



Duct system multi orientation report

Entire House

Barra Designs, LLC.

Job: Manual D Sample
 Date:
 By: db

72 Albermarle Ave, New Rochelle, NY 10801 Phone: 914-908-0896 Email: info@barradesigns.com

Project Information

For: Manual D Sample
 72 Albermarle Ave, New Rochelle, NY 10801
 Phone: 914-908-0896
 Email: info@barradesigns.com

Group 1: (N) Group 2: (NE, W) Group 3: (E) Group 4: (SE) Group 5: (S) Group 6: (SW) Group 7: (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
Supply Branches												
Base Living	100 c	12x4	5	129 c	12x4	6	145 c	12x4	6	138 c	12x4	6
Bath	41 h	12x4	4	45 h	12x4	4	46 h	12x4	4	49 h	12x4	4
Bath 2	66 h	12x4	5	72 h	12x4	5	74 h	12x4	5	79 h	12x4	5
Bath 3	27 h	12x4	4	29 h	12x4	4	30 h	12x4	4	32 h	12x4	4
Bed 1	87 h	12x4	5	105 c	12x4	6	125 c	12x4	6	114 c	12x4	6
Bed 2	89 h	12x4	5	106 c	12x4	6	118 c	12x4	6	123 c	12x4	6
Bed 3	137 h	12x4	6	170 c	12x4	7	195 c	12x4	7	187 c	12x4	7
Bed 5	84 h	12x4	5	92 h	12x4	6	94 h	12x4	6	100 h	12x4	6
Dine + Kit	122 h	12x4	6	134 h	12x4	7	138 h	12x4	7	146 h	12x4	7
Entry	61 h	12x4	5	68 h	12x4	6	69 h	12x4	6	74 h	12x4	6
Laundry	57 h	12x4	5	63 h	12x4	5	65 h	12x4	5	69 h	12x4	5
Master	91 c	12x4	6	98 c	12x4	6	102 c	12x4	6	96 c	12x4	6
Master-A	91 c	12x4	6	98 c	12x4	6	102 c	12x4	6	96 c	12x4	6
Open Kit + Living	75 c	12x4	6	79 c	12x4	6	74 c	12x4	6	82 c	12x4	6
Open Kit + Living-A	75 c	12x4	6	79 c	12x4	6	74 c	12x4	6	82 c	12x4	6
Open Kit + Living-B	75 c	12x4	6	79 c	12x4	6	74 c	12x4	6	82 c	12x4	6
Open Kit + Living-C	75 c	12x4	5	79 c	12x4	6	74 c	12x4	5	82 c	12x4	6
Supply Trunks												
st2	312 h		9x8	344 h		9x8	352 h		9x8	375 h		10x8
st5	61 h		4x8	68 h		4x8	69 h		4x8	74 h		4x8
st4A	253 c		8x8	265 c		9x8	250 c		8x8	194 h		7x8
st6	149 c		6x8	159 c		6x8	148 c		6x8	164 c		6x8
st4	510 c		14x8	541 c		15x8	527 c		14x8	550 c		15x8
st1	312 h		8x8	381 c		9x8	438 c		10x8	424 c		9x8
st1A	137 h		4x8	170 c		5x8	195 c		5x8	187 c		5x8
st3	180 c		5x8	197 c		5x8	206 c		6x8	221 c		6x8
st2A	84 h		4x8	93 h		4x8	95 h		4x8	101 h		4x8
Return Branches												
rb2	504 c	24x24	12	578 c	24x24	13	583 c	24x24	13	626 c	24x24	13
rb3	365 c	24x24	10	408 c	24x24	11	434 c	24x24	11	433 c	24x24	11
rb1	343 h	24x24	10	379 h	24x24	10	388 h	24x24	10	412 h	24x24	11
Friction Rates												
Heating FR	0.075			0.075			0.075			0.075		
Cooling FR	0.075			0.075			0.075			0.075		

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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
Supply Branches												
Base Living	105 c	12x4	5	122 c	12x4	6	126 c	12x4	6	115 c	12x4	6
Bath	43 h	12x4	4	46 h	12x4	4	45 h	12x4	4	44 h	12x4	4
Bath 2	68 h	12x4	5	73 h	12x4	5	72 h	12x4	5	71 h	12x4	5
Bath 3	28 h	12x4	4	30 h	12x4	4	29 h	12x4	4	29 h	12x4	4
Bed 1	91 h	12x4	5	100 c	12x4	6	107 c	12x4	6	94 h	12x4	6
Bed 2	93 h	12x4	6	99 h	12x4	6	98 h	12x4	6	96 h	12x4	6
Bed 3	143 c	12x4	7	165 c	12x4	7	172 c	12x4	7	154 c	12x4	7
Bed 5	88 h	12x4	5	94 h	12x4	6	93 h	12x4	6	91 h	12x4	6
Dine + Kit	128 h	12x4	7	137 h	12x4	7	135 h	12x4	7	132 h	12x4	7
Entry	64 h	12x4	6	69 h	12x4	6	68 h	12x4	6	67 h	12x4	6
Laundry	60 h	12x4	5	64 h	12x4	5	64 h	12x4	5	62 h	12x4	5
Master	82 h	12x4	6	99 c	12x4	6	111 c	12x4	6	105 c	12x4	6
Master-A	82 h	12x4	6	99 c	12x4	6	111 c	12x4	6	105 c	12x4	6
Open Kit + Living	80 c	12x4	6	87 c	12x4	6	82 c	12x4	6	78 c	12x4	6
Open Kit + Living-A	80 c	12x4	6	87 c	12x4	6	82 c	12x4	6	78 c	12x4	6
Open Kit + Living-B	80 c	12x4	6	87 c	12x4	6	82 c	12x4	6	78 c	12x4	6
Open Kit + Living-C	80 c	12x4	6	87 c	12x4	6	82 c	12x4	6	78 c	12x4	6
Supply Trunks												
st2	327 h		9x8	350 h		9x8	345 h		9x8	339 h		9x8
st5	64 h		4x8	69 h		4x8	68 h		4x8	67 h		4x8
st4A	188 c		7x8	201 c		7x8	273 c		9x8	264 c		9x8
st6	160 c		6x8	175 c		6x8	164 c		6x8	157 c		6x8
st4	508 c		14x8	573 c		15x8	576 c		15x8	552 c		15x8
st1	325 h		8x8	358 c		8x8	376 c		9x8	338 h		8x8
st1A	143 c		4x8	165 c		5x8	172 c		5x8	154 c		5x8
st3	191 c		5x8	196 c		5x8	188 c		5x8	193 c		5x8
st2A	88 h		4x8	94 h		4x8	93 h		4x8	91 h		4x8
Return Branches												
rb2	545 c	24x24	12	596 c	24x24	13	575 c	24x24	13	551 c	24x24	12
rb3	373 h	24x24	10	408 c	24x24	11	428 c	24x24	11	410 c	24x24	11
rb1	360 h	24x24	10	385 h	24x24	10	380 h	24x24	10	373 h	24x24	10
Friction Rates												
Heating FR	0.075			0.075			0.075			0.075		
Cooling FR	0.075			0.075			0.075			0.075		

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Duct Name	Largest			Smallest		
	Reg CFM	Reg Size	Duct Size	Reg CFM	Reg Size	Duct Size
Supply Branches						
Base Living	145 c	12x4	6	100 c	12x4	5
Bath	49 h	12x4	4	41 h	12x4	4
Bath 2	79 h	12x4	5	66 h	12x4	5
Bath 3	32 h	12x4	4	27 h	12x4	4
Bed 1	125 c	12x4	6	87 h	12x4	5
Bed 2	123 c	12x4	6	89 h	12x4	5
Bed 3	195 c	12x4	7	137 h	12x4	6
Bed 5	100 h	12x4	6	84 h	12x4	5
Dine + Kit	146 h	12x4	7	122 h	12x4	6
Entry	74 h	12x4	6	61 h	12x4	5
Laundry	69 h	12x4	5	57 h	12x4	5
Master	111 c	12x4	6	82 h	12x4	6
Master-A	111 c	12x4	6	82 h	12x4	6
Open Kit + Living	87 c	12x4	6	74 c	12x4	6
Open Kit + Living-A	87 c	12x4	6	74 c	12x4	6
Open Kit + Living-B	87 c	12x4	6	74 c	12x4	6
Open Kit + Living-C	87 c	12x4	6	74 c	12x4	5
Supply Trunks						
st2	375 h		10x8	312 h		9x8
st5	74 h		4x8	61 h		4x8
st4A	273 c		9x8	188 c		7x8
st6	175 c		6x8	148 c		6x8
st4	576 c		15x8	508 c		14x8
st1	438 c		10x8	312 h		8x8
st1A	195 c		5x8	137 h		4x8
st3	221 c		6x8	180 c		5x8
st2A	101 h		4x8	84 h		4x8
Return Branches						
rb2	626 c	24x24	13	504 c	24x24	12
rb3	434 c	24x24	11	365 c	24x24	10
rb1	412 h	24x24	11	343 h	24x24	10
Friction Rates						
Heating FR	0.075			0.075		
Cooling FR	0.075			0.075		



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
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Available Static Pressure

	Heating (in H2O)	Cooling (in H2O)
External static pressure	0.60	0.60
Pressure losses		
Coil	0.07	0.07
Heat exchanger	0.05	0.05
Supply diffusers	0.03	0.03
Return grilles	0.03	0.03
Filter	0.10	0.10
Humidifier	0	0
Balancing damper	0.03	0.03
Other device	0	0
Available static pressure	0.29	0.29

Total Effective Length

	Supply (ft)	Return (ft)
Measured length of run-out	14	12
Measured length of trunk	31	0
Equivalent length of fittings	260	70
Total length	304	82
Total effective length		386

Friction Rate

	Heating (in/100ft)		Cooling (in/100ft)	
Supply Ducts	0.075	OK	0.075	OK
Return Ducts	0.075	OK	0.075	OK

Fitting Equivalent Length Details

Supply 8B3=20, 4AD=60, 8B3=20, 9K=65, 12H1=20, 8B3=20, 8B3=20, 1C=35: TotalEL=260
 Return 8AE=10, 6M=20, 5D=40: TotalEL=70



Duct System Summary
Entire House
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	Heating	Cooling
External static pressure	0.60 in H2O	0.60 in H2O
Pressure losses	0.31 in H2O	0.31 in H2O
Available static pressure	0.29 in H2O	0.29 in H2O
Supply / return available pressure	0.228 / 0.062 in H2O	0.228 / 0.062 in H2O
Lowest friction rate	0.075 in/100ft	0.075 in/100ft
Actual air flow	1303 cfm	1303 cfm
Total effective length (TEL)	386 ft	

Supply Branch Detail Table

Name	Design (Btuh)	Htg (cfm)	Clg (cfm)	Design FR	Diam (in)	H x W (in)	Duct Matl	Actual Ln (ft)	Ftg.Eqv Ln (ft)	Trunk
Base Living	c 2853	60	126	0.194	6.0	0x0	ShMt	12.8	105.0	st3
Bath	h 1827	45	17	0.137	4.0	0x0	ShMt	16.5	150.0	st2
Bath 2	h 2900	72	35	0.135	5.0	0x0	ShMt	29.3	140.0	st2
Bath 3	h 1185	29	15	0.101	4.0	0x0	ShMt	36.3	190.0	st2A
Bed 1	c 2425	96	107	0.156	6.0	0x0	ShMt	16.8	130.0	st1
Bed 2	h 3960	98	97	0.147	6.0	0x0	ShMt	15.3	140.0	st1
Bed 3	c 3899	149	172	0.140	7.0	0x0	ShMt	28.5	135.0	st1A
Bed 5	h 3738	93	63	0.141	6.0	0x0	ShMt	21.5	140.0	st3
Dine + Kit	h 5447	135	69	0.114	7.0	0x0	ShMt	30.5	170.0	st2
Entry	h 2740	68	27	0.075	6.0	0x0	ShMt	44.3	260.0	st5
Laundry	h 2566	64	27	0.104	5.0	0x0	ShMt	44.8	175.0	st2A
Master	c 2517	87	111	0.106	6.0	0x0	ShMt	34.5	180.0	st4
Master-A	c 2517	87	111	0.107	6.0	0x0	ShMt	43.3	170.0	st4
Open Kit + Living	c 1857	56	82	0.086	6.0	0x0	ShMt	36.0	230.0	st6
Open Kit + Living-A	c 1857	56	82	0.091	6.0	0x0	ShMt	39.8	210.0	st4A
Open Kit + Living-B	c 1857	56	82	0.077	6.0	0x0	ShMt	32.0	265.0	st6
Open Kit + Living-C	c 1857	56	82	0.105	6.0	0x0	ShMt	27.5	190.0	st4

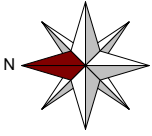
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Supply Trunk Detail Table

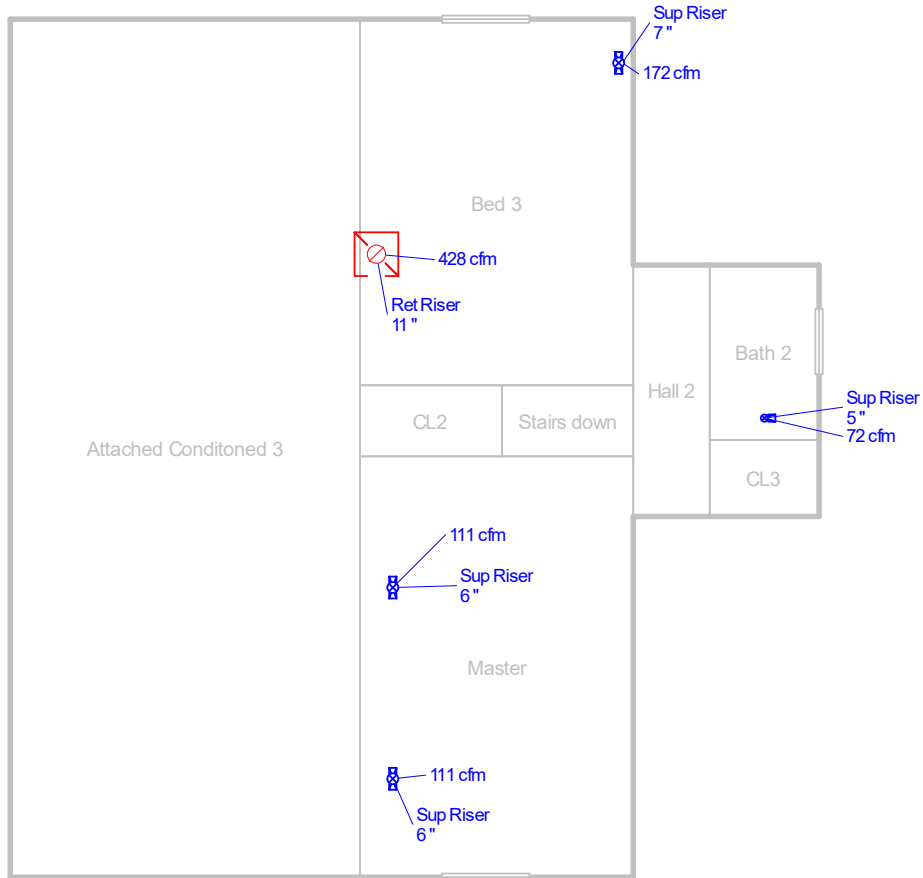
Name	Trunk Type	Htg (cfm)	Clg (cfm)	Design FR	Veloc (fpm)	Diam (in)	H x W (in)	Duct Material	Trunk
st2	Peak AVF	345	163	0.101	690	9.2	8 x 9	ShtMetl	
st5	Peak AVF	68	27	0.075	305	5.3	8 x 4	ShtMetl	st4A
st4A	Peak AVF	235	273	0.075	545	9.0	8 x 9	ShtMetl	st4
st6	Peak AVF	111	164	0.077	491	7.4	8 x 6	ShtMetl	st4A
st4	Peak AVF	463	576	0.075	691	11.9	8 x 15	ShtMetl	
st1	Peak AVF	343	376	0.140	752	8.9	8 x 9	ShtMetl	
st1A	Peak AVF	149	172	0.140	618	6.7	8 x 5	ShtMetl	st1
st3	Peak AVF	152	188	0.141	678	6.9	8 x 5	ShtMetl	
st2A	Peak AVF	93	43	0.101	418	5.7	8 x 4	ShtMetl	st2

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
rb2	0x 0	529	575	64.5	0.095	624	13.0	0x 0		ShMt	
rb3	0x 0	394	428	82.0	0.075	649	11.0	0x 0		ShMt	
rb1	0x 0	380	300	64.0	0.096	696	10.0	0x 0		ShMt	



Level 2



**Job #: Manual D Sample
Performed by db for:**

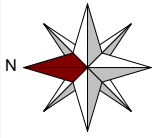
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Scale: 1 : 105

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Level 1



**Job #: Manual D Sample
Performed by db for:**

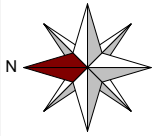
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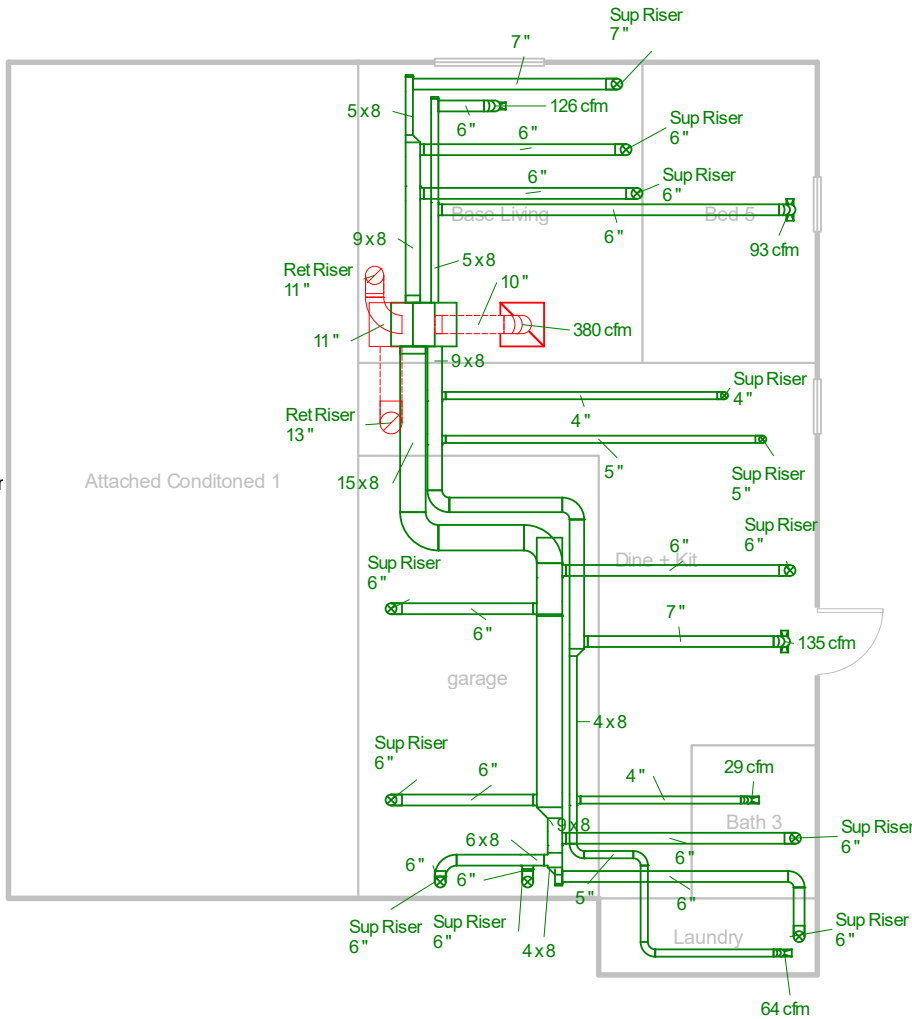
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Basement

- Max Trunk height 8"
- All trunk +branch ducts are fabricated from 26 gauge sheet metal.
- Trunk duct install below 1st floor joist. Branch duct ran between floor joist in basement.
- Branch duct connect to all existing duct riser for 1st floor and 2nd floor
- R8 fibreglas duct insulation in unconditioned space (garage). R4 in conditioned space .
- All new duct seal with fiber reinforced water based duct sealant.



Trunk duct in soffits below ceiling (garage_bsmnt lining)

Register and Diffuser are wall mount for 1st floor and 2nd floor. Register for basement level is ceiling mount

Penetration will be seal with fireblock foam or fire barrier sealant

No cut or notch to install trunk duct or branch duct

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