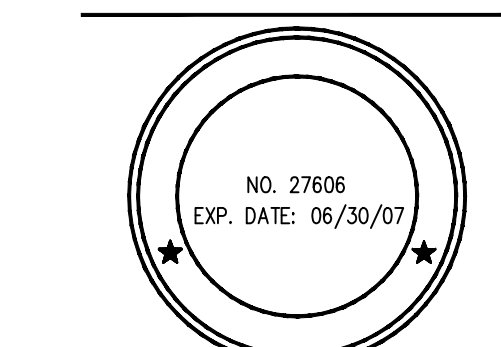


MENLO PARK (650)326-0750
Fax: (650)321-4946

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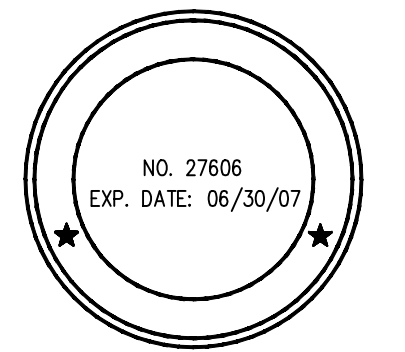
College of San Mateo
Building # 36, Science Building
Increment 3 of 3
DSA Submittal Final
San Mateo, CA
Developed for
San Mateo County Community College District

Table with columns: Date, Revision Description, L.F., COORDINATION REVS, CAS BUILT. Rows include FEB 2, 2005; APR 26, 2005; DEC 27, 2005.

Job No. 50680
Date JUNE 27, 2005
Drawn by
Checked by

EQUIPMENT SCHEDULES

M-0.3



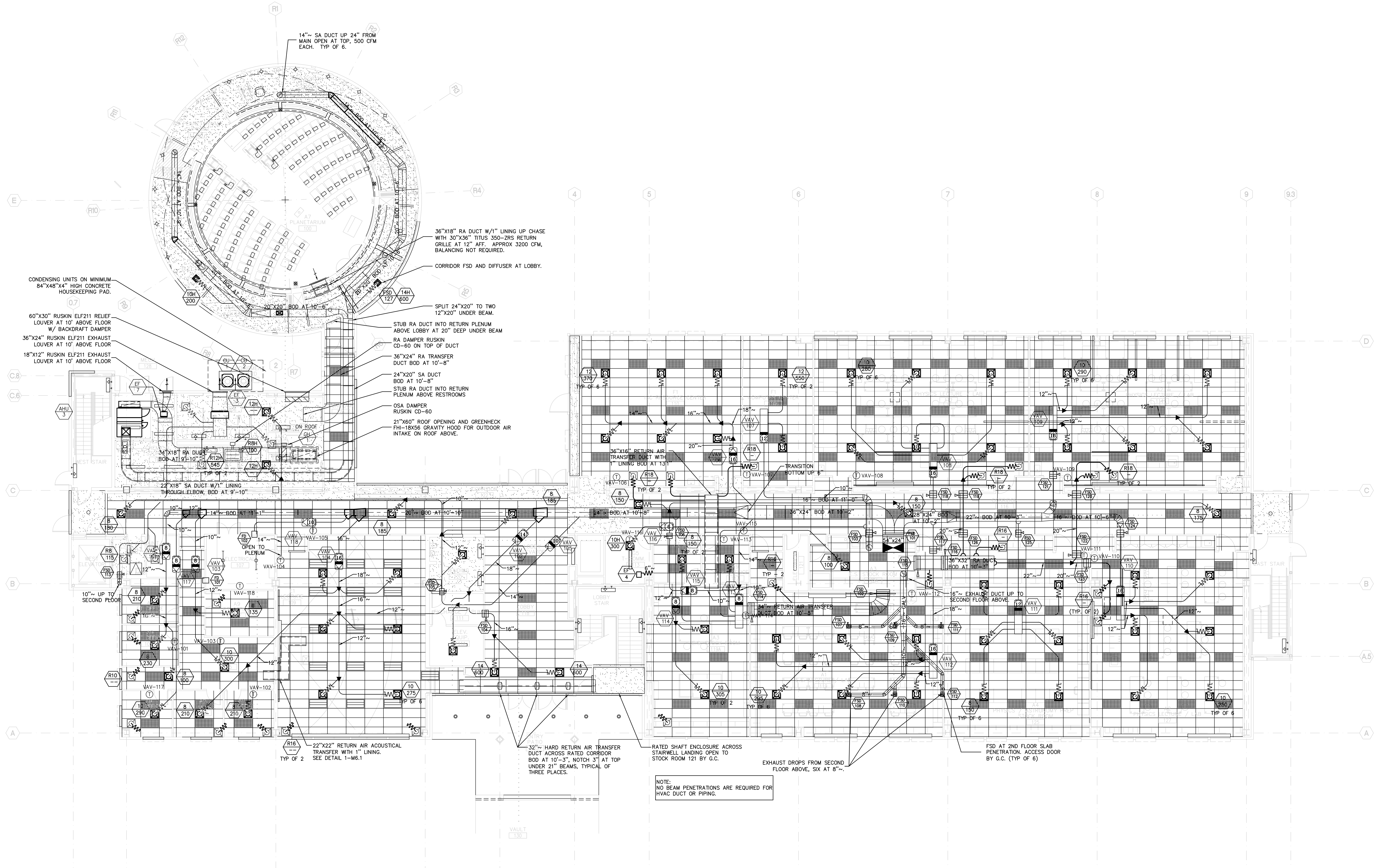
College of San Mateo
Building # 36, Science Building
Increment 3 of 3
DSA Submittal Final
San Mateo, CA
Developed for
San Mateo County Community College District

Revision Description	Date
L.P.F.	FEB 2, 2005
COORDINATION REVS	APR 26, 2005
AS BUILT	DEC 27, 2005

Job No.	50660
Date	JUNE 27, 2005
Drawn by	
Checked by	

1ST FLOOR MECHANICAL PLAN

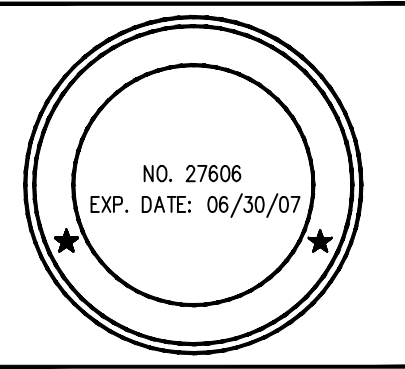
M-2.1



FIRST FLOOR MECHANICAL PLAN

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

NOTE:
NO BEAM PENETRATIONS ARE REQUIRED FOR
HVAC DUCT OR PIPING.

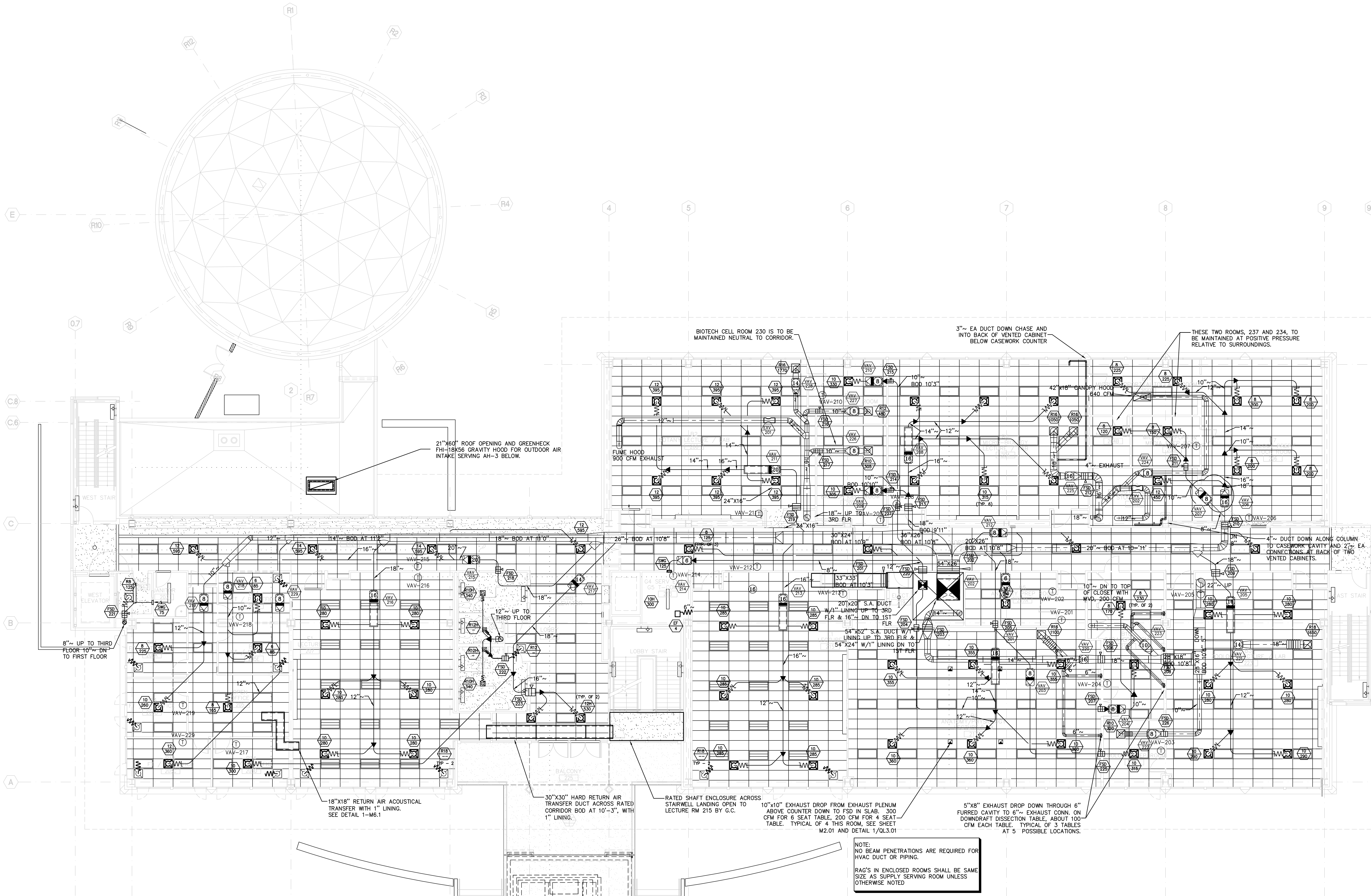


Revision Description	Date
I.T.F.	FEB 2, 2005
COORDINATION REVS	APR 26, 2005
CAS BUILT	DEC 27, 2005

Job No.	50680
Date	JUNE 27, 2005
Drawn by	
Checked by	

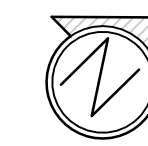
2ND FLOOR MECHANICAL PLAN

M-2.2

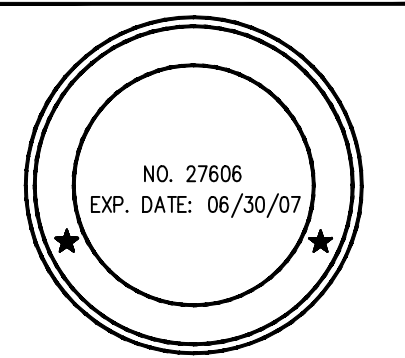


SECOND FLOOR MECHANICAL PLAN

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

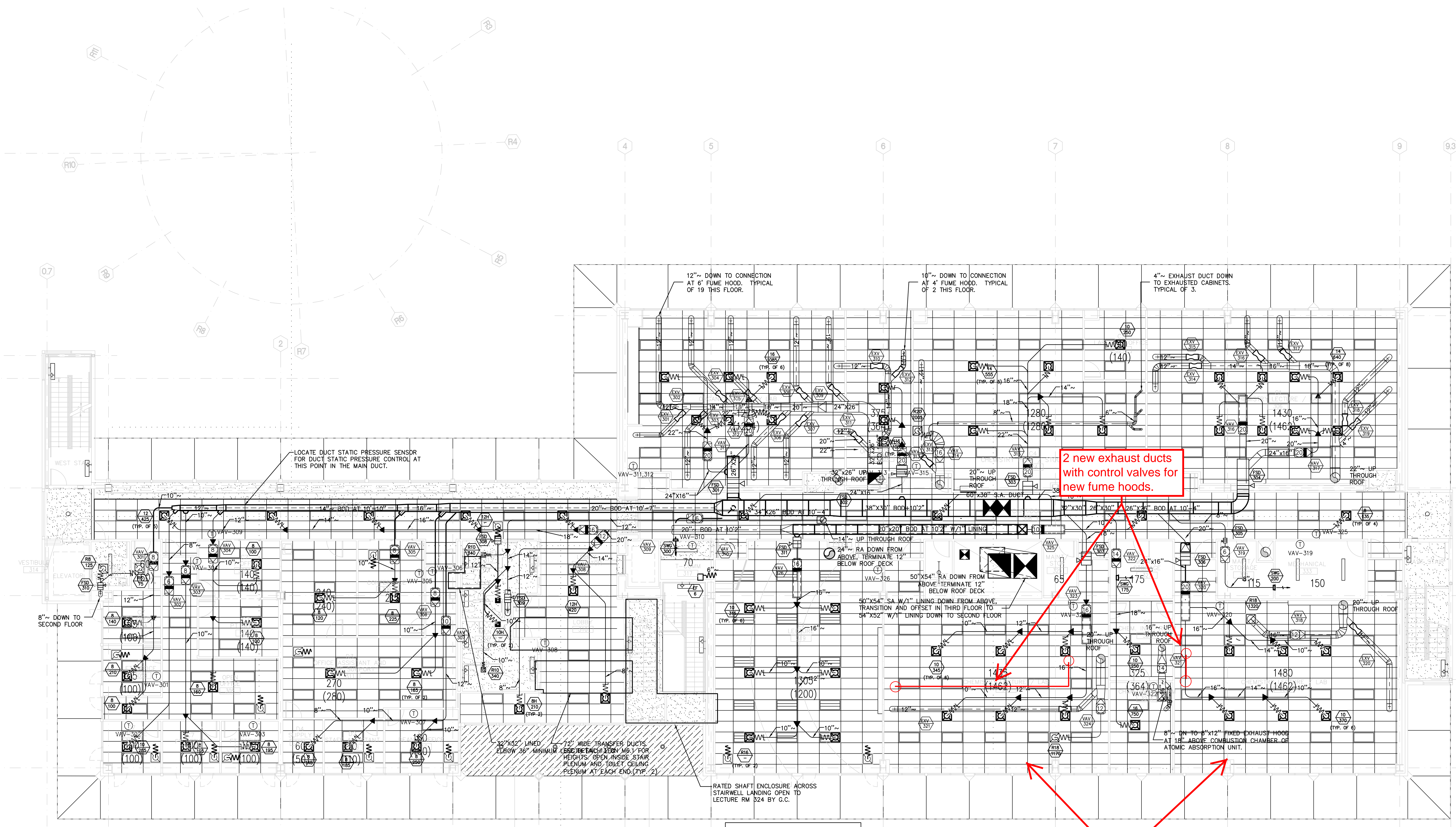


16
8
4
0



Revision Description	Date
I.T.F.	FEB 2, 2005
COORDINATION REVS	APR 26, 2005
AS BUILT	DEC 27, 2005

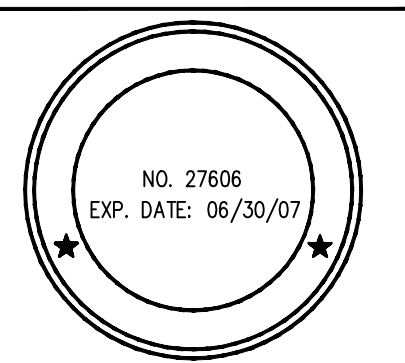
Job No.	50660
Date	JUNE 27, 2005
Drawn by	
Checked by	



THIRD FLOOR MECHANICAL PLAN

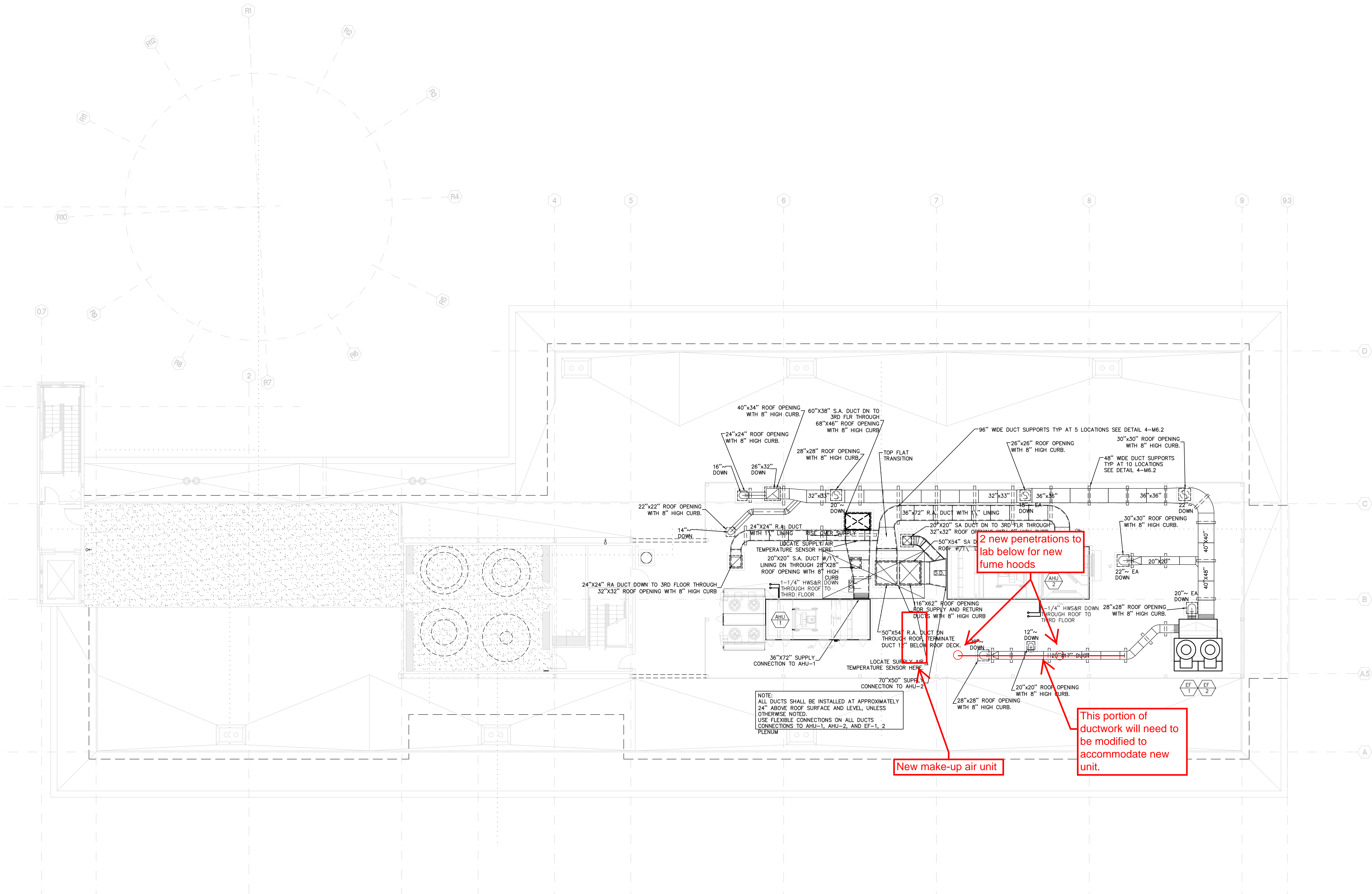
SCALE: 1/8"=1'-0"

16
8
4
0



Revision Description	Date
L.P.F.	FEB 2, 2005
COORDINATION REVS	APR 26, 2005
AS BUILT	DEC 27, 2005

Job No.	50660
Date	JUNE 27, 2005
Drawn by	
Checked by	



ROOF LEVEL MECHANICAL PLAN

SCALE: 1/4"=1'-0"

16
8
4
0