

SITE NAME: TRINIGROUP		WOB		GFA: 2613		DATE: Sep-23		WINTER NATURAL AIR CHANGE RATE 0.377		HEAT LOSS ΔT °F. 78		CSA-F280-12	
BUILDER: GREENPARK HOMES		TYPE: VILLA 3				LO# 102635		SUMMER NATURAL AIR CHANGE RATE 0.118		HEAT GAIN ΔT °F. 13		SB-12 PACKAGE A1	
ROOM USE		MBR	ENS	WIC	BED-2	BED-3	BED-4	BATH	HALL		ENS-2		
EXP. WALL		30	29	5	29	33	11	5	13		6		
CLG. HT.		9	9	9	9	9	9	9	9		9		
FACTORS													
GRS.WALL AREA	LOSS GAIN	273	264	46	264	300	100	46	118		55		
GLAZING		LOSS GAIN	LOSS GAIN	LOSS GAIN	LOSS GAIN	LOSS GAIN	LOSS GAIN	LOSS GAIN	LOSS GAIN		LOSS GAIN		
NORTH	21.8 16.0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		0 0 0		
EAST	21.8 41.6	0 0 0	0 0 0	0 0 0	52 1133 2161	41 893 1704	0 0 0	0 0 0	0 0 0		0 0 0		
SOUTH	21.8 24.9	0 0 0	15 327 373	0 0 0	0 0 0	0 0 0	18 392 448	0 0 0	18 392 448		7 152 174		
WEST	21.8 41.6	18 392 748	16 349 665	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		0 0 0		
SKYLT.	38.1 101.5	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		0 0 0		
DOORS	20.5 3.4	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		0 0 0		
NET EXPOSED WALL	4.6 0.8	255 1165 192	233 1064 175	46 208 34	212 968 159	259 1185 195	82 375 62	46 208 34	100 458 75		48 217 36		
NET EXPOSED BSMT WALL ABOVE GR	3.7 0.6	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		0 0 0		
EXPOSED CLG	1.3 0.6	274 360 161	168 221 99	41 54 24	145 190 85	154 202 90	181 238 106	69 91 41	276 363 162		50 66		
NO ATTIC EXPOSED CLG	2.8 1.3	0 0 0	0 0 0	0 0 0	36 101 45	19 53 24	0 0 0	0 0 0	0 0 0		0 0 0		
EXPOSED FLOOR	2.6 0.4	0 0 0	0 0 0	0 0 0	181 473 78	50 131 21	0 0 0	50 131 21	54 141 23		0 0 0		
BASEMENT/CRAWL HEAT LOSS		0	0	0	0	0	0	0	0		0		
SLAB ON GRADE HEAT LOSS		0	0	0	0	0	0	0	0		0		
SUBTOTAL HT LOSS		1917	1960	262	2865	2464	1005	429	1354		436		
SUB TOTAL HT GAIN			1101	1312	58	2528	2034	616	709		239		
LEVEL FACTOR / MULTIPLIER	0.20 0.28		0.20 0.28	0.20 0.28	0.20 0.28	0.20 0.28	0.20 0.28	0.20 0.28	0.20 0.28		0.20 0.28		
AIR CHANGE HEAT LOSS		532	544	73	795	684	279	119	376		121		
AIR CHANGE HEAT GAIN		80	95	4	183	147	45	7	51		17		
DUCT LOSS		0	0	0	366	315	0	55	173		0		
DUCT GAIN		0	0	0	348	295	0	10	76		0		
HEAT GAIN PEOPLE	240	2	480	0	1	240	1	240	0		0		
HEAT GAIN APPLIANCES/LIGHTS			533	0	533	533	533	0	0		0		
TOTAL HT LOSS BTU/H		2449	2504	334	4026	3463	1284	603	1903		557		
TOTAL HT GAIN x 1.3 BTU/H			2851	1829	81	4983	4225	148	1087		334		

City of Richmond Hill
Building Division

HVAC REVIEWED

Initials:

PXV

ROOM USE		DIN	KT/BF	FAM	LAUN	PWD	FOY	MUD		WOB	BAS
EXP. WALL		21	36	36	9	7	49	22		38	132
CLG. HT.		10	10	10	9	10	10	10		9	9
FACTORS											
GRS.WALL AREA	LOSS GAIN	212	364	364	82	71	495	222		323	726
GLAZING		LOSS GAIN	LOSS GAIN	LOSS GAIN	LOSS GAIN	LOSS GAIN	LOSS GAIN	LOSS GAIN		LOSS GAIN	LOSS GAIN
NORTH	21.8 16.0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		59 1285 942	3 65 48
EAST	21.8 41.6	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	22 479 914	0 0 0		0 0 0	0 0 0
SOUTH	21.8 24.9	25 545 622	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		0 0 0	6 131 149
WEST	21.8 41.6	0 0 0	61 1329 2535	22 479 914	0 0 0	0 0 0	0 0 0	0 0 0		0 0 0	0 0 0
SKYLT.	38.1 101.5	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		0 0 0	0 0 0
DOORS	20.5 3.4	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	22 452 74	21 431 71		0 0 0	21 431 71
NET EXPOSED WALL	4.6 0.8	187 855 141	303 1382 227	342 1561 257	82 374 62	71 323 53	451 2060 339	201 919 151		264 1206 198	0 0 0
NET EXPOSED BSMT WALL ABOVE GR	3.7 0.6	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		0 0 0	396 1459 240
EXPOSED CLG	1.3 0.6	0 0 0	0 0 0	0 0 0	86 113 51	0 0 0	0 0 0	0 0 0		0 0 0	0 0 0
NO ATTIC EXPOSED CLG	2.8 1.3	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		0 0 0	0 0 0
EXPOSED FLOOR	2.6 0.4	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		0 0 0	0 0 0
BASEMENT/CRAWL HEAT LOSS		0	0	0	0	0	0	0		0	2286
SLAB ON GRADE HEAT LOSS		0	0	0	0	0	0	0		0	0
SUBTOTAL HT LOSS		1399	2711	2040	487	323	2991	1350		460	4372
SUB TOTAL HT GAIN			763	2762	1171	53	1327	222		2951	508
LEVEL FACTOR / MULTIPLIER	0.30 0.51		0.30 0.51	0.30 0.51	0.20 0.28	0.30 0.51	0.30 0.51	0.30 0.51		1141	0.50 1.25
AIR CHANGE HEAT LOSS		710	1376	1035	135	164	1517	685			9145
AIR CHANGE HEAT GAIN		55	200	85	8	4	96	16			119
DUCT LOSS		0	0	0	0	0	0	0		0	0
DUCT GAIN		0	0	0	0	0	0	0		0	0
HEAT GAIN PEOPLE	240	0	0	0	0	0	0	0		0	0
HEAT GAIN APPLIANCES/LIGHTS			533	533	533	533	0	0		0	533
TOTAL HT LOSS BTU/H		2109	4087	3075	622	487	4508	2035		2951	13517
TOTAL HT GAIN x 1.3 BTU/H			1757	4544	2325	849	74	310		1483	1509

TOTAL HEAT GAIN BTU/H:

32379

TONS: 2.70

LOSS DUE TO VENTILATION LOAD BTU/H: 1670

STRUCTURAL HEAT LOSS: 50515

TOTAL COMBINED HEAT LOSS BTU/H: 52185

SITE NAME: TRINIGROUP
BUILDER: GREENPARK HOMES

WOB
TYPE: VILLA 3

DATE: Sep-23

GFA: 2613 LO# 102635

HEATING CFM 978 COOLING CFM 978
TOTAL HEAT LOSS 50,515 TOTAL HEAT GAIN 32,104
AIR FLOW RATE CFM 19.36 AIR FLOW RATE CFM 30.46

furnace pressure 0.7
furnace filter 0.14
a/c coil pressure 0.24
available pressure
for s/a & r/a 0.32

#GOODMAN
GMEC960603BNA 60
FAN SPEED LOW

AFUE = 96 %
INPUT (BTU/H) = 60,000
OUTPUT (BTU/H) = 57,600

RUN COUNT	4th	3rd	2nd	1st	Bas
S/A	0	0	14	8	5
R/A	0	0	5	1	1

plenium pressure s/a 0.17
max s/a dif press. loss 0.02
min adjusted pressure s/a 0.15
r/a pressure 0.15
r/a grille press. Loss 0.02
adjusted pressure r/a 0.13

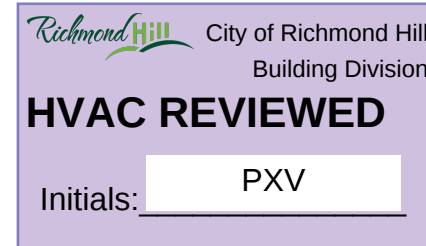
MEDLOW 978
MEDIUM 1017
MEDIUM HIGH 1131
HIGH

DESIGN CFM = 978
CFM @ .7" E.S.P.

All S/A diffusers 4"x10" unless noted otherwise on layout.
All S/A runs 5"Ø unless noted otherwise on layout.

RUN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
ROOM NAME	MBR	ENS	WIC	BED-2	BED-3	BED-4	BATH	HALL	BED-2	MBR	ENS-2	BED-3	DIN	KT/BF	KT/BF	FAM	LAUN	PWD	FOY	MUD	BAS	BAS	BAS	BAS
RM LOSS MBH	1.22	1.25	0.33	2.01	1.73	1.28	0.60	1.90	2.01	1.22	0.56	1.73	2.11	2.04	2.04	1.54	0.62	0.49	4.51	2.04	3.29	3.29	3.29	3.29
CFM PER RUN HEAT	24	24	6	39	34	25	12	37	39	24	11	34	41	40	40	30	12	9	87	39	64	64	64	64
RM GAIN MBH	1.43	0.91	0.08	2.49	2.11	1.86	0.15	1.09	2.49	1.43	0.33	2.11	1.76	2.27	2.27	1.16	0.85	0.07	1.85	0.31	0.60	0.60	0.60	0.60
CFM PER RUN COOLING	43	28	2	76	64	57	4	33	76	43	10	64	54	69	69	35	26	2	56	9	18	18	18	18
ADJUSTED PRESSURE	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.15	0.16	0.16	0.16	0.16	0.16
ACTUAL DUCT LGH	35	48	30	48	56	38	44	36	51	39	34	60	18	23	30	36	36	20	37	12	45	19	16	33
EQUIVALENT LENGTH	180	210	150	130	170	170	170	120	140	180	180	200	90	130	130	160	140	150	100	130	120	100	80	130
TOTAL EFFECTIVE LENGTH	215	258	180	178	226	208	214	156	191	219	214	260	108	153	160	196	176	170	137	142	165	119	96	163
ADJUSTED PRESSURE	0.07	0.06	0.09	0.09	0.07	0.08	0.07	0.1	0.08	0.07	0.07	0.06	0.14	0.1	0.1	0.08	0.09	0.09	0.11	0.11	0.09	0.13	0.16	0.1
ROUND DUCT SIZE	5	4	4	6	6	6	4	4	6	5	4	6	5	5	5	4	4	4	6	4	5	5	5	5
HEATING VELOCITY (ft/min)	176	275	69	199	173	127	138	424	199	176	126	173	301	294	294	344	138	103	444	447	470	470	470	470
COOLING VELOCITY (ft/min)	316	321	23	388	326	291	46	379	388	316	115	326	396	507	507	402	298	23	286	103	132	132	132	132
OUTLET GRILL SIZE	3X10	3X10	3X10	4X10	4X10	4X10	3X10	3X10	4X10	3X10	3X10	4X10	3X10	3X10	3X10	3X10	3X10	3X10	4X10	3X10	3X10	3X10	3X10	3X10
TRUNK	A	A	C	E	D	B	E	E	E	A	B	D	C	A	A	A	C	E	D	C	B	B	C	D

RUN #	25	26	27
ROOM NAME	BAS	FAM	ENS
RM LOSS MBH	3.29	1.54	1.25
CFM PER RUN HEAT	64	30	24
RM GAIN MBH	0.60	1.16	0.91
CFM PER RUN COOLING	18	35	28
ADJUSTED PRESSURE	0.16	0.16	0.16
ACTUAL DUCT LGH	38	27	36
EQUIVALENT LENGTH	140	150	160
TOTAL EFFECTIVE LENGTH	178	177	196
ADJUSTED PRESSURE	0.09	0.09	0.08
ROUND DUCT SIZE	5	4	4
HEATING VELOCITY (ft/min)	470	344	275
COOLING VELOCITY (ft/min)	132	402	321
OUTLET GRILL SIZE	3X10	3X10	3X10
TRUNK	B	A	B



SUPPLY AIR TRUNK SIZE

	TRUNK CFM	STATIC PRESS.	ROUND DUCT	RECT DUCT	VELOCITY (ft/min)		TRUNK CFM	STATIC PRESS.	ROUND DUCT	RECT DUCT	VELOCITY (ft/min)
TRUNK A	212	0.06	8.4	12	x 8	318	TRUNK G	0	0.00	0	0 x 8
TRUNK B	464	0.06	11.3	16	x 8	522	TRUNK H	0	0.00	0	0 x 8
TRUNK C	626	0.06	12.6	20	x 8	563	TRUNK I	0	0.00	0	0 x 8
TRUNK D	219	0.06	8.5	8	x 8	493	TRUNK J	0	0.00	0	0 x 8
TRUNK E	355	0.06	10.2	14	x 8	456	TRUNK K	0	0.00	0	0 x 8
TRUNK F	0	0.00	0	0	x 8	0	TRUNK L	0	0.00	0	0 x 8

RETURN AIR TRUNK SIZE

	TRUNK CFM	STATIC PRESS.	ROUND DUCT	RECT DUCT	VELOCITY (ft/min)
TRUNK O	0	0.05	0	0 x 8	0
TRUNK P	0	0.05	0	0 x 8	0
TRUNK Q	0	0.05	0	0 x 8	0
TRUNK R	0	0.05	0	0 x 8	0
TRUNK S	0	0.05	0	0 x 8	0
TRUNK T	0	0.05	0	0 x 8	0
TRUNK U	0	0.05	0	0 x 8	0
TRUNK V	0	0.05	0	0 x 8	0
TRUNK W	0	0.05	0	0 x 8	0
TRUNK X	978	0.05	15.6	28 x 8	629
TRUNK Y	628	0.05	13.3	20 x 8	565
TRUNK Z	170	0.05	8.1	8 x 8	383
DROP	978	0.05	15.6	24 x 10	887

RETURN AIR #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
AIR VOLUME	90	85	85	100	85	373	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PLENUM PRESSURE	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
ACTUAL DUCT LGH	49	61	60	31	61	33	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
EQUIVALENT LENGTH	135	195	200	135	190	185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL EFFECTIVE LH	184	256	260	166	251	218	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ADJUSTED PRESSURE	0.07	0.05	0.05	0.08	0.05	0.06	13.36	13.36	13.36	13.36	13.36	13.36	13.36	13.36	13.36	13.36	13.36	13.36	13.36	13.36	13.36	13.36	13.36	13.36
ROUND DUCT SIZE	5.9	6	6	5.9	6	10.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
INLET GRILL SIZE	8	8	8	8	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
INLET GRILL SIZE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
INLET GRILL SIZE	14	14	14	14	14	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CITY OF RICHMOND HILL
BUILDING DIVISION

05/01/2024

RECEIVED
Per: joshua.nabua

TYPE: VILLA 3
SITE NAME: TRINIGROUPLO # 102635
WOB

RESIDENTIAL MECHANICAL VENTILATION DESIGN SUMMARY

COMBUSTION APPLIANCES	9.32.3.1(1)
a) ☒ Direct vent (sealed combustion) only	
b) ☐ Positive venting induced draft (except fireplaces)	
c) ☐ Natural draft, B-vent or induced draft gas fireplace	
d) ☐ Solid Fuel (including fireplaces)	
e) ☐ No Combustion Appliances	

HEATING SYSTEM
☒ Forced Air ☐ Non Forced Air
☐ Electric Space Heat

HOUSE TYPE	9.32.1(2)
☒ I Type a) or b) appliance only, no solid fuel	
☐ II Type I except with solid fuel (including fireplaces)	
☐ III Any Type c) appliance	
☐ IV Type I, or II with electric space heat	
☐ Other: Type I, II or IV no forced air	

SYSTEM DESIGN OPTIONS	O.N.H.W.P.
☐ 1 Exhaust only/Forced Air System	
☐ 2 HRV with Ducting/Forced Air System	
☒ 3 HRV Simplified/connected to forced air system	
☐ 4 HRV with Ducting/non forced air system	
☐ Part 6 Design	

TOTAL VENTILATION CAPACITY	9.32.3.3(1)
Basement + Master Bedroom	<u>2</u> @ 21.2 cfm <u>42.4</u> cfm
Other Bedrooms	<u>3</u> @ 10.6 cfm <u>31.8</u> cfm
Kitchen & Bathrooms	<u>5</u> @ 10.6 cfm <u>53</u> cfm
Other Rooms	<u>4</u> @ 10.6 cfm <u>42.4</u> cfm
Table 9.32.3.A.	TOTAL <u>169.6</u> cfm

PRINCIPAL VENTILATION CAPACITY REQUIRED	9.32.3.4.(1)
1 Bedroom	31.8 cfm
2 Bedroom	47.7 cfm
3 Bedroom	63.6 cfm
4 Bedroom	79.5 cfm
5 Bedroom	95.4 cfm
TOTAL	79.5 cfm

SUPPLEMENTAL VENTILATION CAPACITY	9.32.3.5.
Total Ventilation Capacity	<u>169.6</u> cfm
Less Principal Ventil. Capacity	<u>79.5</u> cfm
Required Supplemental Capacity	<u>90.1</u> cfm

PRINCIPAL EXHAUST FAN CAPACITY
Model: VANEE V150H Location: BSMT
<u>79.5</u> cfm ☒ HVI Approved

PRINCIPAL EXHAUST HEAT LOSS CALCULATION
CFM ΔT °F FACTOR % LOSS
79.5 CFM X 78 F X 1.08 X 0.25

SUPPLEMENTAL FANS	BY INSTALLING CONTRACTOR
Location Model cfm HVI Sones	
ENS BY INSTALLING CONTRACTOR 50 ☒ 3.5	
BATH BY INSTALLING CONTRACTOR 50 ☒ 3.5	
ENS-2 BY INSTALLING CONTRACTOR 50 ☒ 3.5	
PWD BY INSTALLING CONTRACTOR 50 ☒ 3.5	

HEAT RECOVERY VENTILATOR	9.32.3.11.
Model: VANEE V150H	
<u>150</u> cfm high <u>35</u> cfm low	
<u>75</u> % Sensible Efficiency ☒ HVI Approved	
@ 32 deg F (0 deg C)	

LOCATION OF INSTALLATION
Lot: Concession
Township Plan:
Address
Roll # Building Permit #

BUILDER:	GREENPARK HOMES
Name:	City of Richmond Hill
Address:	Building Division
City:	
Telephone #:	

INSTALLING CONTRACTOR	
Name:	
Address:	
City:	
Telephone #: Fax #:	

DESIGNER CERTIFICATION
I hereby certify that this ventilation system has been designed in accordance with the Ontario Building Code.
Name: HVAC Designs Ltd.
Signature: <i>Michael O'Rourke</i>
HRAI # 001820
Date: September-23

I REVIEW AND TAKE RESPONSIBILITY FOR THE DESIGN WORK AND AM QUALIFIED IN THE APPROPRIATE CATEGORY AS AN "OTHER DESIGNER" UNDER DIVISION C, 3.2.5 OF THE BUILDING CODE.
INDIVIDUAL BCIN: 19669 MICHAEL O'ROURKE*Michael O'Rourke*

05/01/2024

RECEIVED
Per: joshua.nabua

CSA F280-12 Residential Heat Loss and Heat Gain Calculations																																																													
Formula Sheet (For Air Leakage / Ventilation Calculation)																																																													
LO#: 102635		Model: VILLA 3		Builder: GREENPARK HOMES																																																									
				Date: 9/22/2023																																																									
Volume Calculation			Air Change & Delta T Data																																																										
House Volume <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Level</th> <th>Floor Area (ft²)</th> <th>Floor Height (ft)</th> <th>Volume (ft³)</th> </tr> </thead> <tbody> <tr><td>Bsmt</td><td>1147</td><td>9</td><td>9749.5</td></tr> <tr><td>First</td><td>1147</td><td>10</td><td>11584.7</td></tr> <tr><td>Second</td><td>1484</td><td>9</td><td>13504.4</td></tr> <tr><td>Third</td><td>0</td><td>9</td><td>0</td></tr> <tr><td>Fourth</td><td>0</td><td>9</td><td>0</td></tr> <tr><td colspan="3" style="text-align: right;">Total:</td><td>34,838.6 ft³</td></tr> <tr><td colspan="3" style="text-align: right;">Total:</td><td>986.5 m³</td></tr> </tbody> </table>			Level	Floor Area (ft²)	Floor Height (ft)	Volume (ft³)	Bsmt	1147	9	9749.5	First	1147	10	11584.7	Second	1484	9	13504.4	Third	0	9	0	Fourth	0	9	0	Total:			34,838.6 ft³	Total:			986.5 m³	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">WINTER NATURAL AIR CHANGE RATE</td> <td style="width: 20%;">0.377</td> </tr> <tr> <td>SUMMER NATURAL AIR CHANGE RATE</td> <td>0.118</td> </tr> </table> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="5" style="text-align: center;">Design Temperature Difference</th> </tr> <tr> <th></th> <th>Tin °C</th> <th>Tout °C</th> <th>ΔT °C</th> <th>ΔT °F</th> </tr> <tr> <td>Winter DTDh</td> <td>22</td> <td>-21</td> <td>43</td> <td>78</td> </tr> <tr> <td>Summer DTDc</td> <td>24</td> <td>31</td> <td>7</td> <td>13</td> </tr> </table>			WINTER NATURAL AIR CHANGE RATE	0.377	SUMMER NATURAL AIR CHANGE RATE	0.118	Design Temperature Difference						Tin °C	Tout °C	ΔT °C	ΔT °F	Winter DTDh	22	-21	43	78	Summer DTDc	24	31	7	13
Level	Floor Area (ft²)	Floor Height (ft)	Volume (ft³)																																																										
Bsmt	1147	9	9749.5																																																										
First	1147	10	11584.7																																																										
Second	1484	9	13504.4																																																										
Third	0	9	0																																																										
Fourth	0	9	0																																																										
Total:			34,838.6 ft³																																																										
Total:			986.5 m³																																																										
WINTER NATURAL AIR CHANGE RATE	0.377																																																												
SUMMER NATURAL AIR CHANGE RATE	0.118																																																												
Design Temperature Difference																																																													
	Tin °C	Tout °C	ΔT °C	ΔT °F																																																									
Winter DTDh	22	-21	43	78																																																									
Summer DTDc	24	31	7	13																																																									
5.2.3.1 Heat Loss due to Air Leakage			6.2.6 Sensible Gain due to Air Leakage																																																										
$HL_{airb} = LR_{airh} \times \frac{V_b}{3.6} \times DTD_h \times 1.2$ 0.377 x 274.03 x 43 °C x 1.2 = 5360 W = 18289 Btu/h			$HG_{salb} = LR_{airc} \times \frac{V_b}{3.6} \times DTD_c \times 1.2$ = 0.118 x 274.03 x 7 °C x 1.2 = 275 W = 938 Btu/h																																																										
5.2.3.2 Heat Loss due to Mechanical Ventilation			6.2.7 Sensible heat Gain due to Ventilation																																																										
$HL_{vairb} = PVC \times DTD_h \times 1.08 \times (1 - E)$ 80 CFM x 78 °F x 1.08 x 0.25 = 1670 Btu/h			$HL_{vairb} = PVC \times DTD_h \times 1.08 \times (1 - E)$ 80 CFM x 13 °F x 1.08 x 0.25 = 275 Btu/h																																																										
5.2.3.3 Calculation of Air Change Heat Loss for Each Room (Floor Multiplier Section)																																																													
$HL_{airr} = Level\ Factor \times HL_{airbv} \times \{(HL_{agcr} + HL_{bgcr}) \div (HL_{agclevel} + HL_{bgclevel})\}$ <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Level</th> <th>Level Factor (LF)</th> <th>HLairve Air Leakage + Ventilation Heat Loss (Btu/h)</th> <th>Level Conductive Heat Loss: (HL_{clevel})</th> <th>Air Leakage Heat Loss Multiplier (LF x HLairbv / HL_{clevel})</th> </tr> </thead> <tbody> <tr><td>1</td><td>0.5</td><td rowspan="5" style="text-align: center;">18,289</td><td>7,324</td><td>1.249</td></tr> <tr><td>2</td><td>0.3</td><td>10,814</td><td>0.507</td></tr> <tr><td>3</td><td>0.2</td><td>13,179</td><td>0.278</td></tr> <tr><td>4</td><td>0</td><td>0</td><td>0.000</td></tr> <tr><td>5</td><td>0</td><td>0</td><td>0.000</td></tr> </tbody> </table>						Level	Level Factor (LF)	HLairve Air Leakage + Ventilation Heat Loss (Btu/h)	Level Conductive Heat Loss: (HL _{clevel})	Air Leakage Heat Loss Multiplier (LF x HLairbv / HL _{clevel})	1	0.5	18,289	7,324	1.249	2	0.3	10,814	0.507	3	0.2	13,179	0.278	4	0	0	0.000	5	0	0	0.000																														
Level	Level Factor (LF)	HLairve Air Leakage + Ventilation Heat Loss (Btu/h)	Level Conductive Heat Loss: (HL _{clevel})	Air Leakage Heat Loss Multiplier (LF x HLairbv / HL _{clevel})																																																									
1	0.5	18,289	7,324	1.249																																																									
2	0.3		10,814	0.507																																																									
3	0.2		13,179	0.278																																																									
4	0		0	0.000																																																									
5	0		0	0.000																																																									
*HLairbv = Air leakage heat loss + ventilation heat loss *For a balanced or supply only ventilation system HLairve = 0																																																													

Michael O'Rourke
BCIN# 19669

CITY OF RICHMOND HILL
BUILDING DIVISION

05/01/2024

RECEIVED
Per: joshua.nabua

HEAT LOSS AND GAIN SUMMARY SHEET

MODEL:	VILLA 3	WOB		BUILDER:	GREENPARK HOMES
SFQT:	2613	LO#	102635	SITE:	TRINIGROUP

DESIGN ASSUMPTIONS

HEATING	°F	COOLING	°F
OUTDOOR DESIGN TEMP.	-6	OUTDOOR DESIGN TEMP.	88
INDOOR DESIGN TEMP.	72	INDOOR DESIGN TEMP. (MAX 75°F)	75
		WINDOW SHGC	0.50

BUILDING DATA

ATTACHMENT:	DETACHED	# OF STORIES (+BASEMENT):	3
FRONT FACES:	EAST	ASSUMED (Y/N):	Y
AIR CHANGES PER HOUR:	3.57	ASSUMED (Y/N):	Y
AIR TIGHTNESS CATEGORY:	AVERAGE	ASSUMED (Y/N):	Y
WIND EXPOSURE:	SHELTERED	ASSUMED (Y/N):	Y
HOUSE VOLUME (ft³):	34838.6	ASSUMED (Y/N):	Y
INTERNAL SHADING:	BLINDS/CURTAINS	ASSUMED OCCUPANTS:	5
INTERIOR LIGHTING LOAD (Btu/h/ft²):	1.27	DC BRUSHLESS MOTOR (Y/N):	Y
FOUNDATION CONFIGURATION	BCIN_1	DEPTH BELOW GRADE:	5.5 ft
LENGTH: 56.0 ft	WIDTH: 29.0 ft	EXPOSED PERIMETER:	132.0 ft
WOB INSULATION CONFIGURATION	SCB_9	WOB EXPOSED PERIMETER	38.0 ft

2012 OBC - COMPLIANCE PACKAGE

Component

Compliance Package A1

	Nominal	Min. Eff.
Ceiling with Attic Space Minimum RSI (R)-Value	60	59.22
Ceiling Without Attic Space Minimum RSI (R)-Value	31	27.65
Exposed Floor Minimum RSI (R)-Value	31	29.80
Walls Above Grade Minimum RSI (R)-Value	22	17.03
Basement Walls Minimum RSI (R)-Value	20 ci	21.12
Below Grade Slab Entire surface > 600 mm below grade Minimum RSI (R)-Value	-	-
Edge of Below Grade Slab ≤ 600 mm Below Grade Minimum RSI (R)-Value	10	10
Heated Slab or Slab ≤ 600 mm below grade Minimum RSI (R)-Value	10	11.13
Windows and Sliding Glass Doors Maximum U-Value	0.28	-
Skylights Maximum U-Value	0.49	-
Space Heating Equipment Minimum AFUE	96%	-
HRV/ERV Minimum Efficiency	75%	-
Domestic Hot Water Heater Minimum EF	0.8	-

INDIVIDUAL BCIN: 19669
MICHAEL O'ROURKE



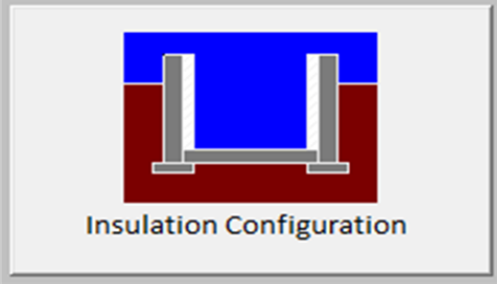
CITY OF RICHMOND HILL
BUILDING DIVISION

05/01/2024

RECEIVED
Per: joshua.nabua

Residential Foundation Thermal Load Calculator

Supplemental tool for CAN/CSA-F280

Weather Station Description		
Province:	Ontario	
Region:	Richmond Hill	
Site Description		
Soil Conductivity:	Normal conductivity: dry sand, loam, clay	
Water Table:	Normal (7-10 m, 23-33 ft)	
Foundation Dimensions		
Floor Length (m):	4.6	 Insulation Configuration
Floor Width (m):	8.8	
Exposed Perimeter (m):	40.2	
Wall Height (m):	2.6	
Depth Below Grade (m):	1.39	
Window Area (m ²):	0.8	
Door Area (m ²):	2.0	
Radiant Slab		
Heated Fraction of the Slab:	0	
Fluid Temperature (°C):	33	
Design Months		
Heating Month	1	
Foundation Loads		
Heating Load (Watts):		670

TYPE: VILLA 3
LO# 102635

WOB

Michael O'Rourke BCIN #19669

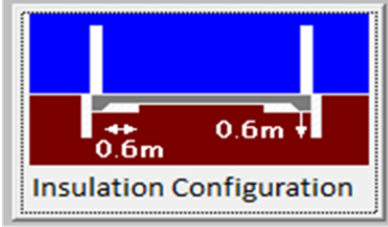
CITY OF RICHMOND HILL
BUILDING DIVISION

05/01/2024


RECEIVED
Per: joshua.nabua

Residential Slab on Grade Thermal Load Calculator

Supplemental tool for CAN/CSA-F280

Weather Station Description		
Province:	Ontario	
Region:	Richmond Hill	
Site Description		
Soil Conductivity:	Normal conductivity: dry sand, loam, clay	
Water Table:	Normal (7-10 m, 23-33 ft)	
Foundation Dimensions		
Length (m):	1.5	
Width (m):	8.5	
Exposed Perimeter (m):	11.6	
Radiant Slab		
Heated Fraction of the Slab:	0	
Fluid Temperature (°C):	33	
Design Months		
Heating Month	1	
Results		
Heating Load (Watts):		135

TYPE: VILLA 3
LO# 102635

WOB

Michael O'Rourke BCIN# 19669

CITY OF RICHMOND HILL
BUILDING DIVISION

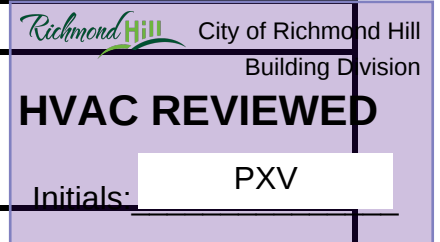
05/01/2024


RECEIVED
Per: joshua.nabua

Air Infiltration Residential Load Calculator

Supplemental tool for CAN/CSA-F280

Weather Station Description				
Province:	Ontario			
Region:	Richmond Hill			
Weather Station Location:	Open flat terrain, grass			
Anemometer height (m):	10			
Local Shielding				
Building Site:	Suburban, forest			
Walls:	Heavy			
Flue:	Heavy			
Highest Ceiling Height (m):	8.44			
Building Configuration				
Type:	Detached			
Number of Stories:	Two			
Foundation:	Full			
House Volume (m ³):	986.5			
Air Leakage/Ventilation				
Air Tightness Type:	Present (1961-) (3.57 ACH)			
Custom BDT Data:	ELA @ 10 Pa.	1315.1 cm ²		
	3.57	ACH @ 50 Pa		
Mechanical Ventilation (L/s):	Total Supply	Total Exhaust		
	37.5	37.5		
Flue Size				
Flue #:	#1	#2	#3	#4
Diameter (mm):	0	0	0	0
Natural Infiltration Rates				
Heating Air Leakage Rate (ACH/H):	0.377			
Cooling Air Leakage Rate (ACH/H):	0.118			

TYPE: VILLA 3
LO# 102635

WOB

Michael O'Rourke BCIN# 19669

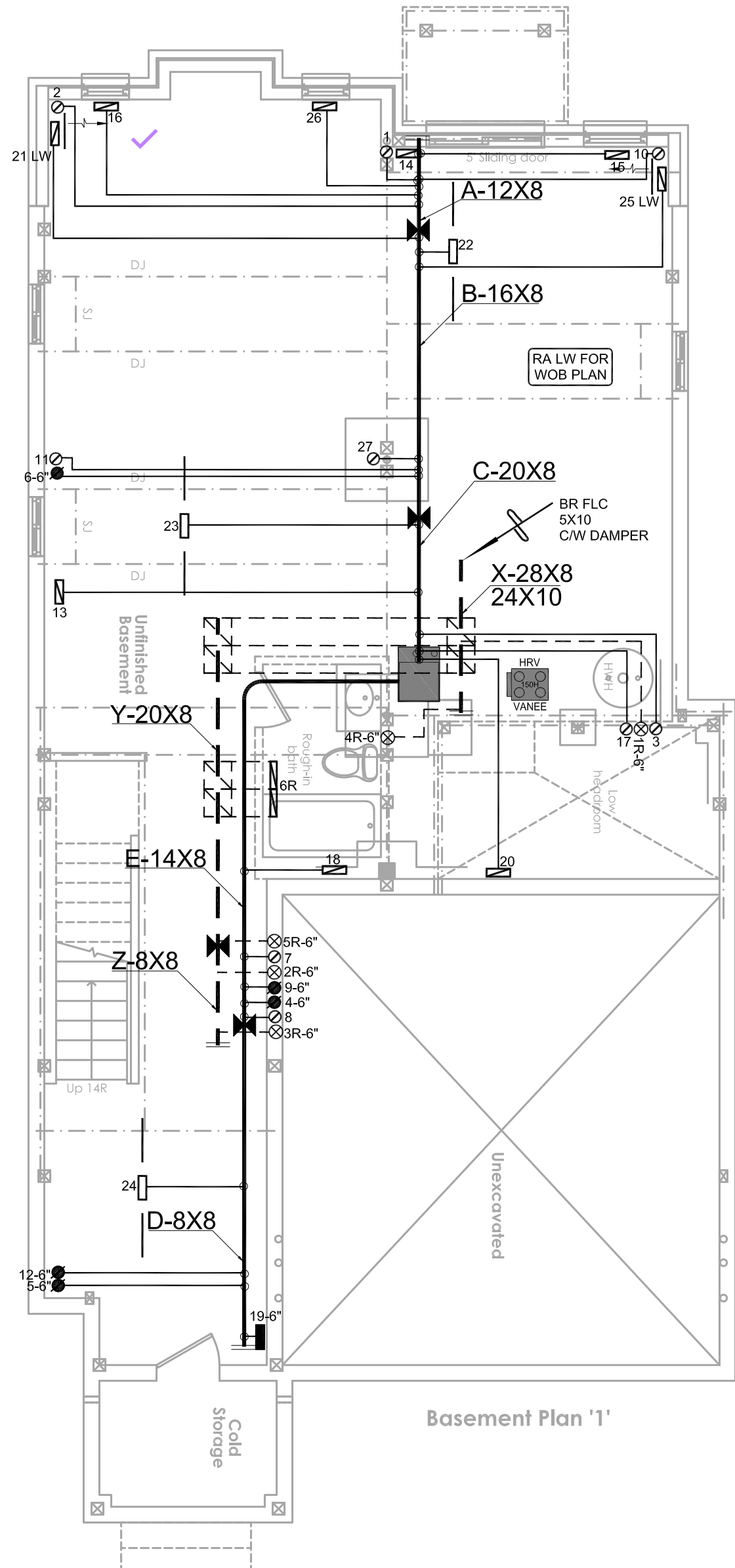


ALL DRAWINGS, CALCULATIONS AND SPECIFICATIONS ARE THE PROPERTY OF HVAC DESIGNS LTD. & MAY NOT BE REPRODUCED, MODIFIED OR ALTERED WITHOUT EXPRESSED WRITTEN CONSENT. THE DRAWINGS ARE DATED AND USE OF THESE DRAWINGS AFTER ONE YEAR FROM THE DATED NOTED IS NOT AUTHORIZED. CONTRACTOR SHALL CHECK ALL CONDITIONS BEFORE PROCEEDING WITH WORK. LATEST MUNICIPAL APPROVED DRAWINGS ONLY TO BE USED DURING INSTALLATION OF HEATING SYSTEM. HVAC DESIGNS LTD. IS NOT LIABLE FOR ANY CLAIMS ARISING FROM UNAUTHORIZED USE OF THE DRAWINGS OR FROM ANY CHANGES TO ACCEPTED STANDARDS AND/OR THE ONTARIO BUILDING CODE.

INSTALLATION TO COMPLY WITH THE LATEST ONTARIO BUILDING CODE. ALL SUPPLY BRANCH OUTLETS SHALL BE EQUIPPED WITH MANUAL BALANCING DAMPER. DUCTWORK WHICH PASSES THROUGH THE GARAGE OR UNHEATED SPACES SHALL BE ADEQUATELY INSULATED AND GAS-PROOFED

ALL S/A DIFFUSERS "4x10" UNLESS NOTED OTHERWISE ON LAYOUT. ALL S/A RUNS 5"ø UNLESS NOTED OTHERWISE ON LAYOUT. UNDERCUT DOORS 1" min. FOR R/A

SUPPLEMENTAL EXHAUST FAN (MINIMUM 100 CFM) DISCHARGING DIRECTLY TO THE EXTERIOR WILL BE PROVIDED IN THE KITCHEN. EXHAUST DUCTS SERVING THE KITCHEN SHALL NOT BE SMALLER THAN RECOMMENDED BY THE MANUFACTURER OF THE FANS AND MUST AT LEAST MEET O.B.C. STATED MINIMUMS.



1. Laundry dryer exhaust duct shall be provided as per OBC 2012 Div.B 6.2.3.8(7).
2. Kitchen hood exhaust duct shall be provided as per OBC 2012, Div.B 9.32.3.10, 9.32.3.5(2).
3. Minimum R-12 Insulation Value required for ducts installed at unheated or exposed condition (OBC 2012 Div.B 6.2.4.3(10) and seal the ducts as per 6.2.4.3(11) & HRAI Digest 2005, Clause 4.5.
4. Penetration of Air Barrier System by ducts, wires, conduits or building materials shall be sealed as per OBC 2012, Div.B 9.25.3.3.(9) & (10).
5. Volume control dampers to all branches to be installed per OBC 2012, Div.B, 6.2.4.5.
6. Space between studs and joists used as return ducts shall be separated from unused portion as per OBC 2012 Div.B 6.2.4.7(6)

7. Combustion air supply shall be provided to the furnace and hot water tank.

8. HRV installation, testing, startup and commissioning shall be in compliance with OBC 2012, Div.B 9.32.3.11, 9.32.3.11(7)&(10)

9. HRV duct connection shall be in compliance with OBC 2012 Div.B 9.32.3.6(3) & 9.32.3.4(7).

10. Supply air grill at finished basement shall be at low level. Return air grill for finished or unfinished basement shall be at low level. HRAI digest 2005, clause 7.7(3).

