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: SPRINGFIELD 4 | GFA: 4076 | LO# 90169 | SUMMER NATURAL AIR CHANGE RATE 0.111 | HEAT GAIN ΔT °F. 13 | SB-12 PACKAGE A1

ROOM USE			MBR			ENS			WIC			BED-2			BED-3			BED-4			ENS-2			ENS-3			FL/B-5			ENS-4			HALL		
EXP. WALL			34			31			8			37			13			14			6			6			11			6			39		
CLG. HT.			9			9			9			9			9			9			9			9			9			9			9		
	FACTORS																																	
GRS.WALL AREA	LOSS	GAIN	306			279			72			333			117			126			54			54			99			54			351		
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	14	277	224	0	0	0	0	0	0	7	138	112	0	0	0	16	316	256	0	0	0	0	0	0
EAST	19.8	41.6	0	0	0	0	0	0	0	0	0	62	1226	2576	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	1186	2493
SOUTH	19.8	24.9	0	0	0	0	0	0	0	0	0	0	0	0	11	217	274	11	217	274	0	0	0	7	138	174	0	0	0	7	138	174	0	0	0
WEST	19.8	41.6	32	633	1330	16	316	665	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	274	1136	206	263	1090	198	72	298	54	257	1065	193	106	439	80	116	477	86	47	195	35	47	195	35	83	344	62	47	195	35	291	1206	219
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	343	409	202	228	272	134	112	134	66	202	241	119	247	294	145	252	300	148	72	86	42	90	107	53	264	315	155	90	107	53	165	197	97
NO ATTIC EXPOSED CLG	2.6	1.3	0	0	0	0	0	0	0	0	0	28	71	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EXPOSED FLOOR	2.4	0.4	0	0	0	0	0	0	0	0	0	230	545	99	0	0	0	0	0	0	44	104	19	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			2177			1678			432			3425			951			995			523			441			975			441			2589		
SUB TOTAL HT GAIN				1737			996			120			3246			499			508			208			263			473			263			2809	
LEVEL FACTOR / MULTIPLIER			0.20	0.29		0.20	0.29		0.20	0.29		0.20	0.29		0.20	0.29		0.20	0.29		0.20	0.29		0.20	0.29		0.20	0.29		0.20	0.29		0.20	0.29	
AIR CHANGE HEAT LOSS			628			484			125			987			274			287			151			127			281			127			747		
AIR CHANGE HEAT GAIN				161			92			11			300			46			47			19			24			44			24			260	
DUCT LOSS			0			0			0			441			0			0			67			0			0			0			0		
DUCT GAIN				0			0			0			454			0			0			23			0			0			0			0	
HEAT GAIN PEOPLE	240		2		480	0		0	0		0	1		240	1		240	1		240	0		0	0		0	1		240	0		0	0		0
HEAT GAIN APPLIANCES/LIGHTS					754			0			0			754			754			754			0			0			754			0			0
TOTAL HT LOSS BTU/H				2805			2162			557			4854			1226			1281			742			568			1256			568			3336	
TOTAL HT GAIN x 1.3 BTU/H					4072			1415			170			6492			2001			2015			325			373			1964			373			3989

ROOM USE			FAM			LV/DN			KT/BK			L/HO/G			LND			W/R			FOY			MUD			WUB			BAS		
EXP. WALL			40			28			45			10			0			6			53			25			27			177		
CLG. HT.			10			10			10			10			9			10			10			11			9			9		
	FACTORS																															
GRS.WALL AREA	LOSS	GAIN	400			280			450			100			0			60			530			275			243			1052		
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	23	455	367	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	99	80
EAST	19.8	41.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	136	291	0	0	0	0	0	0	8	158	332
SOUTH	19.8	24.9	0	0	0	36	712	896	0	0	0	12	237	299	0	0	0	7	138	174	0	0	0	0	0	0	0	0	0	10	198	249
WEST	19.8	41.6	47	929	1953	0	0	0	52	1028	2161	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	20	469	85	0	0	0	0	0	0	0	0	0	40	938	170	20	469	85	20	469	85	20	469	85
NET EXPOSED WALL	4.1	0.8	353	1463	265	244	1012	183	355	1472	267	88	365	66	0	0	0	53	220	40	483	2002	363	255	1057	192	0	0	0	223	924	168	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	531	1775	322	0	0	0
EXPOSED CLG	1.2	0.6	0	0	0	0	0	0	0	0	0	0	0	0	120	143	71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NO ATTIC EXPOSED CLG	2.6	1.3	10	26	13	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 FLOOR	2.4	0.4	0	0	0	0	0	0	0	0	0	0	0	0	100	237	43	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			5923					
SLAB ON GRADE HEAT LOSS			0			0			0			0			0			0			0			0			240					
SUBTOTAL HT LOSS			2418			1723			3423			602			380			358			3079			1526			1634			8622		
SUB TOTAL HT GAIN				2231			1080			2880			365			113			214			824			277			253			1068	
LEVEL FACTOR / MULTIPLIER			0.30	0.49		0.30	0.49		0.30	0.49		0.30	0.49		0.20	0.29		0.30	0.49		0.30	0.49		0.30	0.49					0.50	1.05			
AIR CHANGE HEAT LOSS			1195			852			1692			298			110			177			1522			754						10817		
AIR CHANGE HEAT GAIN				206			100			266			34			10			20			76			26						122	
DUCT LOSS			0			0			0			0			49			0			0			0						0		
DUCT GAIN				0			0			0			0			88			0			0			0						0		
HEAT GAIN PEOPLE	240		0		0	0		0	0		0	1		240	0		0	0		0	0		0	0		0	0		0	0		0	0	
HEAT GAIN APPLIANCES/LIGHTS					754			754			754			754			754			0			0										
TOTAL HT LOSS BTU/H				3613			2575			5116			980			538			535			4601			2281			1634			19439		
TOTAL HT GAIN x 1.3 BTU/H					4149			2514			5070			1811			1256			304			1170			393			328			1547

TOTAL HEAT GAIN BTU/H: 42214 TONS: 3.52 LOSS DUE TO VENTILATION LOAD BTU/H: 2866 STRUCTURAL HEAT LOSS: 60585 TOTAL COMBINED HEAT LOSS BTU/H: 63251

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

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
BUILDER: GREENPARK HOMES

WUB
TYPE: SPRINGFIELD 4

DATE: Apr-21

GFA: 4076 LO# 90169

HEATING CFM	1504	COOLING CFM	1504
TOTAL HEAT LOSS	60,585	TOTAL HEAT GAIN	41,731
AIR FLOW RATE CFM	24.82	AIR FLOW RATE CFM	36.04

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	0.03
min adjusted pressure s/a	0.15
r/a pressure	0.17
r/a grille press. Loss	0.02
adjusted pressure r/a	0.15

#*GOODMAN
GMEC960804CNA 80

FAN SPEED	
LOW	868
MEDLOW	978
MEDIUM	1112
MEDIUM HIGH	1504
HIGH	1615

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

DESIGN CFM = 1504
CFM @ .6 " E.S.P.

TEMPERATURE RISE 47 °F

RUN COUNT	4th	3rd	2nd	1st	Bas
S/A	0	0	18	9	6
R/A	0	0	6	3	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	WIC	BED-2	BED-3	BED-4	ENS-2	ENS-3	FL/B-5	MBR	ENS-4	FAM	LV/DN	KT/BK	KT/BK	L/HO/G	LND	W/R	FOY	MUD	BAS	BAS	BAS	BAS
RM LOSS MBH.	1.40	1.08	0.56	1.62	1.23	1.28	0.37	0.57	1.26	1.40	0.57	1.81	2.57	2.56	2.56	0.90	0.54	0.54	4.60	2.28	3.51	3.51	3.51	3.51
CFM PER RUN HEAT	35	27	14	40	30	32	9	14	31	35	14	45	64	63	63	22	13	13	114	57	87	87	87	87
RM GAIN MBH.	2.04	0.71	0.17	2.16	2.00	2.01	0.16	0.37	1.96	2.04	0.37	2.07	2.51	2.54	2.54	1.81	1.26	0.30	1.17	0.39	0.31	0.31	0.31	0.31
CFM PER RUN COOLING	73	26	6	78	72	73	6	13	71	73	13	75	91	91	91	65	45	11	42	14	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	0.16	0.16	0.16	0.17	0.17	0.17	0.15	0.17	0.16	0.16	0.16	0.16
ACTUAL DUCT LGH.	49	49	42	39	47	50	37	39	28	37	44	28	21	36	41	31	24	34	36	20	35	55	16	23
EQUIVALENT LENGTH	120	130	100	140	190	120	190	160	150	160	150	140	130	110	90	140	190	150	110	130	100	110	110	100
TOTAL EFFECTIVE LENGTH	169	179	142	179	237	170	227	199	178	197	194	168	151	146	131	171	214	184	146	150	135	165	126	123
ADJUSTED PRESSURE	0.1	0.1	0.12	0.1	0.07	0.1	0.08	0.09	0.1	0.09	0.09	0.1	0.11	0.11	0.12	0.1	0.08	0.09	0.1	0.11	0.12	0.1	0.13	0.13
ROUND DUCT SIZE	5	5	4	5	6	5	4	4	5	5	4	5	6	6	6	5	5	4	6	5	6	6	6	6
HEATING VELOCITY (ft/min)	257	198	161	294	153	235	103	161	228	257	161	330	326	321	321	162	95	149	581	419	444	444	444	444
COOLING VELOCITY (ft/min)	536	191	69	573	367	536	69	149	521	536	149	551	464	464	464	477	330	126	214	103	56	56	56	56
OUTLET GRILL SIZE	3X10	3X10	3X10	3X10	4X10	3X10	3X10	3X10	3X10	3X10	3X10	3X10	4X10	4X10	4X10	3X10	3X10	3X10	4X10	3X10	4X10	4X10	4X10	4X10
TRUNK	C	A	C	E	D	A	E	F	C	A	F	A	F	B	B	E	E	D	D	F	B	A	C	C

RUN #	25	26	27	28	29	30	31	32	33
ROOM NAME	BAS	BAS	HALL	HALL	ENS	BED-2	BED-2	FAM	ENS-2
RM LOSS MBH.	3.51	3.51	1.67	1.67	1.08	1.62	1.62	1.81	0.37
CFM PER RUN HEAT	87	87	41	41	27	40	40	45	9
RM GAIN MBH.	0.31	0.31	1.99	1.99	0.71	2.16	2.16	2.07	0.16
CFM PER RUN COOLING	11	11	72	72	26	78	78	75	6
ADJUSTED PRESSURE	0.16	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17
ACTUAL DUCT LGH.	31	38	50	45	43	46	52	42	37
EQUIVALENT LENGTH	110	120	180	190	110	150	170	110	210
TOTAL EFFECTIVE LENGTH	141	158	230	235	153	196	222	152	247
ADJUSTED PRESSURE	0.11	0.1	0.07	0.07	0.11	0.09	0.08	0.11	0.07
ROUND DUCT SIZE	6	6	6	6	4	5	5	5	4
HEATING VELOCITY (ft/min)	444	444	209	209	310	294	294	330	103
COOLING VELOCITY (ft/min)	56	56	367	367	298	573	573	551	69
OUTLET GRILL SIZE	4X10	4X10	4X10	4X10	3X10	3X10	3X10	3X10	3X10
TRUNK	E	D	D	D	A	E	E	A	E

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	298	0.09	8.7	10	x	8	536	TRUNK G	0	0.00	0	0	x	8	0
TRUNK B	213	0.11	7.3	8	x	8	479	TRUNK H	0	0.00	0	0	x	8	0
TRUNK C	765	0.09	12.3	18	x	8	765	TRUNK I	0	0.00	0	0	x	8	0
TRUNK D	326	0.07	9.5	10	x	8	587	TRUNK J	0	0.00	0	0	x	8	0
TRUNK E	586	0.07	11.9	16	x	8	659	TRUNK K	0	0.00	0	0	x	8	0
TRUNK F	735	0.07	12.9	20	x	8	662	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	230	0.05	9.1	10	x	8	414
TRUNK X	1504	0.05	18.4	32	x	10	677
TRUNK Y	460	0.05	11.8	16	x	8	518
TRUNK Z	465	0.05	11.8	16	x	8	523
DROP	1504	0.05	18.4	24	x	14	645

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	0	
AIR VOLUME	115	130	85	75	115	115	155	310	155	0	0	0	0	0	0	0	249
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	0.15
ACTUAL DUCT LGH.	40	41	33	51	55	60	44	42	34	1	1	1	1	1	1	1	19
EQUIVALENT LENGTH	275	155	195	235	225	265	200	195	210	0	0	0	0	0	0	0	225
TOTAL EFFECTIVE LH	315	196	228	286	280	325	244	237	244	1	1	1	1	1	1	1	244
ADJUSTED PRESSURE	0.05	0.08	0.06	0.05	0.05	0.05	0.06	0.06	0.06	14.80	14.80	14.80	14.80	14.80	14.80	14.80	0.06
ROUND DUCT SIZE	7	6.5	6	6	7	7	7.5	9.7	7.5	0	0	0	0	0	0	0	9
INLET GRILL SIZE	8	8	8	8	8	8	8	8	8	0	0	0	0	0	0	0	8
	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	14	14	30	14	0	0	0	0	0	0	0	30

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

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

TYPE: SPRINGFIELD 4 LO # 90169
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	5	@ 10.6 cfm	53	cfm
Kitchen & Bathrooms	6	@ 10.6 cfm	63.6	cfm
Other Rooms	6	@ 10.6 cfm	63.6	cfm
Table 9.32.3.A.		TOTAL	222.6	cfm

PRINCIPAL VENTILATION CAPACITY REQUIRED 9.32.3.4.(1)

6 Bedrooms

As Per Ashrea 62.2 Dwelling- Unit Ventilation

4.1.1 Total Ventilation Rate

$Q_{tot}=0.03A_{floor}+7.5(N_{br}+1)$

TOTAL 174.8 cfm

SUPPLEMENTAL VENTILATION CAPACITY 9.32.3.5.

Total Ventilation Capacity	222.6	cfm
Less Principal Ventil. Capacity	174.8	cfm
Required Supplemental Capacity	47.8	cfm

PRINCIPAL EXHAUST FAN CAPACITY

Model: VANEE G2400H ECM Location: BSMT

174.8 cfm [✓] HVI Approved

PRINCIPAL EXHAUST HEAT LOSS CALCULATION

CFM		ΔT °F		FACTOR		% LOSS
174.8 CFM	X	71 F	X	1.08	X	0.20

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
W/R	BY INSTALLING CONTRACTOR	50	✓	3.5

HEAT RECOVERY VENTILATOR 9.32.3.11.

Model: VANEE G2400H ECM

210 cfm high 50 cfm low

80 % 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 RESPONIBILITY 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#: 90169 Model: SPRINGFIELD 4 Builder: GREENPARK HOMES Date: 05/04/2021

Volume Calculation

House Volume

Level	Floor Area (ft²)	Floor Height (ft)	Volume (ft³)
Bsmt	1863	9	16767
First	1863	10	18630
Second	2213	9	19917
Third	0	9	0
Fourth	0	9	0
		Total:	55,314.0 ft³
		Total:	1566.3 m³

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 435.09 x 39 °C x 1.2 = 6341 W

= 21635 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 435.09 x 7 °C x 1.2 = 412 W

= 1404 Btu/h

5.2.3.2 Heat Loss due to Mechanical Ventilation

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

175 CFM x 71 °F x 1.08 x 0.20 = 2666 Btu/h

6.2.7 Sensible heat Gain due to Ventilation

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

175 CFM x 13 °F x 1.08 x 0.20 = 483 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	21,635	10,256	1.055
2	0.3		13,130	0.494
3	0.2		15,007	0.288
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

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

HEAT LOSS AND GAIN SUMMARY SHEET

MODEL:	SPRINGFIELD 4		WUB	**BUILDER:**	GREENPARK HOMES
SFQT:	4076	**LO#**	90169	**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):	55314.0	ASSUMED (Y/N):	Y
INTERNAL SHADING:	BLINDS/CURTAINS	ASSUMED OCCUPANTS:	7
INTERIOR LIGHTING LOAD (Btu/h/ft^2):	1.27	DC BRUSHLESS MOTOR (Y/N):	Y
FOUNDATION CONFIGURATION	BCIN_1	DEPTH BELOW GRADE:	6.0 ft
LENGTH: 63.0 ft	WIDTH: 39.0 ft	EXPOSED PERIMETER:	177.0 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

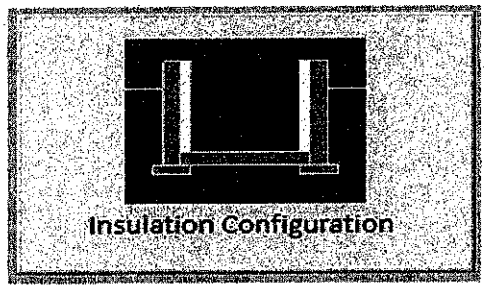
Michael O'Rourke

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):	**19.2**
Floor Width (m):	**11.9**
Exposed Perimeter (m):	**53.9**
Wall Height (m):	**2.7**
Depth Below Grade (m):	**1.83**
Window Area (m^2):	**2.1**
Door Area (m^2):	**3.7**
Radiant Slab	
Heated Fraction of the Slab:	**0**
Fluid Temperature (°C):	**33**
Design Months	
Heating Month	**1**
Foundation Loads	
Heating Load (Watts):	**1735**

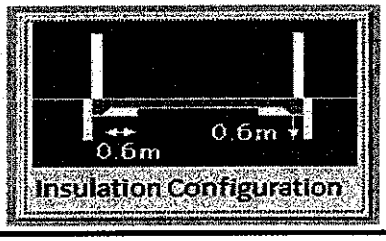


TYPE: SPRINGFIELD 4 WUB
LO# 90169

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):	**1.8**	
Width (m):	**4.6**	
Exposed Perimeter (m):	**8.2**	
Radiant Slab		
Heated Fraction of the Slab:	**0**	
Fluid Temperature (°C):	**33**	
Design Months		
Heating Month	**1**	
Results		
Heating Load (Watts):	**70**	

TYPE: SPRINGFIELD 4 WUB
LO# 90169

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

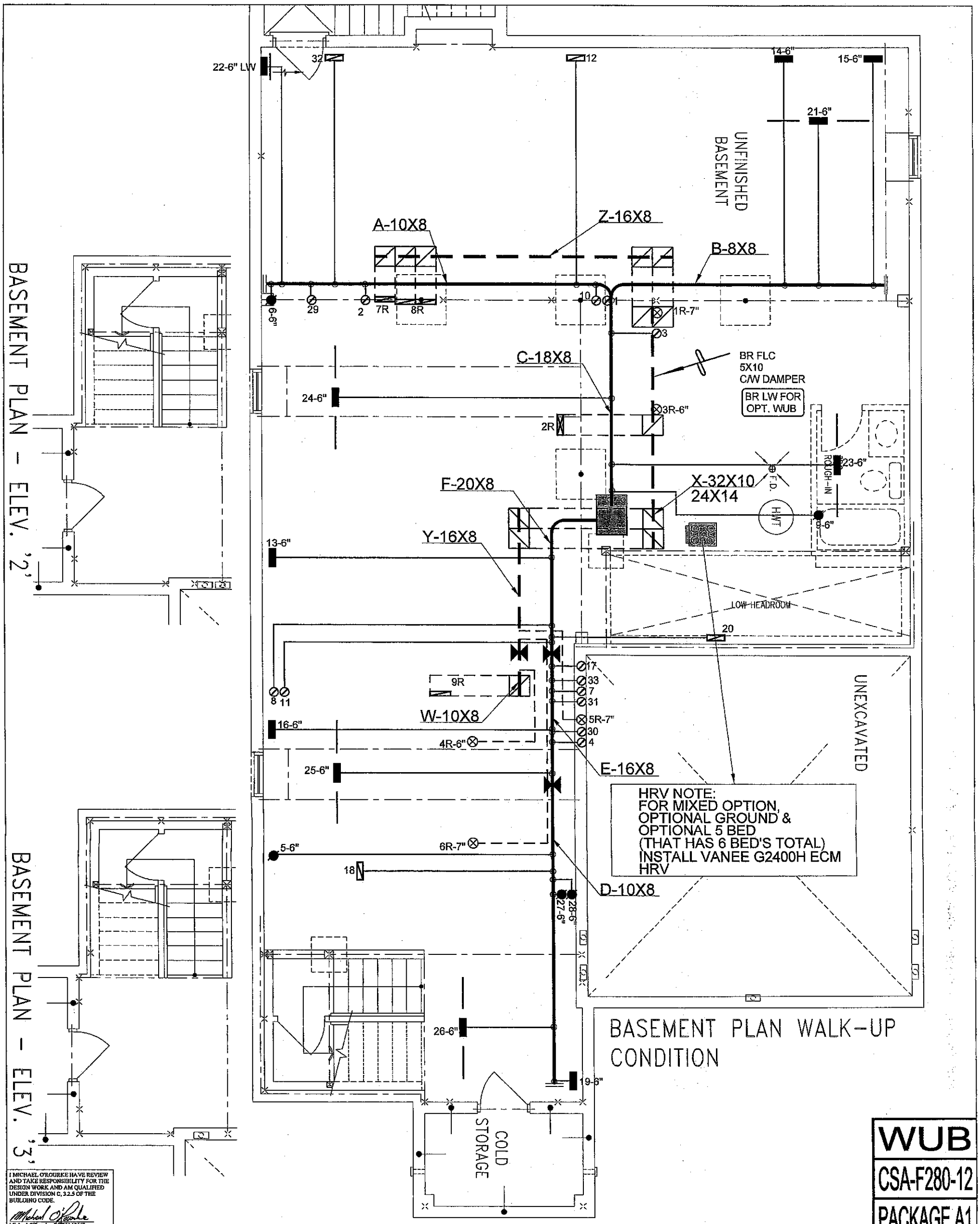
Air Infiltration Residential Load Calculator

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):	1566.3		
Air Leakage/Ventilation			
Air Tightness Type:	Present (1961-) (3.57 ACH)		
Custom BDT Data:	ELA @ 10 Pa.		2088.0 cm^2
	3.57		ACH @ 50 Pa
Mechanical Ventilation (L/s):	Total Supply		Total Exhaust
	82.5		82.5
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: SPRINGFIELD 4 WUB

LO# 90169



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.

WUB
CSA-F280-12
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
	REVISIONS	
3.		
2.		
1.		

Client
GREENPARK HOMES

Project Name
RUSSELL GARDENS PH 4
HAMILTON, ONTARIO

WUB
SPRINGFIELD 4 4076 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
Web: www.hvacdesigns.ca
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 63251 BTU/H

UNIT DATA

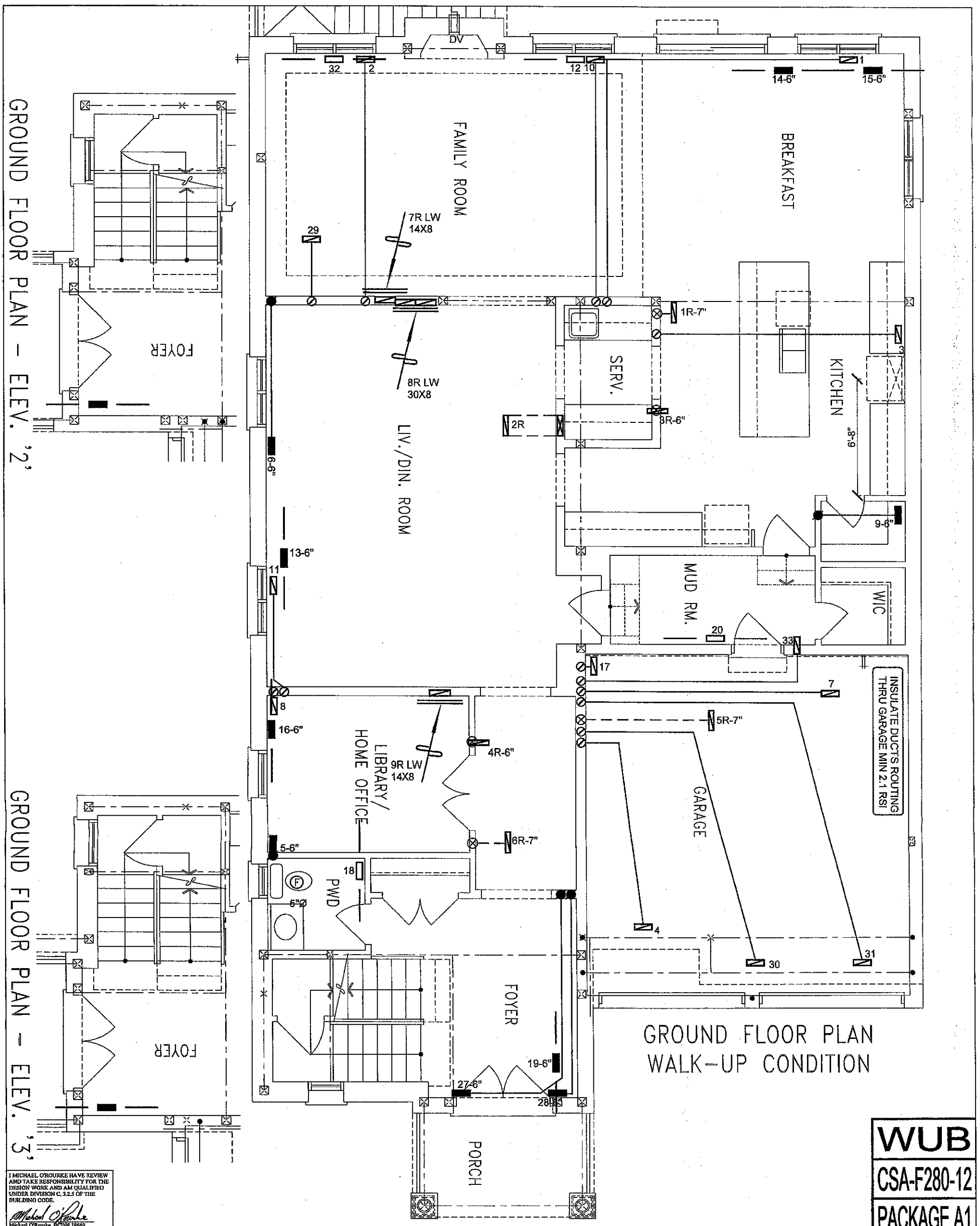
MAKE	GOODMAN	
MODEL	GMEC960804CNA	
INPUT	80	MBTU/H
OUTPUT	76.8	MBTU/H
COOLING	3.5	TONS
FAN SPEED	1504	cfm @ 0.6" w.c.

# OF RUNS	S/A	R/A	FANS
3RD FLOOR			
2ND FLOOR	18	6	6
1ST FLOOR	9	3	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# 90169



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.

WUB
CSA-F280-12
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

No.	Description	Date
3.		
2.		
1.		

REVISIONS

Client
GREENPARK HOMES

Project Name
RUSSELL GARDENS PH 4
HAMILTON, ONTARIO

WUB
SPRINGFIELD 4 4076 sqft

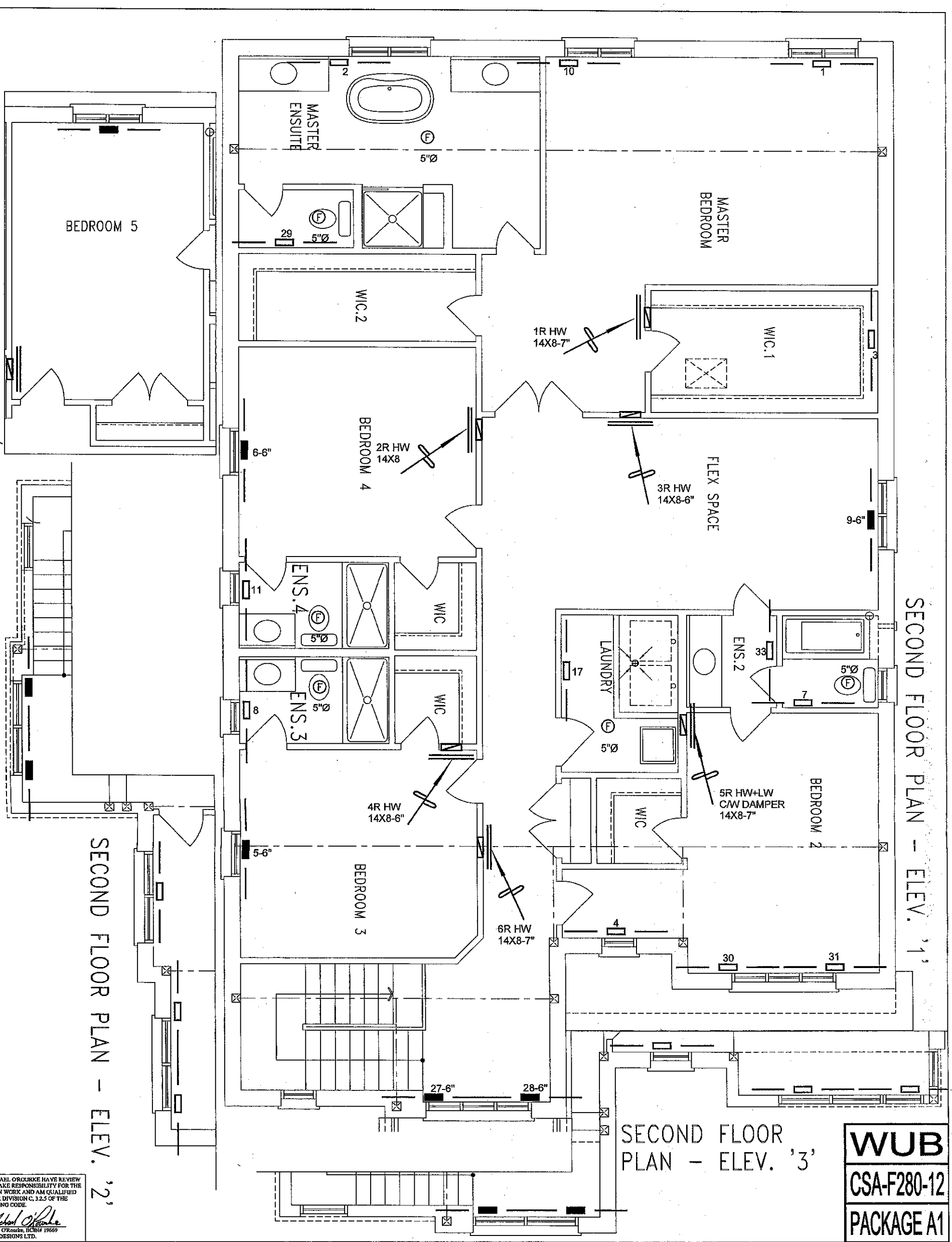
HVAC DESIGNS LTD.
375 Finley Ave. Suite 202 - Ajax, Ontario
L1S 2E2 Tel. 905.619.2300 - 905.420.5300 Fax 905.619.2375
Email: info@hvacdesigns.ca
Web: www.hvacdesigns.ca
Specializing in Residential Mechanical Design Services

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.

Sheet Title
FIRST FLOOR HEATING LAYOUT

Date APR/2021
Scale 3/16" = 1'-0"
BCIN# 19669
LO# 90169

PARTIAL OPT. SECOND FLOOR PLAN W/ BEDROOM 5



SECOND FLOOR PLAN – ELEV. '2'

SECOND FLOOR PLAN – ELEV. '1'

SECOND FLOOR PLAN – ELEV. '3'

WUB

CSA-F280-12

PACKAGE A1

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.

HVAC LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
— ▭ —	SUPPLY AIR GRILLE	▬	6" SUPPLY AIR BOOT ABOVE	▱	14"x8" 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

No.	Description	Date
3.		
2.		
1.		

REVISIONS

Client
GREENPARK HOMES

Project Name
RUSSELL GARDENS PH 4
HAMILTON, ONTARIO

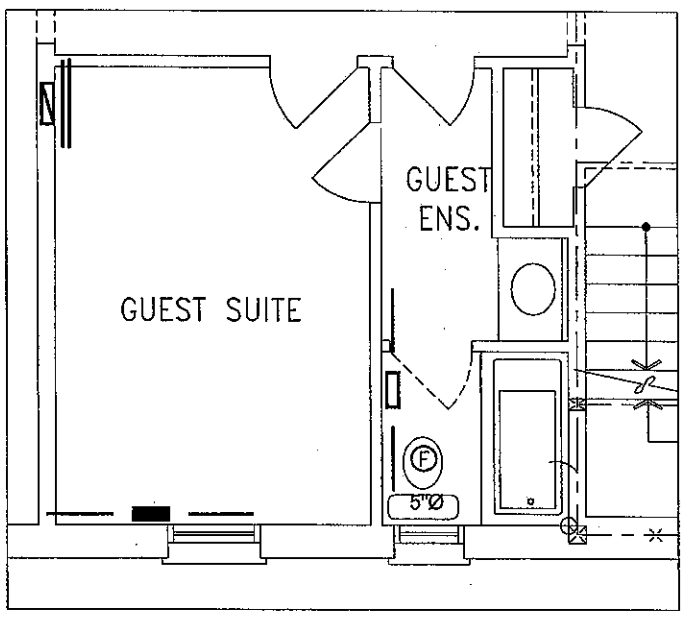
WUB
SPRINGFIELD 4 4076 sqft

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
Web: www.hvacdesigns.ca
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.

Sheet Title
SECOND FLOOR HEATING LAYOUT

Date APR/2021
Scale 3/16" = 1'-0"
BCIN# 19669
LO# 90169



PARTIAL OPT. GROUND FLOOR PLAN W/ GUEST SUITE

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.

WUB
CSA-F280-12
PACKAGE A1

HVAC LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	SUPPLY AIR GRILLE		6" SUPPLY AIR BOOT ABOVE		14"x8" 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

No.	Description	Date
3.		
2.		
1.		

REVISIONS

Client
GREENPARK HOMES

Project Name
RUSSELL GARDENS PH 4
HAMILTON, ONTARIO

WUB
SPRINGFIELD 4 4076 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
Web: www.hvacdesigns.ca
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.

Sheet Title
GUEST SUITE HEATING LAYOUT

Date APR/2021
Scale 3/16" = 1'-0"
BCIN# 19669
LO# 90169