FIL: PRIOM2040090



# CERTIFIED TEST, ADJUST AND BALANCE REPORT

	<b>DATE:</b> June 10, 2014
PROJECT:	
NAME:	DRAFT REPORT
ADDRESS:	St. Lukes East Hospital Kitchen / Dining Exp.  100 Northeast Saint Lukes Boulevard
ADDITEOU.	Lee Summit, Missouri
	200 Odnami, Wissouri
15010-0-	
ARCHITECT:	
NAME:	ACI Boland
ADDRESS:	1421 East 104th Street
	Kansas City, Missouri
HVAC DESIGN ENGINEER	₹:
NAME:	W.L. Cassell and Associates
ADDRESS:	1600 Baltimore Street
	Kansas City, Missouri
OFNIEDAL 0011-10-1	
GENERAL CONTRACTOR	
NAME:	JE Dunn
ADDRESS:	1001 Locust Street
	Kansas City, Missouri
MECHANICAL CONTRACT	ror·
NAME:	US Engineering
ADDRESS:	3422 Roanoke Road
	Kansas City, Missouri
0.1.	
SHEET METAL CONTRAC	· ·
NAME:	US Engineering
ADDRESS:	3422 Roanoke Road
	Kansas City, Missouri



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Commissioning, Validation Balancing Agents
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Office - 913.677.3374 Fax - 913.671.7483 www.dfstesting.com

NEBB Certification No.: 3158



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2	Variable Air Volume Terminal Units	8 - 10
3	Make Up Air Unit for New Kitchen Hood	11
4	Existing Make Up Air for Kitchen Hood #2	12
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7	Captive Air Kitchen Hood	15
8	Existing Exhaust Grilles	16
9	Heating Hot Water Re-heats	17





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CERTIFIC	CATION
Project: St. Lukes East Hospital Kitchen / Dining E Tech: Danny Godden	Location: Lee Summit, Missouri  Date: 6/10/2014
The data presented in this report is a record of sy that have been obtained in accordance with the constant of the standards for Testing, Adjusting and Balancing of the design quantities that exceed NEBB tolerant Balance Report Project Summary.	urrent edition of the NEBB Procedural f Environmental Systems. Any variances
Submitted and Certified By:	
Doyle Field Services, Inc.	
NEBB Certification No.:	3158
NEBB Certification Expiration Date:	3/31/2016
Report Date:	6/10/2014
	NEBB SEAL
IEBB Qualified TAB Supervisor:	
Name: Dennis T. Doyle	
Signature:	





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# Project: St. Lukes East Hospital Kitchen / Dining E Location: Lee Summit, Missouri Tech: Date: 6/10/2014

MANUFACTURER PEOMON PEOCHEMENT Shortridge 12 Months PEDUATION DATE PEOMOND PEOCHEMENT PEOWOND PEOPLE	INSTRUMENT		CALIBRATION	APPLICATION	CALIBRATION
Flowhood Shortridge 12 Months CFM October-13 Air Data Multimeter ADM 860 Shortridge 12 Months CFM/VEL/SP October-13 Digital Tachometer DT205L Shimpo 12 Months RPM April-13 Amp/Volt Meter Fluke 12 Months AMP/VOLT April-13 Temp Probe 16 Fluke 12 Months TEMP April-13		MANUFACTURER		APPLICATION	CALIBRATION
Air Data Multimeter ADM 860 Shortridge 12 Months CFMVELISP October-13 Digital Tachometer DT205L Shimpo 12 Months RPM April-13 Amp/Volt Meter Fluke 12 Months AMP/Vol.T April-13 Temp Probe 16 Fluke 12 Months TEMP April-13  Temp Probe 16 Fluke 12 Months TEMP April-13	Flowbood	Chartridge	12 Martha	OFM	
Amp/Volt Meter Fluke 12 Months RPM April-13  Amp/Volt Meter Fluke 12 Months TEMP April-13  Temp Probe 16 Fluke 12 Months TEMP April-13  Temp Probe 16 Fluke 12 Months TEMP April-13	Air Data Multimator ADM 960	Chartridge	12 Months		Uctober-13
Jugar Taction Probe 16 Shimpo 12 Months AMP/VOLT April-13 Temp Probe 16 Fluke 12 Months TEMP April-13 Temp Probe 16 Shimpo 12 Months TEMP April-13 Shimpo 13 Months TEMP April-13 Shimpo 13 Months TEMP April-13 Shimpo 14 Months TEMP April-13 Shimpo 15 Months TEMP April-13 Shimpo 15 Months TEMP Shimpo 15 Month	Digital Tashamatar DT2051	Shormage	12 IVIORENS	I CHIVI/VEL/SP	Uctober-13
Amprool meter Fluke 12 Months TEMP April-13  Temp Probe 16 Fluke 12 Months TEMP April-13	Digital Tacriometer D1205L	Snimpo	12 Wonths	KPW	April-13
Temp Proce to Fluke 12 Months IEMP April-13	Amp/voit ivieter	- Fluke	12 Months	AMP/VOLI	April-13
	Temp Probe 16	Fluke	12 Months	I EMP	April-13
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# **ABBREVIATIONS** Project: St. Lukes East Hospital Kitchen / Dining Exp. Location: Lee Summit, Missouri Date: 6/10/2014

### **Abbreviations**

CFM = Cubic Feet Per Minute GPM = Gallons Per Minute

AMP = Amperage

KW = Kilowatt

HP = Horsepower

RPM = Revolutions Per Minute

SP = Static Pressure

E.S.P = External Static Pressure

DD = Direct Drive

SQFT or SF = Square Feet

FPM = Feet Per Minute

HZ = Hertz

N/A = Not Applicable

NG = Not given

3D = Triple Duty Valve

CW = Chilled Water

HHW = Heating Hot Water

DW = Domestic Water

LHW = Laboratory Hot Water

CNR = Can Not Read

"W.G. or inwc = Inches in Water Column

AK = Albert Keane DG = Daniel Godden

JC = James Coin

TD = Tom Doyle
DN = Danny Noble
EO = Eric Ortega



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SUMM	ARY	
Project: St. Lukes East Hospital Kitchen / Dining Exp.	Location: Lee Summit, Missouri	
Tech: Danny Godden	Date: 6/10/2014	

## **Project Notes / Summary**

This project consisted of the expansion of the kitchen and dining area at St. Lukes Hospital in Lee Summit, Missouri. Phase 1 consisted of the test and balance of 2 new variable air volume terminal units (VAV) and 1 existing VAV. These VAV's are controlled by Johnson Controls and have hot water re-heat for temperature control. In addition, a new kitchen hood was installed and is served by an existing exhaust fan and make up air unit (MUA). The MUA unit was proportionally balanced so that the existing kitchen hoods would have the same airflow originally measured by the pretest. Return grilles were also balanced as part of this phase.



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Deficienc	cy List	
Project: St. Lukes East Hospital Kitchen / Dining Exp.	Location: Lee Summit, Missouri	
Tech: Danny Godden	Date: 6/10/2014	

The existing general exhaust grille that is served off of the new kitchen hood does not have a manual balance damper installed.

The new kitchen hood exhaust drops do not have manual balance dampers installed.

Any minor deficienies will be found in the project notes at the bottom of the test pages.



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#### **VAV/EAV TERMINAL UNIT TEST REPORT** Project: St. Lukes East Hospital Kitchen / Dining E Location: Lee Summit, Missouri Tech: Danny Godden Date: 6/9/2014 VAV/EAV TERMINAL UNIT DATA VAV 3-1 Unit Design Minimum 654 System Supply / AHU-3 Actual Minimum 664 Size (Inches) 12 Flow Coefficient 2.176 VAV/EAV TERMINAL UNIT OUTLET/INLET DATA AREA OR ROOM OUTLET DESIGN PRELIM. FINAL NUMBER NO. SIZE TYPE CFM CFM CFM % Comments Kitchen Area 1 C 250 326 248 99 Kitchen Area 2 С 250 274 265 106 Kitchen Area 3 С 250 218 247 99 Kitchen Area 4 C 250 293 239 96 Kitchen Area 5 С 250 237 245 98 Kitchen Area 6 250 250 97 242 Kitchen Area 250 275 268 107 TOTALS: 1,750 1,873 1,754 VAV/EAV TERMINAL UNIT DATA Design Minimum 2100 Unit VAV 3-2 (Existing) System Supply / AHU-3 Actual Minimum 2,131 Flow Coefficient 1.450 Size (Inches) 14 VAV/EAV TERMINAL UNIT OUTLET/INLET DATA AREA OR ROOM OUTLET DESIGN PRELIM. FINAL NUMBER NO. TYPE SIZE CFM CFM CFM % Comments Kitchen Area 1 С 350 457 355 101 Kitchen Area 2 С 350 471 374 107 3 С Kitchen Area 350 424 341 97 Kitchen Area 4 С 350 456 325 93 5 350 Kitchen Area С 358 102 309 Kitchen Area 6 С 350 515 378 108 TOTALS: 2,100 2,632 2,131 Remarks:



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Project: St. Luke:	s East Hosp	oital Kitchen / Dinin	ıg E	Location:	Lee Sum	mit, Missou	uri	
Tech:			_	Date:				
VAV/EAV TERMIN	AL UNIT D	ATA						
Unit	VAV 3-3			Design	Minimum			
System	Supply / A	\HU-3	*************************************	Actual I	Vlinimum			
Size (Inches)	16			Flow Co	pefficient			
VAV/EAV TERMIN	AL UNIT O	UTLET/INLET DAT	ГА			_		
AREA OR ROOM		OUTLET		DESIGN	PRELIM.		FINAL	_
NUMBER	NO.	TYPE	SIZE	CFM	CFM	CFM	%	Comment
Dining	1	С		275			0	
Dining	2	C C C C		275			0	
Dining	2 3 4	С		275			0 0	<u> </u>
Dining	4	С		275	PHASE	2	1	
Dining	5	С		275			0	
Dining	6	С		275			0	
Dining	7	С		300			0 0	
Dining	8	C		275			0	
Dining	9	<u>C</u>		275			0	
			TOTALS:	2,500	0	2	0	
/AV/EAV TERMINA	AL UNIT DA	ATA						
Unit	VAV 3-4			Design N	/inimum	900		
System	Supply / A	HU-3	FII PP44411111111111111111111111111111111	Actual N		0	***************************************	
Size (Inches)	9			Flow Co	efficient			
/AV/EAV TERMINA	L UNIT OL	ITLET/INLET DAT	'A	**				
AREA OR ROOM	1	OUTLET	<u>,,                                    </u>	DESIGN	PRELIM.		FINAL	
NUMBER	NO.	TYPE	SIZE	CFM	CFM	CFM	%	Comment
Self Serve Area	1	С		450			0	
Self Serve Area	2	Č		450	• <b>••••</b> •••••••••••••••••••••••••••••••		0	***************************************
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	l		TOTALS:	900	0	2	0	
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#### **VAV/EAV TERMINAL UNIT TEST REPORT** Project: St. Lukes East Hospital Kitchen / Dining E Location: Lee Summit, Missouri Tech: Danny Godden Date: 6/9/2014 VAV/EAV TERMINAL UNIT DATA Unit VAV 3-5 Design Minimum Supply / AHU-3 Actual Minimum System Size (Inches) 16 Flow Coefficient VAV/EAV TERMINAL UNIT OUTLET/INLET DATA AREA OR ROOM OUTLET DESIGN PRELIM. FINAL NUMBER NO. TYPE SIZE CFM CFM CFM % Comments Corridor C 200 С Corridor 2 200 0 3 C Corridor 200 Kitchen C 300 0 4 PHASE 100 Storage 5 Α 2 6 С 300 Serving 0 C 300 Serving 0 8 C 350 Serving 300 Serving 9 **TOTALS:** 2,250 0 VAV/EAV TERMINAL UNIT DATA VAV 3-7 Design Minimum 895 Unit Actual Minimum 908 System Supply / AHU-3 Flow Coefficient 1.889 Size (Inches) VAV/EAV TERMINAL UNIT OUTLET/INLET DATA AREA OR ROOM OUTLET DESIGN PRELIM. FINAL NUMBER SIZE CFM CFM CFM NO. TYPE % Comments 165 Dry Storage В 190 176 107 2 В 179 108 Dry Storage 165 161 Ë Dry Storage 3 165 93 16 154 200 225 206 103 Chef 4 В Dietary 5 200 190 193 97 TOTALS: 895 782 908 101 Remarks:



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#### **DUCT TRAVERSE TEST REPORT (RECTANGULAR)** Project: St. Lukes East Hospital Kitchen / Dining E Location: Lee Summit, Missouri Tech: DG MAU/AHU-8 Location: Kitchen Date: 6/ DUCT INFORMATION **DESIGN AIRFLOW** ACTU Inside Width (In.): 28.00 FPM 1,029 FPM Inside Depth (In.): 18.00 CFM 3,603 SCF Area (Sq. Ft.) 3.500 S.P. (In. W.G.) N/A CFM VELOCITY READINGS (FPM) Position 2 5 6 8 1,469 1,350 1,238 1,251 1,362 1,036 2 1,451 1,724 1,555 1,395 988 1,274 3 1,606 1,371 1,120 1,355 1,704 485 4 488 400 300 701 921 414 5 6 7 8 9 10

4,975

3,209

0

0

0

Sum of columns 1 - 10: Total number of readings: 26,958 24

Average velocity (FPM): Total Airflow (CFM):

Remarks: The new kitchen hood was tested with all 3 hoods running.

There is not an applicable way to read by flow hood, DFSI has proportionally balanced grilles by Vell Grid.



Totals

No. Of

Readings

5,014

4,845

4,213

4,702

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/9/2014	
AL AIRFLOW	
1,123 M	
И I 3,931	<del>- 1 min - 1 min - 1 - 1 min -</del>
0 1 10	
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## SUPPLY / EXHAUST AIR OUTLET / INLET TEST REPORT

Project: St.	Lukes East I	lospital Kitche	Location:	Lee Summit, Missouri	
Tech:	DG (	Unit: <u>E</u>	xisting Hood #2	Date:	6/9/2014

	•			•	0,0, <u>2</u> 014		
AREA OR ROOM	<u></u>	OUTLET		1			
	NO	OUTLET	OUZE	TEST DATA			
NUMBER	NO.	TYPE	SIZE	1/6/2014		FINAL	%
Hood #2	1 2 3	NG		934	747	888	95
Hood #2	2	NG		818	654	793	97
Hood #2 Hood #2	3	NG	ļ	738	590	727	99
Hood #2	4 5	NG NG NG	***************************************	575	460	571	99 97
Hood #2	5	NG		651	520	633	97
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AVOTE WAY			TOTALS:	3,716	2,971	3,612	97

\*NOTE: If AK = 1.00, velocity information and measurements are not required.

Remarks.	These reading were taken after the new nood was balanced.	<u>.                                    </u>		
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## SUPPLY / EXHAUST AIR OUTLET / INLET TEST REPORT

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Project: St. Lukes	East Hos	pital Kitchen / Dining	<u> </u>	Location:	Lee Sumr	nit, Missoi	uri
Tech: DG	_ Unit	Existing Re	turn	_ Date:	6/9/2014		
AREA OR ROOM		OUTLET	***		TEST	DATA	
NUMBER	NO.	TYPE	SIZE	DESIGN	PRE	FINAL	%
Dry Storage	1	ВВ		495	1,503	498	101
Chef	2 3	AA	***************************************	200	136	208	104
Dietary	3	В		200	77	188	94
Dietary North Dining	6 7	NG NG		1 /00			0
i Dinina	7	NG		700			[ <u>0</u>
Dining	8	BB		700		4141134.454	0
Self Serve	9	BB		700			0 0 0 2
Self Serve	10	BB		700			0
Storage	11	DD		100	PHASE	2	2
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\*NOTE: If AK = 1.00, velocity information and measurements are not required.

Remarks:	 	
<del></del>		

TOTALS: 4,495 1,716



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# Project: St. Lukes East Hospital Kitchen / Dining E Location: Lee Summit, Missouri Tech: Unit: Existing Exhaust Date: TEST DATA AREA OR ROOM OUTLET NUMBER TYPE SIZE DESIGN PRE FINAL Dishwasher NG 200 0 Dishwasher NG 400 Ö Cart Wash 100 0 PHASE 2 TOTALS: 700 \*NOTE: If AK = 1.00, velocity information and measurements are not required. Remarks:

SUPPLY / EXHAUST AIR OUTLET / INLET TEST REPORT



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## CAPTIVE-AIRE KITCHEN HOOD TEST REPORT

Project: St. Lukes East Hospital Kitchen / Dining Ex

Location: Lee Summit, Missouri

Tech: DG

New Kitchen Hood

Date: 6/9/2014

Hood #	Inle	Inlet #3		Design Total CFM:		2242		otal CFM:	2,057	
Hood Make:	Captiv	re-Aire	Model N	Number: 5424 ND-2		Serial Number:		NG		
Filter Size	16" x 20"	16" x 20"	16" x 20"	16" x 20"	16" x 16"	16" x 20"				
Sq. Ft.	1.73	1.73	1.73	1.73	1.35	1.73	0.00	0.00	0.00	0.00
Velocity (FPM)	161	177	188	181	164	156				
K-Factor	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CFM	334	367	390	376	266	324	0	0	0	0

Hood #	Inlet #4		Design Total CFM:		2262		Actual Total CFM:		1,829	
Hood Make:	Captiv	e-Aire	Model N	Model Number:		5424 ND-2		Serial Number:		G
Filter Size	16" x 16"	16" x 20"	16" x 20"	16" x 20"	16" x 20"	16" x 20"				
Sq. Ft.	1.35	1.73	1.73	1.73	1.73	1.73	0.00	0.00	0.00	0.00
Velocity (FPM)	131	146	225	151	129	128				
K-Factor	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CFM	212	303	467	313	268	266	0	Ö	0	0

Hood #			Design T	otal CFM:			Actual To	otal CFM:	(	)
Hood Make:	Captiv	e-Aire	Model I	Number:			Serial N	lumber:		G
Filter Size	No Filter									
Sq. Ft.	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Velocity (FPM)										
K-Factor	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CFM	0	0	0	0	0	0	0	0	0	0

Hood #			Design T	otal CFM:			Actual To	otal CFM:	C	)
Hood Make:		e-Aire	Model N	Number:				lumber:	N	G
Filter Size	No Filter									
Sq. Ft.	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Velocity (FPM)								***************************************		***************************************
K-Factor	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CFM	0	0	0	0	0	0	0	0	0	0

Hood #			Design T	otal CFM:			Actual To	otal CFM:	C	)
Hood Make:		/e-Aire	Model N	Number:				lumber:	N	G
Filter Size	No Filter									
Sq. Ft.	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Velocity (FPM)				***************************************	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				***************************************	
K-Factor	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
CFM	0	0	O	0	0	0	0	0	O	0

Remarks:	



DOYLE FIELD SERVICES, INC.
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# SUPPLY / EXHAUST AIR OUTLET / INLET TEST REPORT

Project: St.	Lukes East	Hospital Kit	chen / Dining E	Location: Lee Summit, Missouri
Tech:I	DG	Unit:	Existing Exhaust	Date: 6/9/2014

4554							
AREA OR ROOM	<u> </u>	OUTLET			TEST	DATA	_
NUMBER	NO.	TYPE	SIZE	DESIGN	PRE	FINAL	%
Kitchen	1 2 3	NG		1,200	447	860	72
Kitchen	2	NG	<b>T</b>	1,200 2,242 2,262	1,516 2,241 1,700	1,434 2,057 1,829	120
New Kitchen Hood	3	NG	***************************************	2,242	2,241	2.057	92
New Kitchen Hood	4	NG	***************************************	2.262	1.700	1.829	81
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			TOTALS:	6 904	5,904	6,180	90
*NOTE: 15 AIZ = 4.7			VIALU.	0,007	U,UU4	0,100	σU

\*NOTE: If AK = 1.00, velocity information and measurements are not required.

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BALANCING VALVE TEST REPORT (MANUAL)								
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Project: St. Lukes East Hospital Kitchen / Dining E				Location:	tion: Lee Summit, Missouri			
Tech: DG	System: HHW Date: 6				6/9/2014	6/9/2014		
UNIT DESIGNATION	SYSTEM	MANUFACTURER	MODEL NO.	SIZE (IN.)	DESIGN FLOW (GPM)	VALVE SETTING	DIFF. PRES. (FT)	ACTU/ FLOV (GPM
VAV 3-1	HHW	Bell and Gossett		0.75	3.00	24.0	19.40	3.20
VAV 3-4	HHW	PHASE 2	EP#111111111111111111111111111111111111	·	1.70	<b> </b>	ļi-Xi-X	<u></u>
VAV 3-7	HHW	Bell and Gossett		0.75	1.70	38.0	25.60	1.70
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