



# Manual S Compliance Report

Entire House

J&M Heating and Air Conditioning

Job:  
Date:  
By:

724 Turlington Road, Dunn, NC 28334 Phone: 910 897 5501 Fax: 910 897 0111 License: 17164

## Project Information

For: Harnett County Schools  
125 Alexander Drive, Lillington, NC 28334

## Cooling Equipment

### Design Conditions

Outdoor design DB: 93.2°F	Sensible gain: 18592 Btu/h	Entering coil DB: 76.7°F
Outdoor design WB: 75.1°F	Latent gain: 3235 Btu/h	Entering coil WB: 63.2°F
Indoor design DB: 75.0°F	Total gain: 21828 Btu/h	
Indoor RH: 50%	Estimated airflow: 947 cfm	

### Manufacturer's Performance Data at Actual Design Conditions

Equipment type: Split ASHP		
Manufacturer: Trane	Model: 4TWR4030G1+TEM4A0C37S31++TDR	
Actual airflow: 947 cfm		
Sensible capacity: 23211 Btu/h	125% of load	
Latent capacity: 3861 Btu/h	119% of load	
Total capacity: 27071 Btu/h	124% of load	SHR: 86%

## Heating Equipment

### Design Conditions

Outdoor design DB: 26.4°F	Heat loss: 35685 Btu/h	Entering coil DB: 69.0°F
Indoor design DB: 70.0°F		

### Manufacturer's Performance Data at Actual Design Conditions

Equipment type: Split ASHP			
Manufacturer: Trane	Model: 4TWR4030G1+TEM4A0C37S31++TDR		
Actual airflow: 947 cfm			
Output capacity: 20014 Btu/h	56% of load	Capacity balance: 35 °F	
Supplemental heat required: 15671 Btu/h		Economic balance: -99 °F	

Backup equipment type: Elec strip		
Manufacturer:	Model:	
Actual airflow: 947 cfm		
Output capacity: 10.6 kW	101% of load	Temp. rise: 55 °F

Meets all requirements of ACCA Manual S.





**Project Summary**  
*Entire House*  
**J&M Heating and Air Conditioning**

Job:  
 Date:  
 By:

724 Turlington Road, Dunn, NC 28334 Phone: 910 897 5501 Fax: 910 897 0111 License: 17164

**Project Information**

For: Hamett County Schools  
 125 Alexander Drive, Lillington, NC 28334

Notes:

**Design Information**

Weather: Fayetteville Rgnl G, NC, US

**Winter Design Conditions**

Outside db 26 °F  
 Inside db 70 °F  
 Design TD 44 °F

**Summer Design Conditions**

Outside db 93 °F  
 Inside db 75 °F  
 Design TD 18 °F  
 Daily range M  
 Relative humidity 50 %  
 Moisture difference 38 gr/lb

**Heating Summary**

Structure 31551 Btuh  
 Ducts 4134 Btuh  
 Central vent (0 cfm)  
 (none) 0 Btuh  
 Humidification 0 Btuh  
 Piping 0 Btuh  
 Equipment load 35685 Btuh

**Sensible Cooling Equipment Load Sizing**

Structure 13839 Btuh  
 Ducts 4753 Btuh  
 Central vent (0 cfm)  
 (none) 0 Btuh  
 Blower 0 Btuh  
 Use manufacturer's data n  
 Rate/s wing multiplier 0.98  
 Equipment sensible load 18258 Btuh

**Infiltration**

Method Simplified  
 Construction quality Tight  
 Fireplaces 1 (Average)

**Latent Cooling Equipment Load Sizing**

Structure 2445 Btuh  
 Ducts 790 Btuh  
 Central vent (0 cfm)  
 (none) 0 Btuh  
 Equipment latent load 3235 Btuh

	Heating	Cooling
Area (ft <sup>2</sup> )	1047	1047
Volume (ft <sup>3</sup> )	9423	9423
Air changes/hour	0.33	0.11
Equip. AVF (cfm)	51	17

**Equipment Total Load (Sen+Lat)** 21493 Btuh  
 Req. total capacity at 0.70 SHR 2.2 ton

**Heating Equipment Summary**

Make Trane  
 Trade TRANE  
 Model 4TWR4030G1  
 AHRI ref 205232837  
 Efficiency 8.5 HSPF  
 Heating input 27200 Btuh @ 47°F  
 Heating output 26 °F  
 Temperature rise 947 cfm  
 Actual air flow 0.027 cfm/Btuh  
 Air flow factor 0.40 in H2O  
 Static pressure  
 Space thermostat  
 Capacity balance point = 35 °F  
 Backup:  
 Input = 11 kW, Output = 36077 Btuh, 100 AFUE

**Cooling Equipment Summary**

Make Trane  
 Trade TRANE  
 Cond 4TWR4030G1  
 Coil TEM4A0C37S31++TDR  
 AHRI ref 205232837  
 Efficiency 11.5 EER, 14 SEER  
 Sensible cooling 19880 Btuh  
 Latent cooling 8520 Btuh  
 Total cooling 28400 Btuh  
 Actual air flow 947 cfm  
 Air flow factor 0.051 cfm/Btuh  
 Static pressure 0.40 in H2O  
 Load sensible heat ratio 0.85

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.



**Project Information**

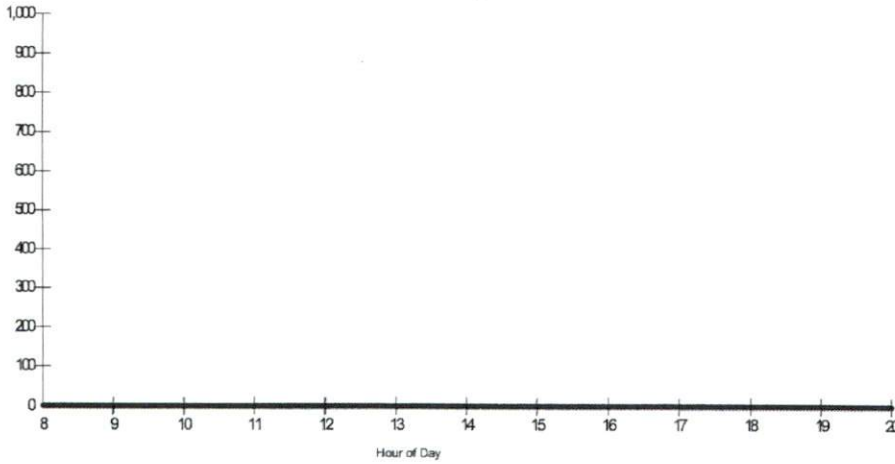
For: Hamett County Schools  
 125 Alexander Drive, Lillington, NC 28334

**Design Conditions**

<b>Location:</b>		<b>Indoor:</b>		<b>Heating</b>	<b>Cooling</b>
Fayetteville Rgnl G, NC, US		Indoor temperature (°F)		70	75
Elevation:	197 ft	Design TD (°F)		44	18
Latitude:	35°N	Relative humidity (%)		50	50
<b>Outdoor:</b>		Moisture difference (gr/lb)		38.7	38.1
	<b>Heating</b>	<b>Cooling</b>	<b>Infiltration:</b>		
Drybulb (°F)	26	93			
Dailyrange (°F)	-	19 (M)			
Wetbulb (°F)	-	75			
Wind speed (mph)	15.0	7.5			

**Test for Adequate Exposure Diversity**

Hourly Glazing Load



Maximum hourly glazing load exceeds average by 0.0%.

House has adequate exposure diversity (AED), based on AED limit of 30%.

AED excursion: 0 Btuh

724 Turlington Road, Dunn, NC 28334 Phone: 910 897 5501 Fax: 910 897 0111 License: 17164

1 Room name		Entire House		office 1														
2 Exposed wall		290.0 ft		68.0 ft														
3 Room height		9.0 ft		9.0 ft														
4 Room dimensions		1047.0 ft²		14.0 x 20.0 ft														
5 Room area				heat/cool														
Ty	Construction number	U-value (Btuh/ft²·F)	Or	HTM (Btuh/ft²)		Area (ft²) or perimeter (ft)		Load (Btuh)		Area (ft²) or perimeter (ft)		Load (Btuh)						
				Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool					
6	W 12D-0sw	0.086	nw	3.75	2.00	423	403	1510	807	180	180	675	361					
	1110	0.380	nw	15.70	10.91	20	20	320	223	0	0	0	0					
	P 12C-0sw	0.091	-	3.97	1.40	2187	2104	8346	2948	432	411	1631	576					
	1110	0.380	n	15.70	10.91	83	83	1309	910	21	21	330	229					
11	C 18B-7md	0.112	-	4.88	8.03	1047	1047	5113	6309	280	280	1367	1687					
	F 22A-vpl	0.969	-	43.12	0.00	1047	290	12505	0	280	68	2932	0					
6	c) AED excursion												0	0				
Envelope loss/gain								29103	11196			6935	2853					
12	a) infiltration												2448	343			1042	146
	b) Room ventilation												0	0			0	0
13	Internal gains:		Occupants @	230			10			2300	2			460				
			Appliances/other							0				0				
Subtotal (lines 6 to 13)								31551	13839			7976	3459					
Less external load								0	0			0	0					
Less transfer								0	0			0	0					
Redistribution								0	0			0	0					
14	Subtotal								31551	13839			7976	3459				
15	Duct loads								13%	34%	4134	4753	13%	34%	1045	1188		
Total room load								35685	18592			9022	4647					
Air required (cfm)								947	947			239	237					

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1 Room name				office 2				office 3					
2 Exposed wall				9.0 ft 54.0 ft heat/cool				9.0 ft 54.0 ft heat/cool					
3 Room height				14.0 x 13.0 ft				13.0 x 14.0 ft					
4 Room dimensions				182.0 ft²				182.0 ft²					
5 Room area													
6 Ty	Construction number	U-value (Btuh/ft²·°F)	Or	HTM (Btuh/ft²)		Area (ft²) or perimeter (ft)		Load (Btuh)		Area (ft²) or perimeter (ft)		Load (Btuh)	
				Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6 W	12D-0sw	0.086	mw	3.75	2.00	117	117	439	234	126	106	396	212
	11D	0.380	mw	15.70	10.91	0	0	0	0	20	20	320	223
P	12C-0sw	0.091	-	3.97	1.40	369	349	1383	489	360	339	1345	475
	11D	0.380	n	15.70	10.91	20	20	320	223	21	21	330	229
11 C	18B-7md	0.112	-	4.88	6.03	182	182	889	1097	182	182	889	1097
	F	0.989	-	43.12	0.00	182	54	2329	0	182	54	2329	0
6	c) AED excursion								0				0
	Envelope loss/gain							5359	2042			5608	2235
12	a) Infiltration							677	95			729	102
	b) Room ventilation							0	0			0	0
13	Internal gains: Occupants @ 230					2			480	2			480
	Appliances/other								0				0
	Subtotal (lines 6 to 13)							6037	2597			6337	2797
	Less external load							0	0			0	0
	Less transfer							0	0			0	0
	Redistribution							0	0			0	0
14	Subtotal							6037	2597			6337	2797
15	Duct loads						13%	791	892	13%	34%	830	961
	Total room load							6828	3489			7168	3758
	Air required (cfm)							181	178			190	191

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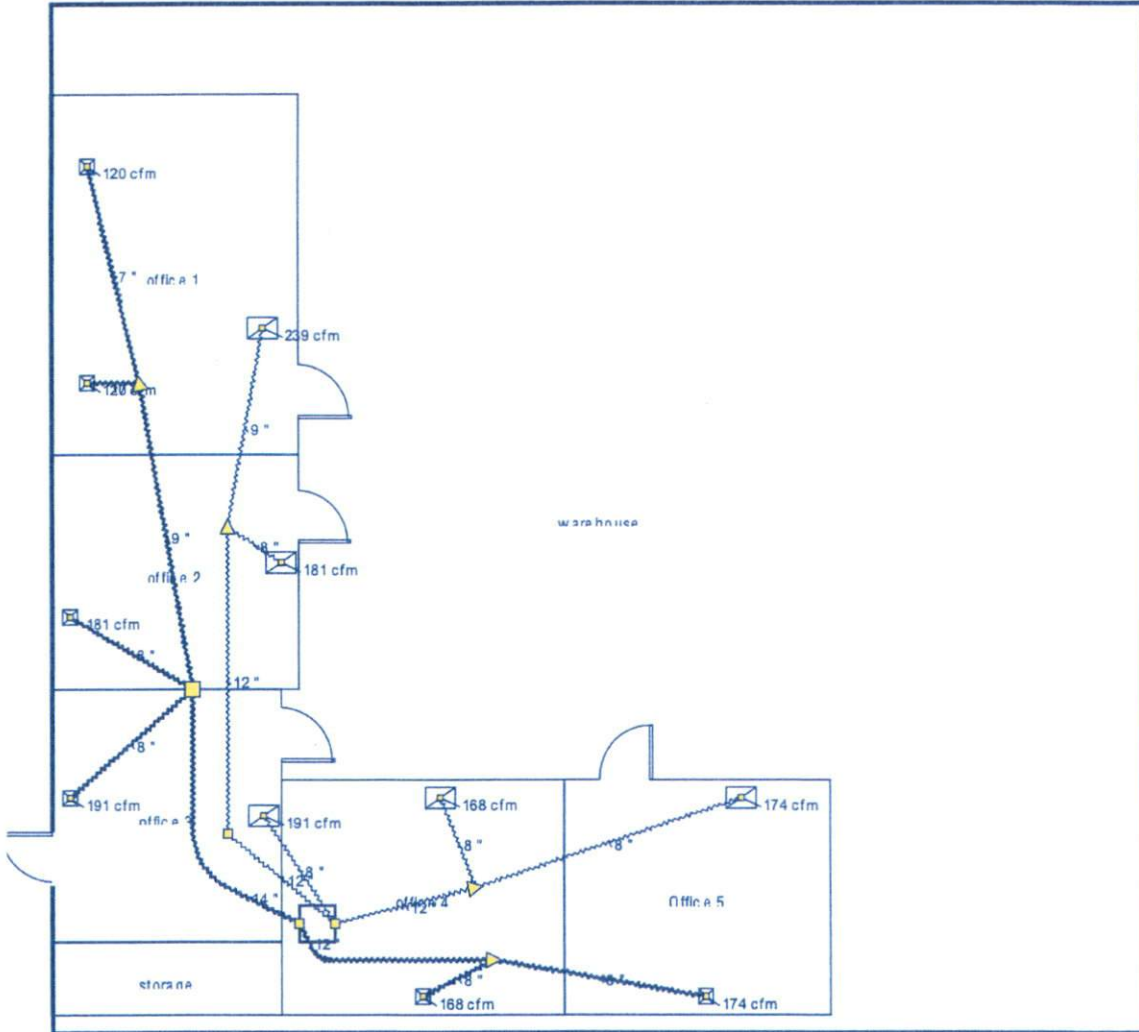
		office 4 9.0 ft 58.0 ft heat/cool 208.0 ft <sup>2</sup> 16.0 x 13.0 ft				Office 5 9.0 ft 56.0 ft heat/cool 195.0 ft <sup>2</sup> 15.0 x 13.0 ft												
1	Room name	Exposed wall	Room height	Room dimensions	Room area	HTM (Btuh/ft <sup>2</sup> )		Area (ft <sup>2</sup> ) or perimeter (ft)		Load (Btuh)		Area (ft <sup>2</sup> ) or perimeter (ft)		Load (Btuh)				
						Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool			
6	W	12D-0sw	0.086	mw	3.75	2.00	0	0	0	0	0	0	0	0	0			
		11D	0.380	nw	15.70	10.81	0	0	0	0	0	0	0	0	0			
	F	12C-0sw	0.091	-	3.97	1.40	522	522	2071	732	504	483	1916	677				
		11D	0.360	n	15.70	10.81	0	0	0	0	21	21	330	229				
11	C	16B-7md	0.112	-	4.88	6.03	208	208	1016	1253	195	195	952	1175				
	F	22A-vpl	0.989	-	43.12	0.00	208	58	2501	0	195	56	2415	0				
6	c) AED excursion																	
Envelope loss/gain										5588	1985			5613	2081			
12	a) Infiltration																	
	b) Room ventilation																	
13	Internal gains:		Occupants @ 230		2				460		2		460					
			Appliances/other						0				0					
Subtotal (lines 6 to 13)										5588	2445			5613	2541			
Less external load										0	0			0	0			
Less transfer										0	0			0	0			
Redistribution										0	0			0	0			
14	Subtotal										5588	2445			5613	2541		
15	Duct loads										13%	34%	732	840	13%	34%	735	873
Total room load										6320	3285			6348	3414			
Air required (cfm)										168	167			168	174			

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.





Level 1



**Job #:**  
**Performed for:**  
Hamett County Schools  
125 Alexander Drive  
Lillington, NC 28334

**J&M Heating and Air Conditioning**

724 Turlington Road  
Dunn, NC 28334  
Phone: 910 897 5501 Fax: 910 897 0111

Scale: 1 : 103

Page 1  
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**Duct System Summary**  
*Entire House*  
**J&M Heating and Air Conditioning**

Job:  
 Date:  
 By:

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**Project Information**

For: Hamett County Schools  
 125 Alexander Drive, Lillington, NC 28334

	Heating	Cooling
External static pressure	0.40 in H2O	0.40 in H2O
Pressure losses	0.06 in H2O	0.06 in H2O
Available static pressure	0.34 in H2O	0.34 in H2O
Supply / return available pressure	0.205 / 0.135 in H2O	0.205 / 0.135 in H2O
Lowest friction rate	0.127 in/100ft	0.127 in/100ft
Actual air flow	947 cfm	947 cfm
Total effective length (TEL)	267 ft	

**Supply Branch Detail Table**

Name	Design (Btuh)	Htg (cfm)	Clg (cfm)	Design FR	Diam (in)	H x W (in)	Duct Mat	Actual Ln (ft)	Ftg. Eqv Ln (ft)	Trunk
Office 5	c 3414	168	174	0.172	8.0	0x0	MFx	24.4	95.0	st2
office 1	h 4511	120	118	0.135	7.0	0x0	MFx	37.0	115.0	st3
office 1-A	h 4511	120	118	0.127	7.0	0x0	MFx	46.3	115.0	st3
office 2	h 6828	181	178	0.171	8.0	0x0	MFx	24.8	95.0	st1
office 3	c 3758	190	191	0.170	8.0	0x0	MFx	25.9	95.0	st1
office 4	h 6320	168	167	0.184	8.0	0x0	MFx	16.7	95.0	st2

**Supply Trunk Detail Table**

Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
st1	Peak AVF	611	606	0.127	571	14.0	0 x 0	VinIFlx	
st2	Peak AVF	336	341	0.172	434	12.0	0 x 0	VinIFlx	
st3	Peak AVF	239	237	0.127	542	9.0	0 x 0	VinIFlx	st1

*Bold/italic values have been manually overridden*





### Return Branch Detail Table

Name	Grille Size (in)	Htg (cfm)	Clg (cfm)	TEL (ft)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Stud/Joist Opening (in)	Duct Matl	Trunk
rb3	0x0	190	191	37.2	0.362	548	8.0	0x 0		VFX	
rb1	0x0	239	237	106.0	0.127	542	9.0	0x 0		VFX	rt3
rb2	0x0	181	178	98.4	0.137	519	8.0	0x 0		VFX	rt3
rb5	0x0	168	174	74.1	0.182	498	8.0	0x 0		VFX	rt2
rb4	0x0	168	167	63.6	0.212	480	8.0	0x 0		VFX	rt2

### Return Trunk Detail Table

Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
rt3	Peak AVF	421	414	0.127	536	12.0	0 x 0	VinIFx	rt1
rt1	Peak AVF	421	414	0.127	536	12.0	0 x 0	VinIFx	
rt2	Peak AVF	336	341	0.182	434	12.0	0 x 0	VinIFx	



**Duct system multi orientation report**  
*Entire House*  
**J&M Heating and Air Conditioning**

Job:  
 Date:  
 By:

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**Project Information**

For: Hamett County Schools  
 125 Alexander Drive, Lillington, NC 28334

**Group 1: ( N, NE, E, SE, S, SW, W, NW)**

Duct Name	(N)			(NE)			(E)			(SE)		
	Reg CFM	Reg Size	Duct Size	Reg CFM	Reg Size	Duct Size	Reg CFM	Reg Size	Duct Size	Reg CFM	Reg Size	Duct Size
<b>Supply Branches</b>												
Office 5	174 c	10x10	8	174 c	10x10	8	174 c	10x10	8	174 c	10x10	8
office 1	120 h	10x10	7	120 h	10x10	7	120 h	10x10	7	120 h	10x10	7
office 1-A	120 h	10x10	7	120 h	10x10	7	120 h	10x10	7	120 h	10x10	7
office 2	181 h	10x10	8	181 h	10x10	8	181 h	10x10	8	181 h	10x10	8
office 3	191 c	10x10	8	191 c	10x10	8	191 c	10x10	8	191 c	10x10	8
office 4	168 h	10x10	8	168 h	10x10	8	168 h	10x10	8	168 h	10x10	8
<b>Supply Trunks</b>												
st1	611 h		14	611 h		14	611 h		14	611 h		14
st2	341 c		12	341 c		12	341 c		12	341 c		12
st3	239 h		9	239 h		9	239 h		9	239 h		9
<b>Return Branches</b>												
rb3	191 c	20x14	8	191 c	20x14	8	191 c	20x14	8	191 c	20x14	8
rb1	239 h	20x14	9	239 h	20x14	9	239 h	20x14	9	239 h	20x14	9
rb2	181 h	20x14	8	181 h	20x14	8	181 h	20x14	8	181 h	20x14	8
rb5	174 c	20x14	8	174 c	20x14	8	174 c	20x14	8	174 c	20x14	8
rb4	168 h	20x14	8	168 h	20x14	8	168 h	20x14	8	168 h	20x14	8
<b>Return Trunks</b>												
rt3	421 h		12	421 h		12	421 h		12	421 h		12
rt1	421 h		12	421 h		12	421 h		12	421 h		12
rt2	341 c		12	341 c		12	341 c		12	341 c		12
<b>Friction Rates</b>												
Heating FR	0.127			0.127			0.127			0.127		
Cooling FR	0.127			0.127			0.127			0.127		



## Project Information

For: Hamett County Schools  
125 Alexander Drive, Lillington, NC 28334

Duct Name	(S)			(SW)			(W)			(NW)		
	Reg CFM	Reg Size	Duct Size	Reg CFM	Reg Size	Duct Size	Reg CFM	Reg Size	Duct Size	Reg CFM	Reg Size	Duct Size
<b>Supply Branches</b>												
Office 5	174 c	10x10	8	174 c	10x10	8	174 c	10x10	8	174 c	10x10	8
office 1	120 h	10x10	7	120 h	10x10	7	120 h	10x10	7	120 h	10x10	7
office 1-A	120 h	10x10	7	120 h	10x10	7	120 h	10x10	7	120 h	10x10	7
office 2	181 h	10x10	8	181 h	10x10	8	181 h	10x10	8	181 h	10x10	8
office 3	191 c	10x10	8	191 c	10x10	8	191 c	10x10	8	191 c	10x10	8
office 4	168 h	10x10	8	168 h	10x10	8	168 h	10x10	8	168 h	10x10	8
<b>Supply Trunks</b>												
st1	611 h		14	611 h		14	611 h		14	611 h		14
st2	341 c		12	341 c		12	341 c		12	341 c		12
st3	239 h		9	239 h		9	239 h		9	239 h		9
<b>Return Branches</b>												
rb3	191 c	20x14	8	191 c	20x14	8	191 c	20x14	8	191 c	20x14	8
rb1	239 h	20x14	9	239 h	20x14	9	239 h	20x14	9	239 h	20x14	9
rb2	181 h	20x14	8	181 h	20x14	8	181 h	20x14	8	181 h	20x14	8
rb5	174 c	20x14	8	174 c	20x14	8	174 c	20x14	8	174 c	20x14	8
rb4	168 h	20x14	8	168 h	20x14	8	168 h	20x14	8	168 h	20x14	8
<b>Return Trunks</b>												
rt3	421 h		12	421 h		12	421 h		12	421 h		12
rt1	421 h		12	421 h		12	421 h		12	421 h		12
rt2	341 c		12	341 c		12	341 c		12	341 c		12
<b>Friction Rates</b>												
Heating FR	0.127			0.127			0.127			0.127		
Cooling FR	0.127			0.127			0.127			0.127		



## Project Information

For: Harnett County Schools  
125 Alexander Drive, Lillington, NC 28334

Duct Name	Largest			Smallest		
	Reg CFM	Reg Size	Duct Size	Reg CFM	Reg Size	Duct Size
<b>Supply Branches</b>						
Office 5	174 c	10x10	8	174 c	10x10	8
office 1	120 h	10x10	7	120 h	10x10	7
office 1-A	120 h	10x10	7	120 h	10x10	7
office 2	181 h	10x10	8	181 h	10x10	8
office 3	191 c	10x10	8	191 c	10x10	8
office 4	168 h	10x10	8	168 h	10x10	8
<b>Supply Trunks</b>						
st1	611 h		14	611 h		14
st2	341 c		12	341 c		12
st3	239 h		9	239 h		9
<b>Return Branches</b>						
rb3	191 c	20x14	8	191 c	20x14	8
rb1	239 h	20x14	9	239 h	20x14	9
rb2	181 h	20x14	8	181 h	20x14	8
rb5	174 c	20x14	8	174 c	20x14	8
rb4	168 h	20x14	8	168 h	20x14	8
<b>Return Trunks</b>						
rt3	421 h		12	421 h		12
rt1	421 h		12	421 h		12
rt2	341 c		12	341 c		12
<b>Friction Rates</b>						
Heating FR	0.127			0.127		
Cooling FR	0.127			0.127		



## Background Color Legend

### Yellow background

- Duct Size - duct size is smaller than the largest duct size in the row
- Reg Size - register size is smaller than the largest register size in the row
- Reg CFM - register design cfm is larger than 150 CFM
- Friction Rate - friction rate is outside ACCA Manual-D recommended range (0.06 - 0.18)

### Pink background column header

- Largest cooling load orientation



# Static Pressure and Friction Rate

Entire House

J&M Heating and Air Conditioning

Job:

Date:

By:

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## Project Information

For: Hamett County Schools  
125 Alexander Drive, Lillington, NC 28334

## Available Static Pressure

	Heating (in H2O)	Cooling (in H2O)
External static pressure	0.40	0.40
Pressure losses		
Coil	0	0
Heat exchanger	0	0
Supply diffusers	0.03	0.03
Return grilles	0.03	0.03
Filter	0	0
Humidifier	0	0
Balancing damper	0	0
Other device	0	0
Available static pressure	0.34	0.34

## Total Effective Length

	Supply (ft)	Return (ft)
Measured length of run-out	12	11
Measured length of trunk	34	25
Equivalent length of fittings	115	70
Total length	161	106
Total effective length		267

## Friction Rate

	Heating (in/100ft)		Cooling (in/100ft)	
Supply Ducts	0.127	OK	0.127	OK
Return Ducts	0.127	OK	0.127	OK

## Fitting Equivalent Length Details

Supply 4X=35, 11M=20, 11A=20, 1A=35, 11G=5: TotalEL=115  
Return 11M=20, 6M=20, 11M=20, 5E1=10: TotalEL=70

