HVAC DESIGNS LTD.

375 Finley Ave. Suite 202 Ajax, ON L1S 2E2
Tel: 905.619.2300 Fax: 905.619.2375
Web: www.hvacdesigns.ca E-mail: info@hvacdesigns.ca

SITE NAME: RUSSEL GARDENS PH. 4 | WUB | DATE: Apr-21 | WINTER NATURAL AIR CHANGE RATE 0.310 | HEAT LOSS ΔT °F. 71 | CSA-F280-12
BUILDER: GREENPARK HOMES | TYPE: GRANDVILLE 2 | GFA: 4178 | LO# 90145 | SUMMER NATURAL AIR CHANGE RATE 0.111 | HEAT GAIN ΔT °F. 13 | SB-12 PACKAGE A1

ROOM USE			MBR			ENS				BED-2			BED-3			BED-4			ENS-2			FLEX			ENS-3			ENS-4			DIN			LB/OF		
EXP. WALL			40			27				37			28			13			6			14			6			9			27			34		
CLG. HT.			9			9				9			9			9			9			9			9			9			10			11		
	FACTORS																																			
GRS.WALL AREA	LOSS	GAIN	360			243				333			252			117			54			126			54			81			270			374		
GLAZING			LOSS	GAIN		LOSS	GAIN			LOSS	GAIN		LOSS	GAIN		LOSS	GAIN		LOSS	GAIN		LOSS	GAIN		LOSS	GAIN		LOSS	GAIN		LOSS	GAIN		LOSS	GAIN
NORTH	19.8	16.0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	7	136	112	16	316	258	0	0	0	0	0	0	22	435	361	0	0	0
EAST	19.8	41.6	0	0	0	0	0	0		78	1542	3241	14	277	582	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68	1344	2826
SOUTH	19.8	24.9	0	0	0	0	0	0		0	0	0	16	316	398	16	316	398	0	0	0	0	0	0	7	138	174	7	138	174	0	0	0	0	0	0
WEST	19.8	41.6	32	633	1330	23	456	956		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
SKYLT.	34.6	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	0	0	0	0	0	0
DOORS	23.5	4.3	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	0	0	0	0	0	0
NET EXPOSED WALL	4.1	0.8	328	1360	247	220	912	165		255	1057	192	222	920	167	101	419	76	47	195	35	110	456	83	47	195	35	74	307	56	248	1028	186	306	1269	230
NET EXPOSED BSMT WALL ABOVE GR	3.3	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	0	0	0	0	0	0
EXPOSED CLG	1.2	0.6	478	570	281	182	217	107		206	246	121	235	280	138	247	294	145	116	138	68	234	279	138	67	80	39	72	86	42	0	0	0	0	0	0
NO ATTIC EXPOSED CLG	2.6	1.3	0	0	0	0	0	0		25	64	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169	432	213
EXPOSED FLOOR	2.4	0.4	0	0	0	0	0	0		231	547	99	0	0	0	0	0	0	85	201	37	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			0			0			0		
SLAB ON GRADE HEAT LOSS			0			0				0			0			0			0			0			0			0			0			0		
SUBTOTAL HT LOSS			2562			1584				3456			1794			1029			673			1051			413			531			1483			3044		
SUB TOTAL HT GAIN				1857			1228				3684			1285			619			252			476			248			272			538			3268
LEVEL FACTOR / MULTIPLIER			0.20	0.32		0.20	0.32			0.20	0.32		0.20	0.32		0.20	0.32		0.20	0.32		0.20	0.32		0.20	0.32		0.20	0.32		0.30	0.47		0.30	0.47	
AIR CHANGE HEAT LOSS				830			513				1120			581			334			218			341			134			172			662			1419	
AIR CHANGE HEAT GAIN					148			97				290			101			49			20			37			20			21			42			257
DUCT LOSS				0			0				458			0			0			89			0			0			0			0			0	
DUCT GAIN					0			0				494			0			0			27			0			0			0			0			0
HEAT GAIN PEOPLE	240		2		480	0		0		1		240	1		240	1		240	0		0	0		0	0		0	0		0	0		0	1		240
HEAT GAIN APPLIANCES/LIGHTS					728			0				728			728			728			0			728			0			0			728			728
TOTAL HT LOSS BTU/H				3392			2097				5033			2375			1363			980			1392			547			703			2145			4463	
TOTAL HT GAIN x 1.3 BTU/H					4174			1722				7087			3060			2127			388			1613			349			382			1700			5841

ROOM USE			WIC-2			FAM			KT/BR			LIV			LAUN			PWD			FOY			MUD						WUB			BAS		
EXP. WALL			5			40			47			21			8			8			24			6						20			188		
CLG. HT.			9			10			10			10			9			11			11			10						9			9		
	FACTORS																																			
GRS.WALL AREA	LOSS	GAIN	45			400			470			210			72			88			264			60						180			1128		
GLAZING			LOSS	GAIN		LOSS	GAIN		LOSS	GAIN		LOSS	GAIN		LOSS	GAIN		LOSS	GAIN		LOSS	GAIN		LOSS	GAIN					LOSS	GAIN		LOSS	GAIN
NORTH	19.8	16.0	0	0	0	0	0	0	0	0	0	0	0	0	7	136	112	0	0	0	0	0	0	0	0	0				0	0	0	8	158	128
EAST	19.8	41.6	11	217	457	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	217	457	0	0	0				0	0	0	0	0	0
SOUTH	19.8	24.9	0	0	0	0	0	0	0	0	0	36	712	896	0	0	0	7	138	174	0	0	0	0	0	0				0	0	0	4	79	100
WEST	19.8	41.6	0	0	0	40	791	1662	77	1522	3200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0
SKYLT.	34.6	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	0	0	0
DOORS	23.5	4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	938	176	20	469	85				20	469	85	20	469	85
NET EXPOSED WALL	4.1	0.8	34	141	26	360	1492	271	393	1629	295	174	721	131	66	269	49	81	336	61	213	883	160	40	166	30				160	663	120	0	0	0
NET EXPOSED BSMT WALL ABOVE GR	3.3	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	564	1865	342
EXPOSED CLG	1.2	0.6	45	54	26	0	0	0	0	0	0	0	0	0	115	137	68	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0
NO ATTIC EXPOSED CLG	2.6	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	128	63	0	0	0				0	0	0	0	0	0
EXPOSED FLOOR	2.4	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	0	0	0
BASEMENT/CRAWL HEAT LOSS			0			0			0			0			0			0			0			0									5361		
SLAB ON GRADE HEAT LOSS			0			0			0			0			0			0			0			0						174					
SUBTOTAL HT LOSS			412			2263			3151			1433			545			474			2166			636						1306			8953		
SUB TOTAL HT GAIN				509			1933			3495			1027			228			235			850			115					295			654	
LEVEL FACTOR / MULTIPLIER			0.20	0.32		0.30	0.47		0.30	0.47		0.30	0.47		0.20	0.32		0.30	0.47		0.30	0.47		0.30	0.47								0.50	1.11	
AIR CHANGE HEAT LOSS				134			1064			1469			668			177			221			1010			286									11380		
AIR CHANGE HEAT GAIN					40			152			275			81			18			18			67			9										68
DUCT LOSS				55			0			0			0			0			0			0			0									0		
DUCT GAIN					55			0			0			0			0			0			0			0										0
HEAT GAIN PEOPLE	240		0		0	0		0	0		0	0		0	0		0	0		0	0		0	0		0				0		0	0		0
HEAT GAIN APPLIANCES/LIGHTS					0			728			728			728			728			0			0								0				728
TOTAL HT LOSS BTU/H				600			3347			4620			2101			721			695			3176			931						1306			20333	
TOTAL HT GAIN x 1.3 BTU/H					785			3656			5847			2386			1266			330			1192			161						267			1884

TOTAL HEAT GAIN BTU/H: 46527 | TONS: 3.88 | LOSS DUE TO VENTILATION LOAD BTU/H: 1819 | STRUCTURAL HEAT LOSS: 62321 | TOTAL COMBINED HEAT LOSS BTU/H: 64139

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.

Michael O'Rourke

INDIVIDUAL BCIN: 19669 MICHAEL O'ROURKE

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SITE NAME: RUSSEL GARDENS PH. 4
BUILDER: GREENPARK HOMES

WUB
TYPE: GRANDVILLE 2

DATE: Apr-21

GFA: 4178 LO# 90145

HEATING CFM	1396	COOLING CFM	1396
TOTAL HEAT LOSS	62,321	TOTAL HEAT GAIN	46,197
AIR FLOW RATE CFM	22.4	AIR FLOW RATE CFM	30.22

furnace pressure	0.6
furnace filter	0.05
a/c coil pressure	0.2
available pressure for s/a & r/a	0.35
plenum pressure s/a	0.18
max s/a dif press. loss	0.02
min adjusted pressure s/a	0.16
r/a pressure	0.17
r/a grille press. Loss	0.02
adjusted pressure r/a	0.15

~*GOODMAN
GMVC960804CNA 80
FAN SPEED
LOW 1300
MEDLOW 0
MEDIUM 1389
MEDIUM HIGH 0
HIGH 1396

AFUE = 96 %
INPUT (BTU/H) = 80,000
OUTPUT (BTU/H) = 76,800

DESIGN CFM = 1396
CFM @ .6 " E.S.P.

TEMPERATURE RISE 51 °F

RUN COUNT	4th	3rd	2nd	1st	Bas
S/A	0	0	16	11	6
R/A	0	0	5	4	1

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	BED-2	BED-2	BED-3	BED-4	ENS-2	FLEX	ENS-3	MBR	ENS-4	WIC-2	FAM	KT/BR	KT/BR	LIV	LAUN	PWD	FOY	MUD	BAS	BAS	BAS	BAS
RM LOSS MBH.	1.70	1.05	1.68	1.68	1.19	1.36	0.98	1.39	0.55	1.70	0.70	0.60	1.67	2.31	2.31	2.10	0.72	0.70	3.18	0.93	3.61	3.61	3.61	3.61
CFM PER RUN HEAT	38	23	38	38	27	31	22	31	12	38	16	13	37	52	52	47	16	16	71	21	81	81	81	81
RM GAIN MBH.	2.09	0.86	2.36	2.36	1.53	2.13	0.39	1.61	0.35	2.09	0.38	0.79	1.83	2.92	2.92	2.39	1.27	0.33	1.19	0.16	0.36	0.36	0.36	0.36
CFM PER RUN COOLING	63	26	71	71	46	64	12	49	11	63	12	24	55	88	88	72	38	10	36	5	11	11	11	11
ADJUSTED PRESSURE	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.16	0.16	0.17	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16
ACTUAL DUCT LGH.	60	69	31	31	54	75	22	32	84	49	69	32	68	52	44	41	32	53	49	19	54	52	52	24
EQUIVALENT LENGTH	150	190	170	150	170	200	180	170	200	160	150	160	110	110	110	140	150	160	170	150	120	130	120	130
TOTAL EFFECTIVE LENGTH	210	259	201	181	224	275	202	202	284	209	219	192	178	162	154	181	182	213	219	169	174	182	172	154
ADJUSTED PRESSURE	0.08	0.07	0.09	0.1	0.08	0.06	0.09	0.09	0.06	0.08	0.08	0.09	0.1	0.1	0.11	0.1	0.09	0.08	0.08	0.1	0.09	0.09	0.09	0.11
ROUND DUCT SIZE	6	4	5	5	5	6	4	6	4	6	4	4	5	6	6	5	4	4	5	4	6	6	6	6
HEATING VELOCITY (ft/min)	194	264	279	279	198	158	252	158	138	194	184	149	272	265	265	345	184	184	521	241	413	413	413	413
COOLING VELOCITY (ft/min)	321	298	521	521	338	326	138	250	126	321	138	275	404	449	449	529	436	115	264	57	56	56	56	56
OUTLET GRILL SIZE	4X10	3X10	3X10	3X10	3X10	4X10	3X10	4X10	3X10	4X10	3X10	3X10	3X10	4X10	4X10	3X10	3X10	3X10	3X10	3X10	4X10	4X10	4X10	4X10
TRUNK	D	C	H	H	H	C	H	D	C	D	C	H	A	B	B	G	D	F	G	G	A	A	B	B

RUN #	25	26	27	28	29	30	31	32	33
ROOM NAME	BAS	BAS	BED-2	BED-3	ENS	DIN	LB/OF	LB/OF	FAM
RM LOSS MBH.	3.61	3.61	1.68	1.19	1.05	2.14	2.23	2.23	1.67
CFM PER RUN HEAT	81	81	38	27	23	48	50	50	37
RM GAIN MBH.	0.36	0.36	2.36	1.53	0.86	1.70	2.92	2.92	1.83
CFM PER RUN COOLING	11	11	71	46	26	51	88	88	55
ADJUSTED PRESSURE	0.16	0.16	0.17	0.17	0.17	0.17	0.16	0.16	0.17
ACTUAL DUCT LGH.	41	49	33	51	80	11	60	68	56
EQUIVALENT LENGTH	130	170	150	170	170	130	160	150	130
TOTAL EFFECTIVE LENGTH	171	219	183	221	250	141	220	218	186
ADJUSTED PRESSURE	0.09	0.07	0.09	0.08	0.07	0.12	0.07	0.07	0.09
ROUND DUCT SIZE	6	6	5	5	4	5	6	6	5
HEATING VELOCITY (ft/min)	413	413	279	198	264	352	255	255	272
COOLING VELOCITY (ft/min)	56	56	521	338	298	374	449	449	404
OUTLET GRILL SIZE	4X10	4X10	3X10	3X10	3X10	3X10	4X10	4X10	3X10
TRUNK	G	F	H	H	C	B	F	F	A

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	236	0.09	7.9	8	x	8	531	TRUNK G	417	0.07	10.4	12	x	8	626
TRUNK B	550	0.09	10.9	14	x	8	707	TRUNK H	269	0.08	8.6	8	x	8	605
TRUNK C	105	0.06	6.5	8	x	8	236	TRUNK I	620	0.07	12.1	18	x	8	620
TRUNK D	368	0.06	10.4	12	x	8	552	TRUNK J	0	0.00	0	0	x	8	0
TRUNK E	778	0.06	13.7	22	x	8	637	TRUNK K	0	0.00	0	0	x	8	0
TRUNK F	197	0.07	7.9	8	x	8	443	TRUNK L	0	0.00	0	0	x	8	0

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	1396	0.05	17.9	30	x	10	670
TRUNK Y	775	0.05	14.3	24	x	8	581
TRUNK Z	565	0.05	12.7	18	x	8	565
DROP	1396	0.05	17.9	24	x	12	698

RETURN AIR #	1	2	3	4	5	6	7	8	9							BR
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
AIR VOLUME	115	85	85	130	130	280	155	95	85	0	0	0	0	0	0	236
PLENUM PRESSURE	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
ACTUAL DUCT LGH.	69	46	56	57	80	65	63	27	53	1	1	1	1	1	1	14
EQUIVALENT LENGTH	205	195	195	165	185	210	205	165	185	0	0	0	0	0	0	135
TOTAL EFFECTIVE LH	274	241	251	222	265	275	268	192	238	1	1	1	1	1	1	149
ADJUSTED PRESSURE	0.05	0.06	0.06	0.07	0.06	0.05	0.06	0.08	0.06	14.80	14.80	14.80	14.80	14.80	14.80	0.10
ROUND DUCT SIZE	7	6	6	6.8	7	9.8	7.5	5.8	6	0	0	0	0	0	0	7.7
INLET GRILL SIZE	8	8	8	8	8	8	8	8	8	0	0	0	0	0	0	8
	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	14	14	14	0	0	0	0	0	0	24

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.

Michael O'Rourke

INDIVIDUAL BCIN: 19669 MICHAEL O'ROURKE

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TYPE: GRANDVILLE 2 LO # 90145
SITE NAME: RUSSEL GARDENS PH. 4 WUB

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	2	@ 21.2 cfm	42.4	cfm
Other Bedrooms	4	@ 10.6 cfm	42.4	cfm
Kitchen & Bathrooms	6	@ 10.6 cfm	63.6	cfm
Other Rooms	8	@ 10.6 cfm	84.8	cfm
Table 9.32.3.A.		TOTAL	233.2	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	95.4	cfm

SUPPLEMENTAL VENTILATION CAPACITY — 9.32.3.5.

Total Ventilation Capacity	233.2	cfm
Less Principal Ventil. Capacity	95.4	cfm
Required Supplemental Capacity	137.8	cfm

PRINCIPAL EXHAUST FAN CAPACITY

Model: VANEE V150H Location: BSMT

95.4 cfm [✓] HVI Approved

PRINCIPAL EXHAUST HEAT LOSS CALCULATION

CFM		ΔT °F		FACTOR		% LOSS
95.4 CFM	X	71 F	X	1.08	X	0.25

SUPPLEMENTAL FANS — BY INSTALLING CONTRACTOR

Location	Model	cfm	HVI	Sones
ENS	BY INSTALLING CONTRACTOR	50	✓	3.5
ENS-2	BY INSTALLING CONTRACTOR	50	✓	3.5
ENS-4	BY INSTALLING CONTRACTOR	50	✓	3.5
PWD	BY INSTALLING CONTRACTOR	50	✓	3.5

HEAT RECOVERY VENTILATOR — 9.32.3.11.

Model: VANEE V150H

150 cfm high 35 cfm low

75 % Sensible Efficiency @ 32 deg F (0 deg C) [✓] HVI Approved

LOCATION OF INSTALLATION

Lot: Concession

Township Plan:

Address

Roll # Building Permit #

BUILDER: GREENPARK HOMES

Name:

Address:

City:

Telephone #: Fax #:

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: Michael O'Rourke

HRAI # 001820

Date: April-21

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

HVAC DESIGNS LTD.

375 Finley Ave. Suite 202 Ajax, ON L1S 2E2
Tel: 905.619.2300 Fax: 905.619.2375
Web: www.hvacdesigns.ca E-mail: info@hvacdesigns.ca

CSA F280-12 Residential Heat Loss and Heat Gain Calculations

Formula Sheet (For Air Leakage / Ventiliation Calculation)

LO#: 90145 Model: GRANDVILLE 2 Builder: GREENPARK HOMES Date: 4/8/2021

Volume Calculation

House Volume

Level	Floor Area (ft^2)	Floor Height (ft)	Volume (ft^3)
Bsmt	2059	9	18531
First	2059	10	20590
Second	2119	9	19071
Third	0	9	0
Fourth	0	9	0
		Total:	58,192.0 ft^3
		Total:	1647.8 m^3

Air Change & Delta T Data

WINTER NATURAL AIR CHANGE RATE	0.310
SUMMER NATURAL AIR CHANGE RATE	0.111

Design Temperature Difference

	Tin °C	Tout °C	ΔT °C	ΔT °F
Winter DTDh	22	-17	39	71
Summer DTDc	24	31	7	13

5.2.3.1 Heat Loss due to Air Leakage

$$HL_{airb} = LR_{airh} \times \frac{V_b}{3.6} \times DTD_h \times 1.2$$

0.310 x 457.73 x 39 °C x 1.2 = 6671 W

= 22760 Btu/h

6.2.6 Sensible Gain due to Air Leakage

$$HG_{salb} = LR_{airc} \times \frac{V_b}{3.6} \times DTD_c \times 1.2$$

= 0.111 x 457.73 x 7 °C x 1.2 = 433 W

= 1477 Btu/h

5.2.3.2 Heat Loss due to Mechanical Ventilation

$$HL_{vairb} = PVC \times DTD_h \times 1.08 \times (1 - E)$$

95 CFM x 71 °F x 1.08 x 0.25 = 1819 Btu/h

6.2.7 Sensible heat Gain due to Ventilation

$$HL_{vairb} = PVC \times DTD_h \times 1.08 \times (1 - E)$$

95 CFM x 13 °F x 1.08 x 0.25 = 330 Btu/h

5.2.3.3 Calculation of Air Change Heat Loss for Each Room (Floor Multiplier Section)

$$HL_{airr} = Level\ Factor \times HL_{airbv} \times \{(HL_{agcr} + HL_{bgcr}) \div (HL_{agclevel} + HL_{bgclevel})\}$$

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 / HLlevel)
1	0.5	22,760	10,259	1.109
2	0.3		14,650	0.466
3	0.2		14,050	0.324
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

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HEAT LOSS AND GAIN SUMMARY SHEET

MODEL:	GRANDVILLE 2		WUB	**BUILDER:**	GREENPARK HOMES
SFQT:	4178	**LO#**	90145	**SITE:**	RUSSEL GARDENS PH. 4

DESIGN ASSUMPTIONS

HEATING	°F	COOLING	°F
OUTDOOR DESIGN TEMP.	1	OUTDOOR DESIGN TEMP.	88
INDOOR DESIGN TEMP.	72	INDOOR DESIGN TEMP. (MAX 75°F)	75

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 (ft^3):	58192.0	ASSUMED (Y/N):	Y
INTERNAL SHADING:	BLINDS/CURTAINS	ASSUMED OCCUPANTS:	6
INTERIOR LIGHTING LOAD (Btu/h/ft^2):	1.40	DC BRUSHLESS MOTOR (Y/N):	Y
FOUNDATION CONFIGURATION	BCIN_1	DEPTH BELOW GRADE:	6.0 ft
LENGTH: 62.0 ft	WIDTH: 42.0 ft	EXPOSED PERIMETER:	188.0 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 Minimum Efficiency	75%	-
Domestic Hot Water Heater Minimum EF	0.8	-

INDIVIDUAL BCIN: 19669
MICHAEL O'ROURKE

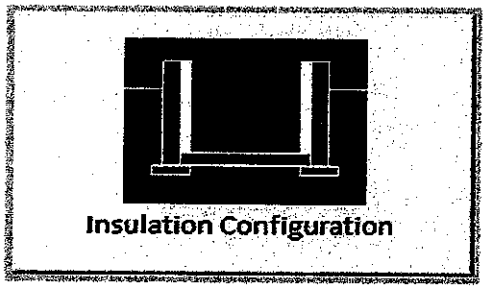
HVAC Designs Ltd.
375 Finley Ave, Suite 202
Ajax ON, L1S 2E2
905-619-2300

Residential Foundation Thermal Load Calculator

Supplemental tool for CAN/CSA-F280

Weather Station Description	
Province:	Ontario
Region:	Hamilton
Site Description	
Soil Conductivity:	Normal conductivity: dry sand, loam, clay
Water Table:	Normal (7-10 m, 23-33 ft)

Foundation Dimensions		
Floor Length (m):	18.9	
Floor Width (m):	12.8	
Exposed Perimeter (m):	57.3	
Wall Height (m):	2.7	
Depth Below Grade (m):	1.83	
Window Area (m^2):	1.1	
Door Area (m^2):	3.7	


Insulation Configuration

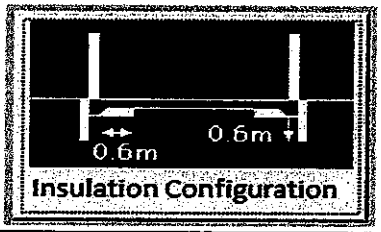
Radiant Slab		
Heated Fraction of the Slab:	0	
Fluid Temperature (°C):	33	
Design Months		
Heating Month	1	
Foundation Loads		
Heating Load (Watts):	**1864**	

TYPE: GRANDVILLE 2 WUB
LO# 90145

HVAC Designs Ltd.
375 Finley Ave, Suite 202
Ajax ON, L1S 2E2
905-619-2300

Residential Slab on Grade Thermal Load Calculator

Supplemental tool for CAN/CSA-F280

Weather Station Description		
Province:	Ontario	
Region:	Hamilton	
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):	**4.6**	
Exposed Perimeter (m):	**6.1**	
Radiant Slab		
Heated Fraction of the Slab:	**0**	
Fluid Temperature (°C):	**33**	
Design Months		
Heating Month	**1**	
Results		
Heating Load (Watts):	**51**	

TYPE: GRANDVILLE 2 WUB
LO# 90145

HVAC Designs Ltd.
375 Finley Ave, Suite 202
Ajax ON, L1S 2E2
905-619-2300

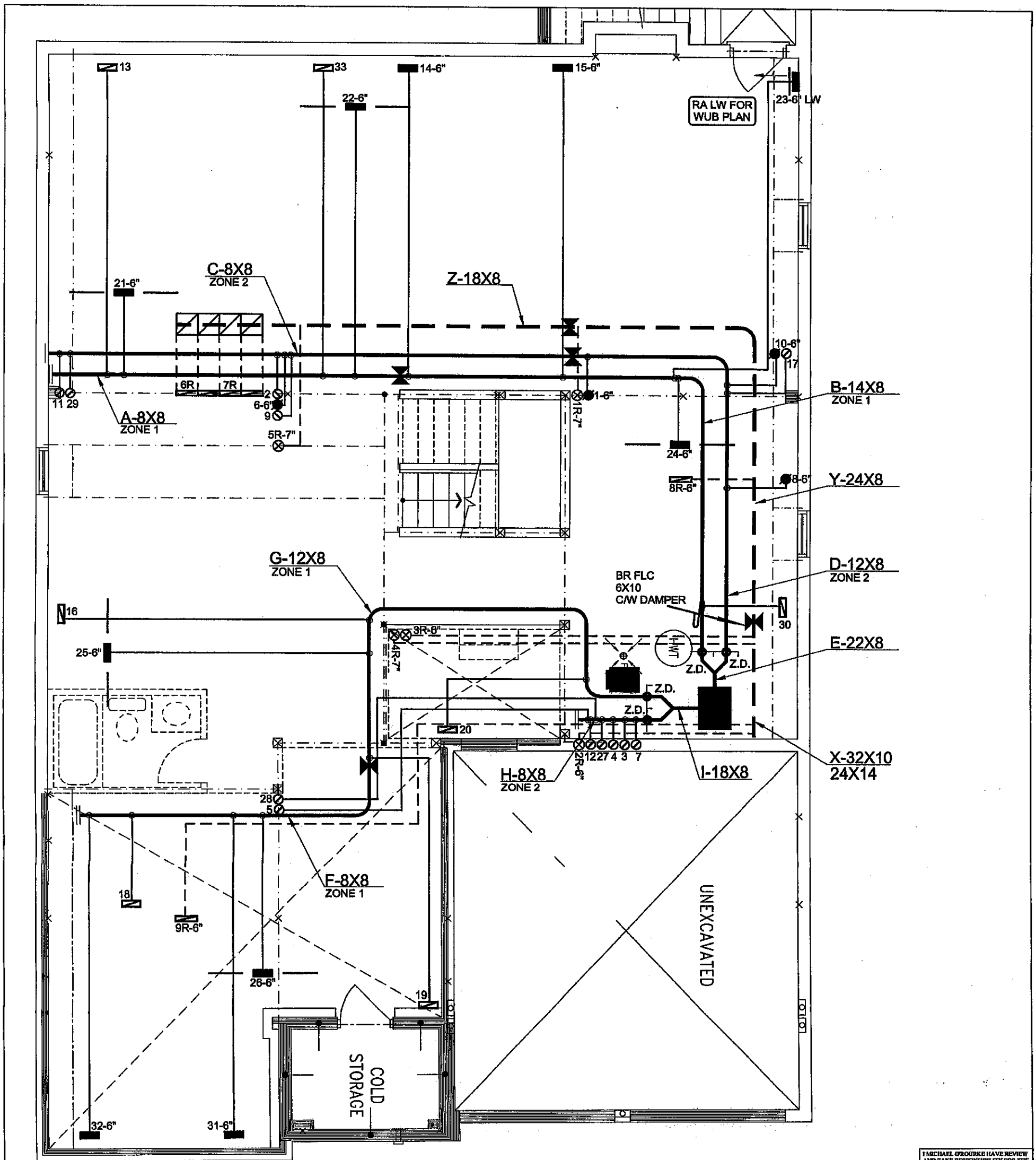
Air Infiltration Residential Load Calculator

Supplemental tool for CAN/CSA-F280

Weather Station Description					
Province:	Ontario				
Region:	Hamilton				
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):	6.71				
Building Configuration					
Type:	Detached				
Number of Stories:	Two				
Foundation:	Full				
House Volume (m^3):	1647.8				
Air Leakage/Ventilation					
Air Tightness Type:	Present (1961-) (3.57 ACH)				
Custom BDT Data:	ELA @ 10 Pa.				2196.6 cm^2
	3.57				ACH @ 50 Pa
Mechanical Ventilation (L/s):	Total Supply			Total Exhaust	
	45.0			45.0	
Flue Size					
Flue #:	#1	#2	#3	#4	
Diameter (mm):	0	0	0	0	
Natural Infiltration Rates					
Heating Air Leakage Rate (ACH/H):	**0.310**				
Cooling Air Leakage Rate (ACH/H):	**0.111**				

TYPE: GRANDVILLE 2 WUB

LO# 90145



BASEMENT FLOOR PLAN ELEV. '1'

Z.D. = MECHANICAL ZONE DAMPER

ZONE 1	BASEMENT AND FIRST FLOOR
ZONE 2	SECOND FLOOR

I MICHAEL O'ROURKE HAVE REVIEW AND TAKE RESPONSIBILITY FOR THE DESIGN WORK AND AM QUALIFIED UNDER DIVISION C, 3.2.5 OF THE BUILDING CODE.

Michael O'Rourke, BCIN# 19669
HVAC DESIGNS LTD.

CSA-F280-12

WUB | PACKAGE A1

HVAC LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	SUPPLY AIR GRILLE		6" SUPPLY AIR BOOT ABOVE		14"x6" RETURN AIR GRILLE		RETURN AIR STACK ABOVE
	SUPPLY AIR GRILLE 6" BOOT		SUPPLY AIR STACK FROM 2nd FLOOR		30"x6" RETURN AIR GRILLE		RETURN AIR STACK 2nd FLOOR
	SUPPLY AIR BOOT ABOVE		6" SUPPLY AIR STACK 2nd FLOOR		FRA- FLOOR RETURN AIR GRILLE		REDUCER

No.	Description	Date
3.		
2.		
1.		

REVISIONS

Client
GREENPARK HOMES

Project Name
RUSSELL GARDENS PH. 4
HAMILTON, ONTARIO

WUB
GRANDVILLE 2 4178 sqft

HVAC DESIGNS LTD.
375 Finley Ave. Suite 202 - Ajax, Ontario
L1S 2E2 Tel. 905.619.2300 - 905.420.5300 Fax 905.619.2375
Email: info@hvacdesigns.ca
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Specializing in Residential Mechanical Design Services

Installation to comply with the latest Ontario Building Code. All supply branch outlets shall be equipped with a manual balancing damper. Ductwork which passes through the garage or unheated spaces shall be adequately insulated and be gas-proofed.

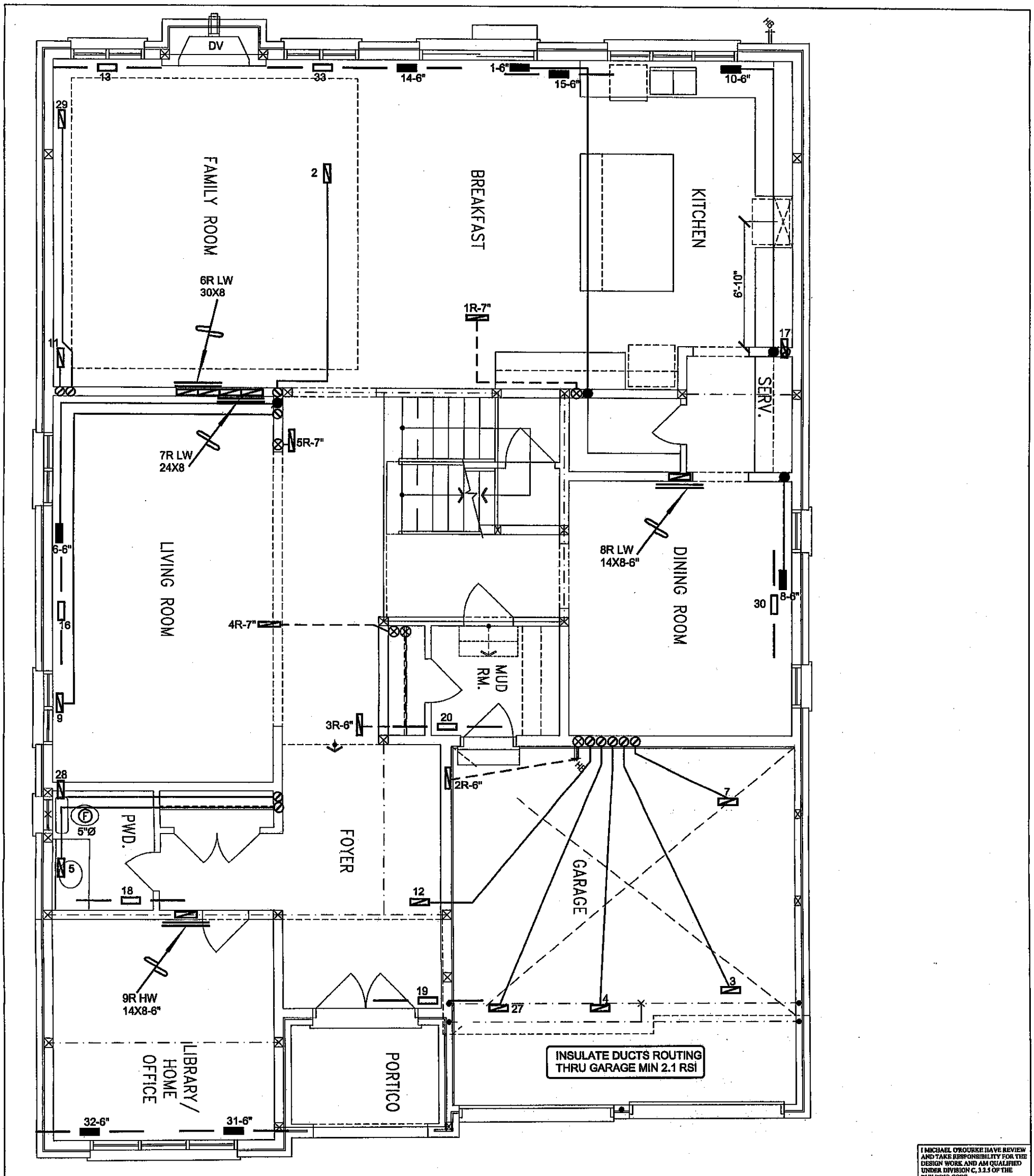
HEAT LOSS 64139 BTU/H	
UNIT DATA	
MAKE	GOODMAN
MODEL	GMVC960804CNA
INPUT	80 MBTU/H
OUTPUT	76.8 MBTU/H
COOLING	4.0 (2 STAGE) TONS
FAN SPEED	1396 cfm @ 0.6" w.c.

# OF RUNS	S/A	R/A	FANS
3RD FLOOR			
2ND FLOOR	16	5	5
1ST FLOOR	11	4	2
BASEMENT	6	1	0

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

Sheet Title
BASEMENT HEATING LAYOUT

Date APR/2021
Scale 3/16" = 1'-0"
BCIN# 19669
LO# 90145



GROUND FLOOR PLAN ELEV. '1'

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CSA-F280-12

WUB | PACKAGE A1

HVAC LEGEND

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	SUPPLY AIR BOOT ABOVE		6" SUPPLY AIR STACK 2nd FLOOR		FRA- FLOOR RETURN AIR GRILLE		REDUCER

No.	Description	Date
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REVISIONS

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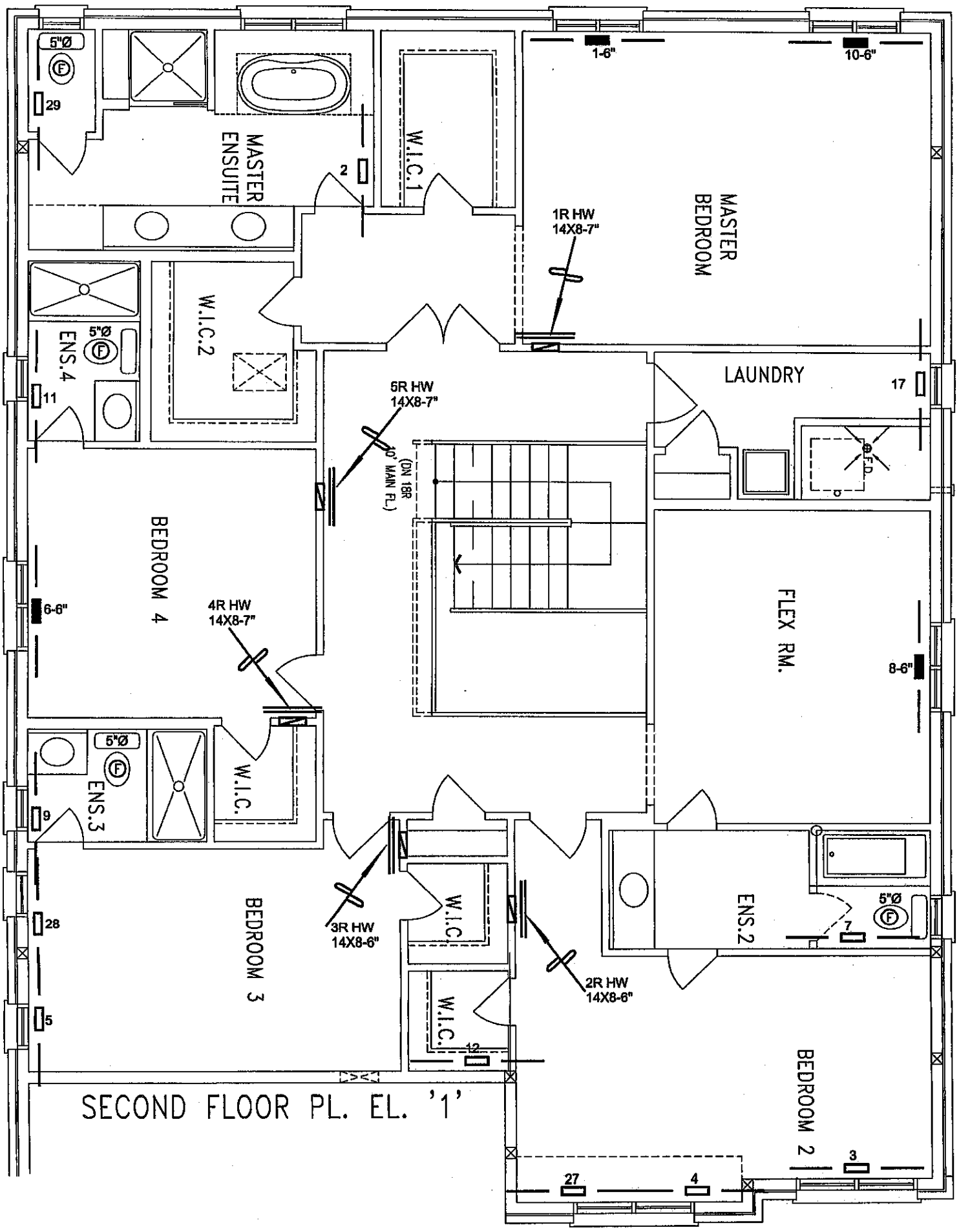
Sheet Title
FIRST FLOOR HEATING LAYOUT

Date APR/2021
Scale 3/16" = 1'-0"
BCIN# 19669
LO# 90145



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CSA-F280-12

WUB | PACKAGE A1

HVAC LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	SUPPLY AIR GRILLE		6" SUPPLY AIR BOOT ABOVE		14"x6" RETURN AIR GRILLE		RETURN AIR STACK ABOVE
	SUPPLY AIR GRILLE 6" BOOT		SUPPLY AIR STACK FROM 2nd FLOOR		30"x8" RETURN AIR GRILLE		RETURN AIR STACK 2nd FLOOR
	SUPPLY AIR BOOT ABOVE		6" SUPPLY AIR STACK 2nd FLOOR		FRA- FLOOR RETURN AIR GRILLE		REDUCER

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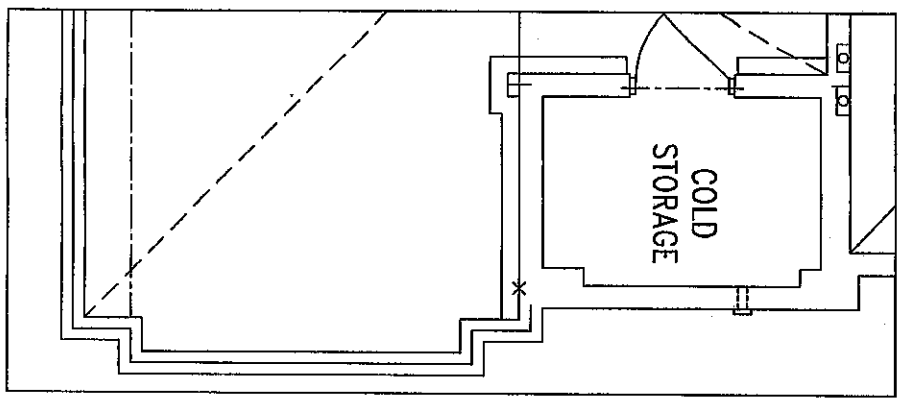
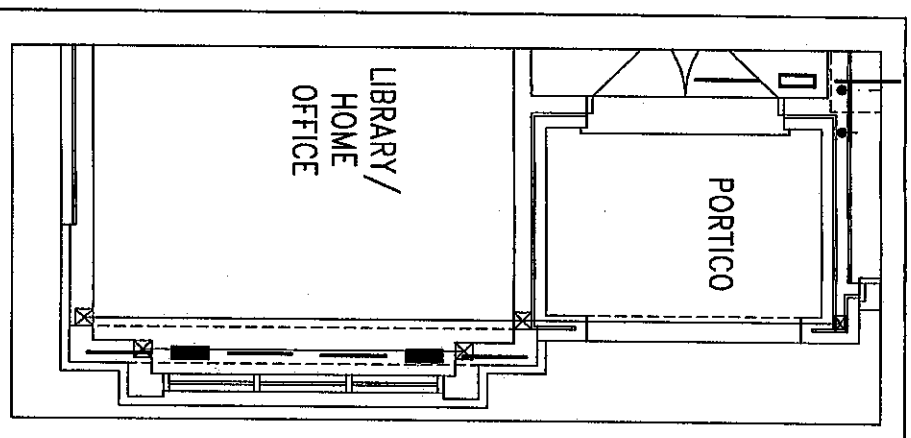
Sheet Title
SECOND FLOOR HEATING LAYOUT

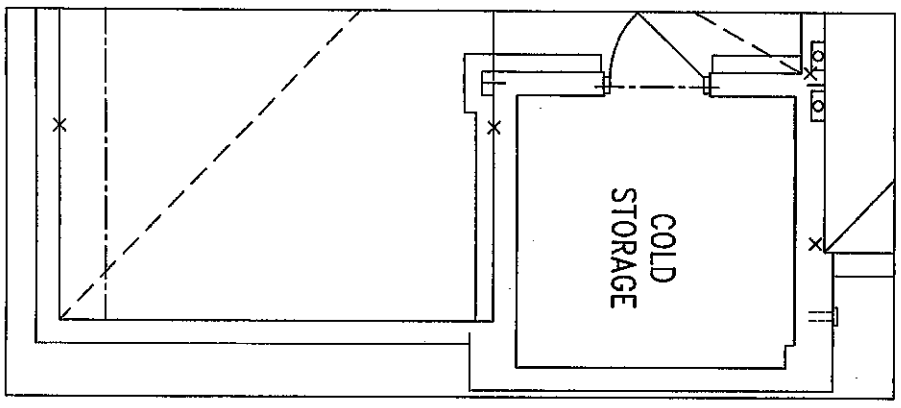
Date APR/2021
Scale 3/16" = 1'-0"
BCIN# 19669
LO# 90145



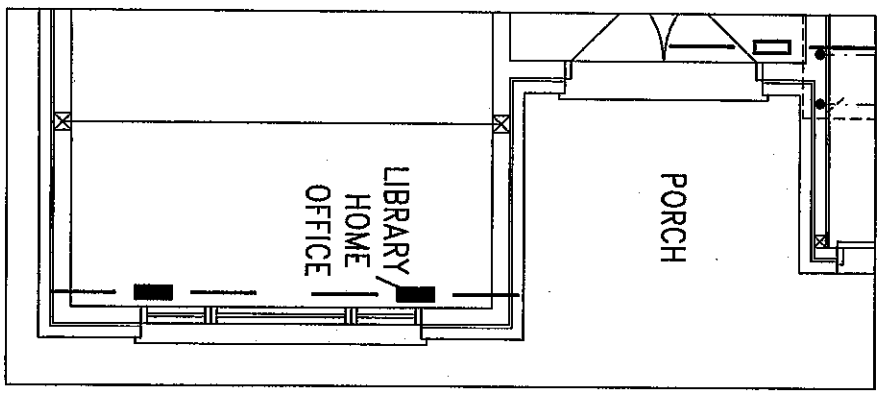
BASEMENT FLOOR PLAN ELEV. '2'



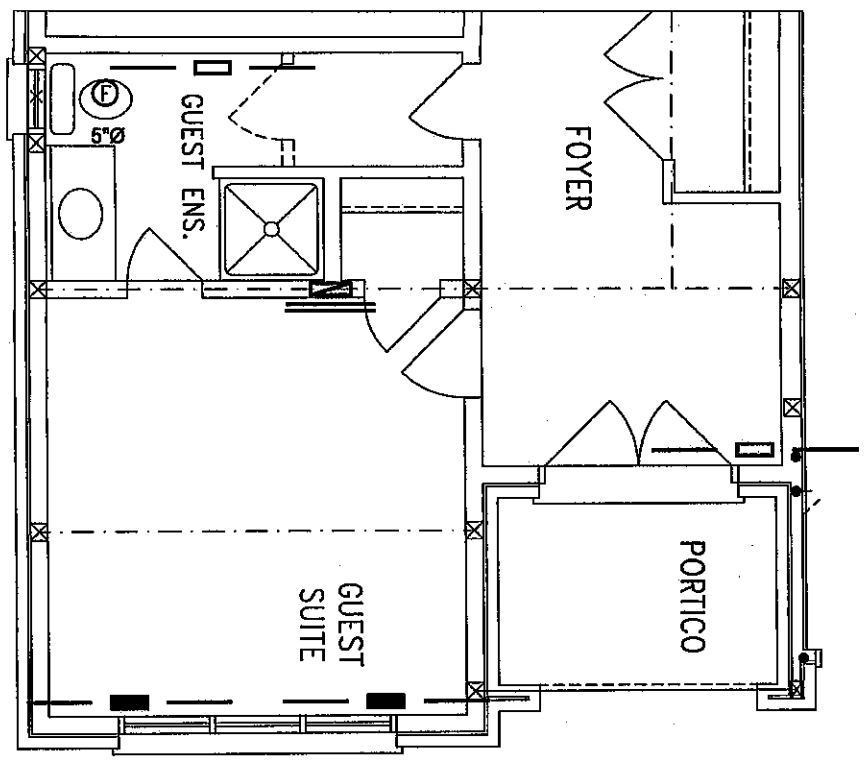
GROUND FLOOR PLAN ELEV. '2'



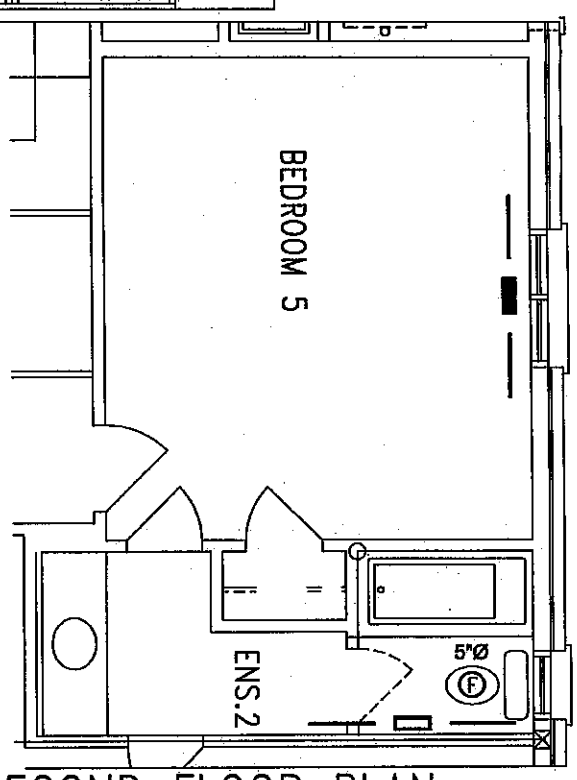
BASEMENT FLOOR PLAN ELEV. '3'



GROUND FLOOR PLAN ELEV. '3'



PART. GROUND FLOOR PLAN
W/ OPT. GUEST SUITE ELEV. '1'



PART. SECOND FLOOR PLAN
W/ OPT. BEDROOM 5

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Michael O'Rourke
Michael O'Rourke, BCIN# 19669
HVAC DESIGNS LTD.

CSA-F280-12

WUB | PACKAGE A1

HVAC LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
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	SUPPLY AIR GRILLE 6" BOOT		SUPPLY AIR STACK FROM 2nd FLOOR		30"x8" RETURN AIR GRILLE		RETURN AIR STACK 2nd FLOOR
	SUPPLY AIR BOOT ABOVE		6" SUPPLY AIR STACK 2nd FLOOR		FRA- FLOOR RETURN AIR GRILLE		REDUCER

No.	Description	Date
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1.		

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Client
GREENPARK HOMES

Project Name
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HAMILTON, ONTARIO

WUB
GRANDVILLE 2 4178 sqft

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Sheet Title
OPTIONAL HEATING LAYOUT

Date APR/2021
Scale 3/16" = 1'-0"
BCIN# 19669
LO# 90145