Load Summary

CSA F280 Load Calculation

Project #:L211

October 03, 2023

Project Information

Project #: L211

Name: Matthew Holmes

Location: 10403, Y1A7A1, Whitehorse, Yukon, Canada

Notes:

Outdoor Conditions

Location:	Whitehorse, Yukon Territory
Latitude:	61
Soil Temp:	37.4 °F
Heating Design Temp:	-41.8 °F
Cooling Design Temp:	77.0 °F

Indoor Conditions

	Heating	Cooling
Room Temp:	70 °F °F	75 °F °F
Design ΔT:	111.8 °F	2.0 °F

Infiltration

See detailed load report for all settings	
Stories:	Two
Type:	Detached
Air Tightness:	Custom - BDT values
Heating Air Changes:	0.18 /hr
Cooling Air Changes:	0.02 /hr

Ventilation

Num Occupants: 2

	Heating	Cooling
Air Changes:	0.28 /hr	0.27 /hr
Flowrate:	100 cfm	100 cfm
Effectiveness*:	0.6	0.6

Floorplan/Levels

Ground Floor	1,000 ft²
Main Floor	1,066 ft²
Total Heated Area:	2,066 ft²
Total Cooled Area:	2,131 ft²

Total Heat Loss: 29,233 Btu/hr

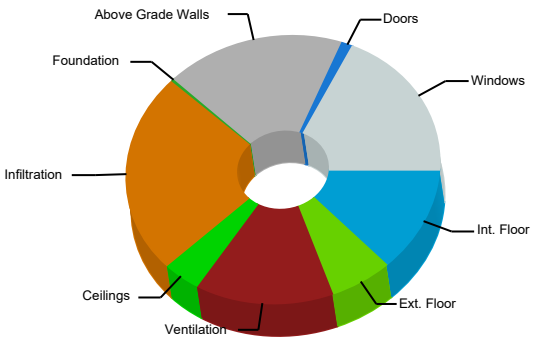
Total Heat Gain: 10,103 Btu/hr

Latent Factor: 1.3

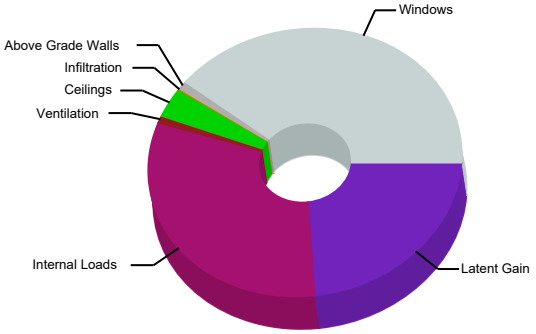
Load Breakdown

Name	Heat Loss	Heat Gain
Windows	6,231	4,013
Doors	386	0
Skylights	0	0
Above Grade Walls	6,133	98
Exposed Floors	0	0
Foundation	102	0
Infiltration	8,095	16
Ceiling	1,354	351
Duct Loads	0	0
Ventilation	4,801	86
Internal Loads	0	3,207
Other Loads	0	0
External Floor Radiant Panel Loss	2,131	0
Internal Floor Radiant Panel Loss	4,209	0
Total Sensible	29,233	7,772
Latent Gain	0	2,332
Total Load	29,233	10,103
Total Area	2,066 ft²	2,131 ft²

Heat Loss Breakdown



Heat Gain Breakdown



(*) Heating: apparent sensible effectiveness of the HRV; Cooling: adjusted total recovery efficiency of the HRV/ERV.

Calculations meet requirements of CSA F280-12 (R2021 Update 3)
Length = ft Area = ft² Temperature = °F Flowrate = USGPM Air Flow = cfm Heat Loss = Btu/hr
Unit Heat Loss = Btu/(hr·ft²) Rv = hr·ft²·°F/btu Head Loss = ft water RH = Radiant Floor Heating
BB = Baseboard FA = Forced Air OTH = Other Heating SM = Snowmelt N = Not Heated

Created Using LoopCAD 2023 (2023-10-24)
Software Version:23.0.0180 R

See sections at end of report for important Notes, Assumptions and Disclaimers.

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Cold weather humidification, or some lifestyles that produce excessive moisture, may cause condensation to occur if the absolute humidity of the indoor air is too high for the momentary circumstances. Condensation can occur on surfaces or concealed within the structure, and can lead to mold, mildew, frost damage, and moisture damage. The software does not perform calculations for the estimation or detection of possible condensation problems, and it is the designers (i.e. software users) responsibility to do so independently if required.

The calculated values shown in this report are based on the data input by the user of the software. Inaccurate or erroneous data input will result in inaccurate or erroneous results. You are strongly advised to review all input data carefully, and to have the calculated results reviewed by an experienced heating professional to ensure reasonableness and suitability for your application.

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Load Details

CSA F280 Load Calculation

Project #:L211

October 03, 2023

Project Information

Project #: L211

Name: Matthew Holmes

Location: 10403, Y1A7A1, Whitehorse, Yukon, Canada

Notes:

CSA Load Details

Total Heating: 29,233 Btu/hr **Total Cooling: 10,103 Btu/hr** **Latent Factor: 1.3**

Outdoor Conditions

Location:	Whitehorse, Yukon Territory
Latitude:	61
Soil Temp:	37.4 °F
Heating Design Temp:	-41.8 °F
Cooling Design Temp:	77.0 °F

Indoor Conditions

	Heating	Cooling
Room Temp:	70 °F	75 °F
Design ΔT:	111.8 °F	2.0 °F

Infiltration

Stories:	Two
Air Tightness:	Custom - BDT values
Building Site:	Suburban, forest
Walls Shielding:	Very heavy
Flue Shielding:	Heavy
Building Type/Foundation:	Detached/ Full
ELA Pressure:	ELA @ 10 Pa
ELA:	26 in²
ACH 50 Pa:	0.70 /hr
Flue Diameters:	4 in, 4 in
Building Volume / Height:	22,093 ft³ / 24'-11"
Heating Air Changes:	0.18 /hr
Cooling Air Changes:	0.02 /hr

Ventilation

	Heating	Cooling
Air Changes:	0.28 /hr	0.27 /hr
Flowrate:	100 cfm	100 cfm
Effectiveness*:	0.6	0.6

Floorplan/Levels

Calculations meet requirements of CSA F280-12 (R2021 Update 3)

Created Using LoopCAD 2023 (2023-10-24)

(1) ΔT: Difference between supply air and return air (2) Estimated air flow based on specified supply air ΔT

Version:23.0.0180 R

(*) Heating: apparent sensible effectiveness of the HRV; Cooling: adjusted total recovery efficiency of the HRV/ERV.

Length = ft Area = ft² Temperature = °F Flowrate = USGPM Air Flow = cfm Heat Loss = Btu/hr Unit Heat Loss = Btu/(hr·ft²) Rv = hr·ft²·°F/btu

Head Loss = ft water RH = Radiant Floor Heating BB = Baseboard FA = Forced Air OTH = Other Heating SM = Snowmelt N = Not Heated

See end of report for important Notes and Disclaimers.

Ground Floor	1,000 ft²	Total Heated Area:	2,066 ft²
Main Floor	1,066 ft²	Total Cooled Area:	2,131 ft²

Constructions

Doors

Description	R-Value	Area	Heating	Cooling
Insulated fiberglass—Polystryrene core	4.83	17	386	0

Walls

Description	R-Value	Area	Heating	Cooling
Wall	48.0	2,805	6,133	98

Ceilings

Description	R-Value	Area	Heating	Cooling
Ceiling	88.0	1,066	1,354	351

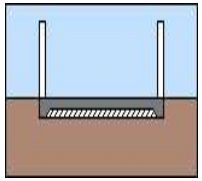
Glazing

Windows

Description	Exposure	R-Value	SHGC	Area	Heating	Cooling
Glass	E	6.4	0.30	57	1,002	795
Glass	S	6.4	0.30	188	3,281	1,917
Glass	W	6.4	0.30	85	1,479	1,174
Glass	N	6.4	0.30	27	469	127

Foundations

ID	Code	Description	Area	Heat Loss	Options
F0	SCB_25	Slab Floors	1,066	2,233	Slab Insulation: 20.0 hr·ft²·°F/btu



F0

Description

SCB_25
- concrete or soil (for crawl space) floor
- bottom of slab fully insulated except under footing/foundation wall (ie. insulation starts 0.25 m from edge)
- first storey is non-brick veneer or bricks thermally broken from concrete floor

Options

Slab Insulation: 20.0 hr·ft²·°F/btu

Duct Loads

All ducts are in conditioned space.

Internal Loads

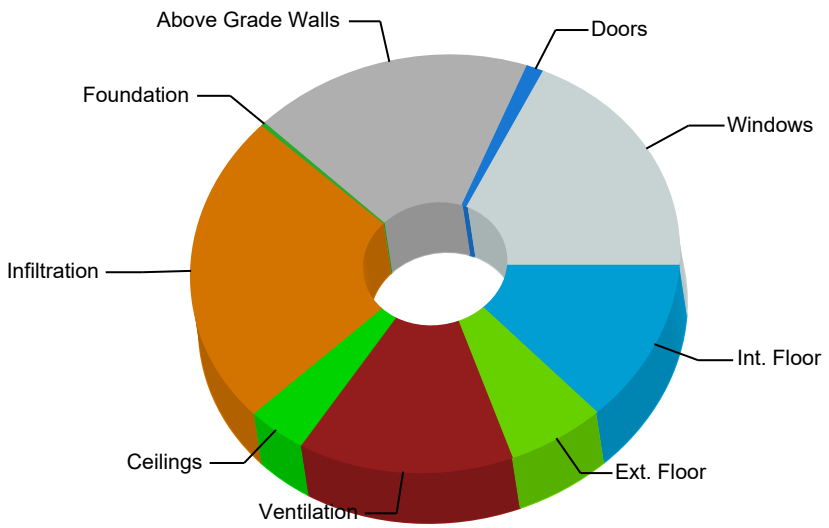
Occupants:	2
Total Internal Heat Gain:	10,103 Btu/hr

No rooms specified at peak cooling. Internal loads will be evenly distributed throughout the building.

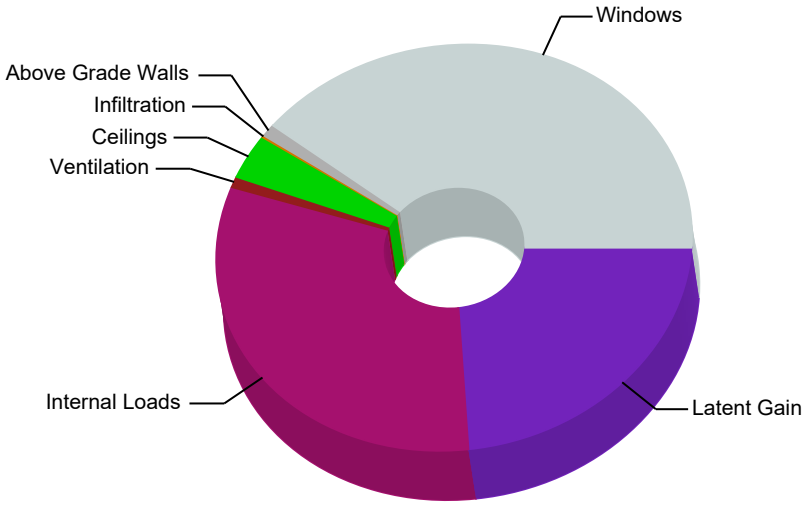
Load Breakdown

Name	Heat Loss	Heat Gain
Windows	6,231	4,013
Doors	386	0
Skylights	0	0
Above Grade Walls	6,133	98
Exposed Floors	0	0
Foundation	102	0
Infiltration	8,095	16
Ceiling	1,354	351
Duct Loads	0	0
Ventilation	4,801	86
Internal Loads	0	3,207
Other Loads	0	0
External Floor Radiant Panel Loss	2,131	0
Internal Floor Radiant Panel Loss	4,209	0
Total Sensible	29,233	7,772
Latent Gain	0	2,332
Total Load	29,233	10,103
Total Area	2,066 ft²	2,131 ft²

Heat Loss Breakdown



Heat Gain Breakdown



Heating Zones

Zone	Area	Room Temp	Total Load
Zone 101	524	70	8,601
Zone 102	476	70	7,078
Zone 201	1,066	70	13,553

Heating Rooms

Room	Area	Room Temp	Total Load
Corridor / Entry	266	70	4,662
Dining	476	70	7,078
Downstair WC	45	70	861
Pantry	73	70	937
Rumpus Room	141	70	2,140
Bedroom 1	146	70	1,552
Bedroom 2	154	70	2,291
Laundry	57	70	337
Library/Office/Upstairs Corridor	341	70	3,498
Primary WC	91	70	1,668
PrimaryBedroom	207	70	3,014
Upstair WC	69	70	1,193

Cooling Zones

Zone	Area	Room Temp	Total Load
C1	2,131	75	10,103

Cooling Rooms

Room	Area	Room Temp	Total Load
Corridor / Entry	266	75	1,378
Dining	476	75	2,505
Downstair WC	45	75	163
Mechanical ROom	66	75	138
Pantry	73	75	143
Rumpus Room	141	75	562
Bedroom 1	146	75	689
Bedroom 2	154	75	730
Laundry	57	75	137
Library/Office/Upstairs Corridor	341	75	1,439

Primary WC	91	75	691
PrimaryBedroom	207	75	1,129
Upstair WC	69	75	399

CSA Room Details

Corridor / Entry (Ground Floor)

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	794	630
Doors	386	0
Above Grade Walls	734	15
Infiltration	1,407	2
Ventilation	727	12
Internal Loads	0	400
External Floor Radiant Panel Loss	615	0
Total Sensible	4,662	1,060
Total Floor Area	266 ft²	266 ft²

Constructions

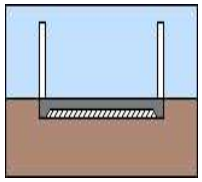
Type	Description	R-Value	Area	Heating	Cooling
Doors	Insulated fiberglass—Polystryrene core	4.83	17	386	0
Walls	Wall	48.0	315	734	15

Glazings

Type	Description	Exposure	R-Value	SHGC	Area	Heating	Cooling
Windows	Glass	E	6.4	0.30	45	794	630

Foundation

ID	Code	Description	Area	Heat Loss	Options
F0	SCB_25	Slab Floors	266	615	Slab Insulation: 20.0 hr·ft²·°F/btu



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Description

SCB_25
- concrete or soil (for crawl space) floor
- bottom of slab fully insulated except under footing/foundation wall (ie. insulation starts 0.25 m from edge)
- first storey is non-brick veneer or bricks thermally broken from concrete floor

Options

Slab Insulation: 20.0 hr·ft²·°F/btu

Dining (Ground Floor)

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	1,819	1,172
Above Grade Walls	1,046	12
Foundation	96	0
Infiltration	2,140	4
Ventilation	1,107	23
Internal Loads	0	716
External Floor Radiant Panel Loss	871	0
Total Sensible	7,078	1,927
Total Floor Area	476 ft²	476 ft²

Constructions

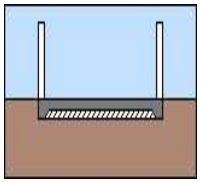
Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	449	1,046	12

Glazings

Type	Description	Exposure	R-Value	SHGC	Area	Heating	Cooling
Windows	Glass	S	6.4	0.30	74	1,296	757
Windows	Glass	W	6.4	0.30	30	523	415

Foundation

ID	Code	Description	Area	Heat Loss	Options
F0	SCB_25	Slab Floors	476	966	Slab Insulation: 20.0 hr·ft²·°F/btu



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Description

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- first storey is non-brick veneer or bricks thermally broken from concrete floor

Options

Slab Insulation: 20.0 hr·ft²·°F/btu

Downstair WC (Ground Floor)

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	208	56
Above Grade Walls	154	0
Foundation	6	0
Infiltration	261	0
Ventilation	135	1
Internal Loads	0	68
External Floor Radiant Panel Loss	98	0
Total Sensible	861	126
Total Floor Area	45 ft²	45 ft²

Constructions

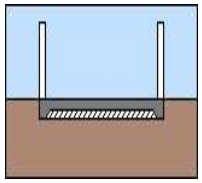
Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	66	154	0

Glazings

Type	Description	Exposure	R-Value	SHGC	Area	Heating	Cooling
Windows	Glass	N	6.4	0.30	12	208	56

Foundation

ID	Code	Description	Area	Heat Loss	Options
F0	SCB_25	Slab Floors	45	104	Slab Insulation: 20.0 hr·ft²·°F/btu



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Description

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- bottom of slab fully insulated except under footing/foundation wall (ie. insulation starts 0.25 m from edge)
- first storey is non-brick veneer or bricks thermally broken from concrete floor

Options

Slab Insulation: 20.0 hr·ft²·°F/btu

Mechanical ROom (Ground Floor)

Load Breakdown

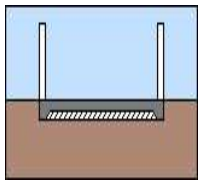
Name	Heat Loss	Heat Gain
Above Grade Walls	0	7
Ventilation	0	0
Internal Loads	0	99
Total Sensible	0	106
Total Floor Area	0 ft²	66 ft²

Constructions

Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	172	0	7

Foundation

ID	Code	Description	Area	Heat Loss	Options
F0	SCB_25	Slab Floors	66	0	Slab Insulation: 20.0 hr·ft²·°F/btu



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Description

SCB_25
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- bottom of slab fully insulated except under footing/foundation wall (ie. insulation starts 0.25 m from edge)
- first storey is non-brick veneer or bricks thermally broken from concrete floor

Options

Slab Insulation: 20.0 hr·ft²·°F/btu

Pantry (Ground Floor)

Load Breakdown

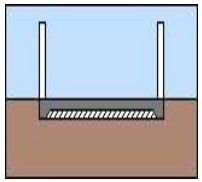
Name	Heat Loss	Heat Gain
Above Grade Walls	324	0
Infiltration	281	0
Ventilation	145	0
Internal Loads	0	110
External Floor Radiant Panel Loss	187	0
Total Sensible	937	110
Total Floor Area	73 ft²	73 ft²

Constructions

Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	139	324	0

Foundation

ID	Code	Description	Area	Heat Loss	Options
F0	SCB_25	Slab Floors	73	187	Slab Insulation: 20.0 hr·ft²·°F/btu



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- first storey is non-brick veneer or bricks thermally broken from concrete floor

Options

Slab Insulation: 20.0 hr·ft²·°F/btu

Rumpus Room (Ground Floor)

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	260	207
Above Grade Walls	542	10
Infiltration	644	1
Ventilation	333	4
Internal Loads	0	211
External Floor Radiant Panel Loss	362	0
Total Sensible	2,140	433
Total Floor Area	141 ft²	141 ft²

Constructions

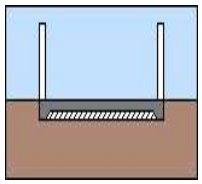
Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	233	542	10

Glazings

Type	Description	Exposure	R-Value	SHGC	Area	Heating	Cooling
Windows	Glass	W	6.4	0.30	15	260	207

Foundation

ID	Code	Description	Area	Heat Loss	Options
F0	SCB_25	Slab Floors	141	362	Slab Insulation: 20.0 hr·ft²·°F/btu



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Options

Slab Insulation: 20.0 hr·ft²·°F/btu

Bedroom 1 (Main Floor)

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	436	254
Above Grade Walls	276	0
Infiltration	385	1
Ceiling	186	48
Ventilation	270	6
Internal Loads	0	220
Internal Floor Radiant Panel Loss	324	0
Total Sensible	1,552	530
Total Floor Area	146 ft²	146 ft²

Constructions

Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	118	276	0
Ceilings	Ceiling	88.0	146	186	48
Radiant Floors	Concrete Thin Slab; R-6.31 Insulation Below Tubing.	6.31	146	324	0

Glazings

Type	Description	Exposure	R-Value	SHGC	Area	Heating	Cooling
Windows	Glass	S	6.4	0.30	25	436	254

Bedroom 2 (Main Floor)

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	436	254
Above Grade Walls	694	18
Infiltration	568	1
Ceiling	196	51
Ventilation	398	6
Internal Loads	0	232
Internal Floor Radiant Panel Loss	1,658	0
Total Sensible	2,291	562
Total Floor Area	154 ft²	154 ft²

Constructions

Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	298	694	18
Ceilings	Ceiling	88.0	154	196	51
Radiant Floors	Concrete Thin Slab; R-6.31 Insulation Below Tubing.	6.31	154	1,658	0

Glazings

Type	Description	Exposure	R-Value	SHGC	Area	Heating	Cooling
Windows	Glass	S	6.4	0.30	25	436	254

Laundry (Main Floor)

Load Breakdown

Name	Heat Loss	Heat Gain
Above Grade Walls	122	0
Infiltration	84	0
Ceiling	72	19
Ventilation	59	0
Internal Loads	0	86
Internal Floor Radiant Panel Loss	80	0
Total Sensible	337	105
Total Floor Area	57 ft²	57 ft²

Constructions

Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	53	122	0
Ceilings	Ceiling	88.0	57	72	19
Radiant Floors	Concrete Thin Slab; R-6.31 Insulation Below Tubing.	6.31	57	80	0

Library/Office/Upstairs Corridor (Main

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	941	468
Above Grade Walls	648	0
Infiltration	868	2
Ceiling	434	112
Ventilation	607	11
Internal Loads	0	514
Internal Floor Radiant Panel Loss	856	0
Total Sensible	3,498	1,107
Total Floor Area	341 ft²	341 ft²

Constructions

Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	278	648	0
Ceilings	Ceiling	88.0	341	434	112
Radiant Floors	Concrete Thin Slab; R-6.31 Insulation Below Tubing.	6.31	341	856	0

Glazings

Type	Description	Exposure	R-Value	SHGC	Area	Heating	Cooling
Windows	Glass	N	6.4	0.30	15	261	71
Windows	Glass	S	6.4	0.30	39	680	397

Primary WC (Main Floor)

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	436	346
Above Grade Walls	413	10
Infiltration	414	1
Ceiling	116	30
Ventilation	290	7
Internal Loads	0	137
Internal Floor Radiant Panel Loss	385	0
Total Sensible	1,668	531
Total Floor Area	91 ft²	91 ft²

Constructions

Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	177	413	10
Ceilings	Ceiling	88.0	91	116	30
Radiant Floors	Concrete Thin Slab; R-6.31 Insulation Below Tubing.	6.31	91	385	0

Glazings

Type	Description	Exposure	R-Value	SHGC	Area	Heating	Cooling
Windows	Glass	W	6.4	0.30	25	436	346

PrimaryBedroom (Main Floor)

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	695	460
Above Grade Walls	785	16
Infiltration	748	2
Ceiling	263	68
Ventilation	523	10
Internal Loads	0	312
Internal Floor Radiant Panel Loss	623	0
Total Sensible	3,014	869
Total Floor Area	207 ft²	207 ft²

Constructions

Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	337	785	16
Ceilings	Ceiling	88.0	207	263	68
Radiant Floors	Concrete Thin Slab; R-6.31 Insulation Below Tubing.	6.31	207	623	0

Glazings

Type	Description	Exposure	R-Value	SHGC	Area	Heating	Cooling
Windows	Glass	S	6.4	0.30	25	434	254
Windows	Glass	W	6.4	0.30	15	261	207

Upstair WC (Main Floor)

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	208	165
Above Grade Walls	395	11
Infiltration	296	1
Ceiling	87	23
Ventilation	207	4
Internal Loads	0	103
Internal Floor Radiant Panel Loss	281	0
Total Sensible	1,193	307
Total Floor Area	69 ft²	69 ft²

Constructions

Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	169	395	11
Ceilings	Ceiling	88.0	69	87	23
Radiant Floors	Concrete Thin Slab; R-6.31 Insulation Below Tubing.	6.31	69	281	0

Glazings

Type	Description	Exposure	R-Value	SHGC	Area	Heating	Cooling
Windows	Glass	E	6.4	0.30	12	208	165

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Heating System Summary

Project #:L211
October 03, 2023

Project Information

Project #: L211
Name: Matthew Holmes
Location: 10403, Y1A7A1, Whitehorse, Yukon, Canada

Notes:

Project Summary

Load Calculation Method:	CSA F280-12	Total Circuit Lengths:		Component Losses:	14,206 Btu/hr
Design Location:	Whitehorse, Yukon Territory	Barrier PEX 1/2"	2,320 ft	Infiltration/Ventilation:	12,896 Btu/hr
Outdoor Temperature:	-41.8 °F			Radiant Back Losses:	2,131 Btu/hr
Floorplans / Levels:		Total RH Circuits:	10	Total Heating Load:	29,233 Btu/hr
Ground Floor	1,000 ft²	Total Manifolds:	1		
Main Floor	1,066 ft²	Total Zones:	3	Radiant Heating:	26,752 Btu/hr
Total Area:	2,066 ft²			Radiant Back Losses:	2,131 Btu/hr
		Fluid Type:	30% Propylene Glycol	Other:	350 Btu/hr
		Total Tubing Volume:	21.35 USG	Total Heating Load:	29,233 Btu/hr
		Glycol Volume:	6.41 USG		
		Surface Temperature:	82 - 84 °F		

Zone Heating Summary

Zone #	Gross Area	Construction	Heating Types	RH[1] Circuits	Total Tubing	Manifolds	Flowrate	Head Loss (Circuit Only)	RH Load[2]	Supplemental	Zone Load[3]
Zone 101	524	Embedded Slab	RH,OTH	3	578	1	1.33	2.2	8,508	94	8,601
Zone 102	476	Embedded Slab	RH	2	516	1	0.88	3.1	7,078	0	7,078
Zone 201	1,066	Concrete Thin Slab	RH,OTH	5	1,226	1	2.34	4.2	17,506	256	17,762

(1) Complete circuits assigned to this zone. (2) Total Radiant heating load for rooms in zone, including all panel back loss. (3) Total load for zone including all panel back loss. Does not account for reclaimed loss within building envelope.

Room Heating Summary (By Construction Type)

Embedded Slab

Zone #	Room Name	Heating Type	Floor Area	Heated Area	Manifold #	Tube Size	RH Circuits[1]	Tube Spacing	Tubing In Room	Floor Cover RV	Required Temp.	Unit RH Load	RH Load[2]	Supplemental	Total Load[3]
Zone 101	Corridor / Entry	RH	207	203	Manifold 1	1/2"	1	10	259	0.5	114	23.0	4,662	0	4,662
Zone 101	Downstair WC	RH, OTH	29	27	Manifold 1	1/2"	1	10	34	0.5	120	28.6	768	94	861
Zone 101	Pantry	RH	48	48	n/a	n/a	0	10	55	0.5	0	19.5	937	0	937
Zone 101	Rumpus Room	RH	107	107	Manifold 1	1/2"	1	10	124	0.5	108	20.0	2,140	0	2,140
Zone 102	Dining	RH	406	352	Manifold 1	1/2"	2	10	419	0.5	110	20.1	7,078	0	7,078

(1) Circuits assigned to this room. Leaders from other rooms may not be counted. (2) Includes panel back loss. (3) Total load including panel back loss. Does not account for reclaimed loss within building envelope.

Concrete Thin Slab

Zone #	Room Name	Heating Type	Floor Area	Heated Area	Manifold #	Tube Size	RH Circuits[1]	Tube Spacing	Tubing In Room	Floor Cover RV	Required Temp.	Unit RH Load	RH Load[2]	Supplemental	Total Load[3]
Zone 201	Bedroom 1	RH	117	117	Manifold 1	1/2"	1	10	143	0.5	101	16.1	1,876	0	1,876
Zone 201	Bedroom 2	RH	119	119	n/a	n/a	0	10	155	0.5	0	33.3	3,950	0	3,950
Zone 201	Laundry	RH	40	40	Manifold 1	1/2"	1	10	53	0.5	93	10.4	417	0	417
Zone 201	Library/Office/ Upstairs Corridor	RH	279	232	Manifold 1	1/2"	1	10	287	0.5	104	18.8	4,354	0	4,354
Zone 201	Primary WC	RH, OTH	65	62	n/a	n/a	0	10	80	0.5	0	31.3	1,926	128	2,053
Zone 201	PrimaryBedroom	RH	166	166	Manifold 1	1/2"	1	10	205	0.5	108	21.9	3,637	0	3,637
Zone 201	Upstair WC	RH, OTH	46	43	Manifold 1	1/2"	1	10	50	0.5	120	31.5	1,346	129	1,474

(1) Circuits assigned to this room. Leaders from other rooms may not be counted. (2) Includes panel back loss. (3) Total load including panel back loss. Does not account for reclaimed loss within building envelope.

Manifold Summary

Manifold Name	# Zones	# Circuits	Flow	Head Loss[1]	Required Temp.	Supplied Temp.	Temp Drop	Manifold Type	Control Type	# Actuators	S/R Length[2]	S/R Pipe
Manifold 1	3	10	4.56	4.9	120	120	20	Stainless Steel	Circuit	10	-	-
Total	3	10	4.56	4.9	-	-	-	-	-	10	-	-

(1) Total Head loss includes manifold, circuits and supply/return piping if specified. (2) S/R Length = one way

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Heating System Detail

Project #:L211
October 03, 2023

Project Information

Project #: L211
Name: Matthew Holmes
Location: 10403, Y1A7A1, Whitehorse, Yukon, Canada

Notes:

Design Conditions and Summary

Load Calculation Method:	CSA F280-12
Design Location:	Whitehorse, Yukon Territory
Outdoor Temperature:	-41.8 °F
Floorplans / Levels:	
Ground Floor	1,000 ft²
Main Floor	1,066 ft²
Total Area:	2,066 ft²

Total Tubing Lengths:	
Barrier PEX 1/2"	2,320 ft
Total RH Circuits:	10
Total Manifolds:	1
Total Zones:	3
Fluid Type:	30% Propylene Glycol
Total Tubing Volume:	21.35 USG
Glycol Volume:	6.41 USG

Component Losses:	14,206 Btu/hr
Infiltration/Ventilation:	12,896 Btu/hr
Radiant Back Losses:	2,131 Btu/hr
Total Heating Load:	29,233 Btu/hr
Radiant Heating:	26,752 Btu/hr
Radiant Back Losses:	2,131 Btu/hr
Other:	350 Btu/hr
Total Heating Load:	29,233 Btu/hr

Zone Heating Summary

Zone #	Area	Heating Types	RH Circuits	Flowrate	Head Loss	Supplemental	Rooms
101	524	RH,OTH	3	1.33	2.9	94	Pantry, Rumpus Room, Corridor / Entry, Downstair WC
102	476	RH	2	0.88	3.7	0	Dining
201	1,066	RH,OTH	5	2.34	4.9	256	Primary WC, Laundry, PrimaryBedroom, Bedroom 1, Bedroom 2, Library/Office/Upstairs Corridor, Upstair WC
Total	2,066	RH,OTH	10	4.56	4.9	350	

*RH Loads include internal panel back loss that may not be included in the project total.

Room Heating Summary

Ground Floor

Corridor / Entry

Total Area:	266	ft²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	203	ft²	**Room Design Load:**	4,047 Btu/hr
Room Temperature:	70	°F	Tubing in Floor:	272	ft		
Floor Covering (Rv):	0.5		Circuits in Room:	1		Radiant Load:	4,662 Btu/hr
			Tube Spacing:	10		Baseboard Load:	0 Btu/hr
			Required Surface Temp:	81	°F	Forced Air Load	0 Btu/hr
			Required Water Temp:	114	°F	Other Load:	0 Btu/hr
			Est. Peak Output:	5,035	Btu/hr		
						Radiant Back Loss:	615 Btu/hr
						Recovered Back Loss:	0 Btu/hr
						Total Heat Loss:	4,662 Btu/hr

Dining

Total Area:	476	ft²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	352	ft²	**Room Design Load:**	6,208 Btu/hr
Room Temperature:	70	°F	Tubing in Floor:	434	ft		
Floor Covering (Rv):	0.5		Circuits in Room:	2		Radiant Load:	7,078 Btu/hr
			Tube Spacing:	10		Baseboard Load:	0 Btu/hr
			Required Surface Temp:	80	°F	Forced Air Load	0 Btu/hr
			Required Water Temp:	110	°F	Other Load:	0 Btu/hr
			Est. Peak Output:	8,110	Btu/hr		
						Radiant Back Loss:	871 Btu/hr
						Recovered Back Loss:	0 Btu/hr
						Total Heat Loss:	7,078 Btu/hr

Downstair WC

Total Area:	45	ft²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH,OTH		Heated Area:	27	ft²	**Room Design Load:**	670 Btu/hr
Room Temperature:	70	°F	Tubing in Floor:	36	ft		
Floor Covering (Rv):	0.5		Circuits in Room:	1		Radiant Load:	768 Btu/hr
			Tube Spacing:	10		Baseboard Load:	0 Btu/hr
			Required Surface Temp:	83	°F	Forced Air Load	0 Btu/hr
			Required Water Temp:	120	°F	Other Load:	94 Btu/hr
			Est. Peak Output:	670	Btu/hr		
						Radiant Back Loss:	98 Btu/hr
			Supplemental Req'd:	94	Btu/hr	Recovered Back Loss:	0 Btu/hr
						Total Heat Loss:	861 Btu/hr

Pantry

Total Area:	73	ft²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	48	ft²	**Room Design Load:**	751 Btu/hr
Room Temperature:	70	°F	Tubing in Floor:	58	ft		
Floor Covering (Rv):	0.5		Circuits in Room:	0		Radiant Load:	937 Btu/hr
			Tube Spacing:	10		Baseboard Load:	0 Btu/hr
			Required Surface Temp:	79	°F	Forced Air Load	0 Btu/hr
			Required Water Temp:	106	°F	Other Load:	0 Btu/hr
			Est. Peak Output:	1,168	Btu/hr		
						Radiant Back Loss:	187 Btu/hr
						Recovered Back Loss:	0 Btu/hr
						Total Heat Loss:	937 Btu/hr

Rumpus Room

Total Area:	141	ft²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	107	ft²	**Room Design Load:**	1,779 Btu/hr
Room Temperature:	70	°F	Tubing in Floor:	128	ft		
Floor Covering (Rv):	0.5		Circuits in Room:	1		Radiant Load:	2,140 Btu/hr
			Tube Spacing:	10		Baseboard Load:	0 Btu/hr
			Required Surface Temp:	79	°F	Forced Air Load	0 Btu/hr
			Required Water Temp:	108	°F	Other Load:	0 Btu/hr
			Est. Peak Output:	2,611	Btu/hr		
						Radiant Back Loss:	362 Btu/hr
						Recovered Back Loss:	0 Btu/hr
						Total Heat Loss:	2,140 Btu/hr

Main Floor

Bedroom 1

Total Area:	146	ft²	Radiant Heating:		Load/Loss Summary:	
Heated by:	RH		Heated Area:	117 ft²	**Room Design Load:**	1,552 Btu/hr
Room Temperature:	70	°F	Tubing in Floor:	147 ft		
Floor Covering (Rv):	0.5		Circuits in Room:	1	Radiant Load:	1,876 Btu/hr
			Tube Spacing:	10	Baseboard Load:	0 Btu/hr
			Required Surface Temp:	77 °F	Forced Air Load	0 Btu/hr
			Required Water Temp:	101 °F	Other Load:	0 Btu/hr
			Est. Peak Output:	2,901 Btu/hr		
					Radiant Back Loss:	324 Btu/hr
					Recovered Back Loss:	-324 Btu/hr
					Total Heat Loss:	1,552 Btu/hr

Bedroom 2

Total Area:	154	ft²	Radiant Heating:		Load/Loss Summary:	
Heated by:	RH		Heated Area:	119 ft²	**Room Design Load:**	2,291 Btu/hr
Room Temperature:	70	°F	Tubing in Floor:	159 ft		
Floor Covering (Rv):	0.5		Circuits in Room:	0	Radiant Load:	3,950 Btu/hr
			Tube Spacing:	9	Baseboard Load:	0 Btu/hr
			Required Surface Temp:	81 °F	Forced Air Load	0 Btu/hr
			Required Water Temp:	105 °F	Other Load:	0 Btu/hr
			Est. Peak Output:	3,017 Btu/hr		
					Radiant Back Loss:	1,658 Btu/hr
					Recovered Back Loss:	-1,658 Btu/hr
					Total Heat Loss:	2,291 Btu/hr

Laundry

Total Area:	57	ft²	Radiant Heating:		Load/Loss Summary:	
Heated by:	RH		Heated Area:	40 ft²	**Room Design Load:**	337 Btu/hr
Room Temperature:	70	°F	Tubing in Floor:	54 ft		
Floor Covering (Rv):	0.5		Circuits in Room:	1	Radiant Load:	417 Btu/hr
			Tube Spacing:	10	Baseboard Load:	0 Btu/hr
			Required Surface Temp:	75 °F	Forced Air Load	0 Btu/hr
			Required Water Temp:	93 °F	Other Load:	0 Btu/hr
			Est. Peak Output:	1,017 Btu/hr		
					Radiant Back Loss:	80 Btu/hr
					Recovered Back Loss:	-80 Btu/hr
					Total Heat Loss:	337 Btu/hr

Library/Office/Upstairs Corridor

Total Area:	341	ft²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	232	ft²	**Room Design Load:**	3,498 Btu/hr
Room Temperature:	70	°F	Tubing in Floor:	293	ft		
Floor Covering (Rv):	0.5		Circuits in Room:	1		Radiant Load:	4,354 Btu/hr
			Tube Spacing:	10		Baseboard Load:	0 Btu/hr
			Required Surface Temp:	78	°F	Forced Air Load	0 Btu/hr
			Required Water Temp:	104	°F	Other Load:	0 Btu/hr
			Est. Peak Output:	5,787	Btu/hr		
						Radiant Back Loss:	856 Btu/hr
						Recovered Back Loss:	-856 Btu/hr
						Total Heat Loss:	3,498 Btu/hr

Primary WC

Total Area:	91	ft²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH,OTH		Heated Area:	62	ft²	**Room Design Load:**	1,540 Btu/hr
Room Temperature:	70	°F	Tubing in Floor:	81	ft		
Floor Covering (Rv):	0.5		Circuits in Room:	0		Radiant Load:	1,926 Btu/hr
			Tube Spacing:	9		Baseboard Load:	0 Btu/hr
			Required Surface Temp:	84	°F	Forced Air Load	0 Btu/hr
			Required Water Temp:	120	°F	Other Load:	128 Btu/hr
			Est. Peak Output:	1,540	Btu/hr		
						Radiant Back Loss:	385 Btu/hr
			Supplemental Req'd:	128	Btu/hr	Recovered Back Loss:	-385 Btu/hr
						Total Heat Loss:	1,668 Btu/hr

PrimaryBedroom

Total Area:	207	ft²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	166	ft²	**Room Design Load:**	3,014 Btu/hr
Room Temperature:	70	°F	Tubing in Floor:	210	ft		
Floor Covering (Rv):	0.5		Circuits in Room:	1		Radiant Load:	3,637 Btu/hr
			Tube Spacing:	10		Baseboard Load:	0 Btu/hr
			Required Surface Temp:	80	°F	Forced Air Load	0 Btu/hr
			Required Water Temp:	108	°F	Other Load:	0 Btu/hr
			Est. Peak Output:	4,107	Btu/hr		
						Radiant Back Loss:	623 Btu/hr
						Recovered Back Loss:	-623 Btu/hr
						Total Heat Loss:	3,014 Btu/hr

Upstair WC

Total Area:	69 ft²	Radiant Heating:		Load/Loss Summary:	
Heated by:	RH,OTH	Heated Area:	43 ft²	**Room Design Load:**	1,064 Btu/hr
Room Temperature:	70 °F	Tubing in Floor:	51 ft		
Floor Covering (Rv):	0.5	Circuits in Room:	1	Radiant Load:	1,346 Btu/hr
		Tube Spacing:	10	Baseboard Load:	0 Btu/hr
		Required Surface Temp:	83 °F	Forced Air Load	0 Btu/hr
		Required Water Temp:	120 °F	Other Load:	129 Btu/hr
		Est. Peak Output:	1,064 Btu/hr		
				Radiant Back Loss:	281 Btu/hr
		Supplemental Req'd:	129 Btu/hr	Recovered Back Loss:	-281 Btu/hr
				Total Heat Loss:	1,193 Btu/hr

Radiant Heating Details

Manifold Summary

Manifold Name	Zones	Circuits	Flowrate	Head Loss[1]	Required Temp.	Supplied Temp.	Temp Drop	Manifold Type	Control Type	Actuators	S/R Length[2]	S/R Pipe
Manifold 1	3	10	4.56	4.9	120	120	20	Stainless Steel	Circuit	10	-	-
Total	3	10	4.56	4.9	120	-	-	-	-	10	-	-

(1) Total Head loss includes manifold, circuits and supply/return piping if specified., (2) S/R Length = one way

Tubing Circuit Details

Manifold 1

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss[1]	Temp Drop	Load	Actuator
A-1	Dining	262	10	167	Barrier PEX 1/2"	0.44	3.1	20	3,374	Yes
A-2	Dining	253	10	192	Barrier PEX 1/2"	0.44	3.0	20	3,863	Yes
A-3	Corridor / Entry	193	10	130	Barrier PEX 1/2"	0.44	2.2	20	2,824	Yes
A-4	Rumpus Room	192	10	126	Barrier PEX 1/2"	0.44	2.2	20	2,630	Yes
A-5	Downstair WC	193	10	125	Barrier PEX 1/2"	0.44	2.2	20	2,868	Yes
B-1	Laundry	246	10	161	Barrier PEX 1/2"	0.44	2.9	20	3,079	Yes
B-2	Library/Office/Upstairs Corridor	253	10	157	Barrier PEX 1/2"	0.44	2.9	20	2,949	Yes
B-3	Bedroom 1	248	10	152	Barrier PEX 1/2"	0.44	2.9	20	2,872	Yes
B-4	Upstair WC	229	10	150	Barrier PEX 1/2"	0.57	4.2	20	4,787	Yes
B-6	PrimaryBedroom	251	10	158	Barrier PEX 1/2"	0.44	2.9	20	3,818	Yes
Total	-	2,320		1,518	-	4.56	4.2		33,065	10

(1) Head loss for circuit tubing only

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Water Supply Summary

Project #:L211
October 03, 2023

Project Information

Project #: L211
Name: Matthew Holmes
Location: 10403, Y1A7A1, Whitehorse, Yukon, Canada

Notes:

Supply Summary

Name	Temp	Total Fluid Vol	Total Flow	Head Loss[1]	Load[2]	# Circuits	# Zones
Water Temperature	120	21.35	4.56	4.9	33,065	10	3

(1) Head loss includes manifolds, circuits, and supply/return piping if specified, may also contain control valve losses. (2) Load includes all panel back losses.

Manifold Summary

Manifold Name	Circuits	Flowrate	Required Temp.	Supplied Temp.	Manifold Type	S/R Length[1]	S/R Pipe	Manifold Head Loss	Circuit Head Loss	S/R Head Loss	Total Head Loss[2]
Manifold 1	10	4.56	120	120	Stainless Steel	-	-	0.6	4.2	0.0	4.9
Total	10	4.56	-	-	-	-	-	0.6	4.2	0.0	4.9

(1) S/R Length = one way, (2) Total Head loss includes manifold, circuits and supply/return piping if specified.

Water Temperature (120 °F)

Manifold 1 (120 °F, Stainless Steel, 10 Circuits)

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss[1]	Temp Drop[2]	Load[3]	Actuator
A-1	Dining	262	10	167	Barrier PEX 1/2"	0.44	3.1	20	3,374	Yes
A-2	Dining	253	10	192	Barrier PEX 1/2"	0.44	3.0	20	3,863	Yes
A-3	Corridor / Entry	193	10	128	Barrier PEX 1/2"	0.44	2.2	20	2,824	Yes
A-4	Rumpus Room	192	10	126	Barrier PEX 1/2"	0.44	2.2	20	2,630	Yes
A-5	Downstair WC	193	10	125	Barrier PEX 1/2"	0.44	2.2	20	2,868	Yes
B-1	Laundry	246	10	161	Barrier PEX 1/2"	0.44	2.9	20	3,079	Yes
B-2	Library/Office/Upstairs Corridor	253	10	157	Barrier PEX 1/2"	0.44	2.9	20	2,949	Yes
B-3	Bedroom 1	248	10	152	Barrier PEX 1/2"	0.44	2.9	20	2,872	Yes
B-4	Upstair WC	229	10	150	Barrier PEX 1/2"	0.57	4.2	20	4,787	Yes
B-6	PrimaryBedroom	251	10	158	Barrier PEX 1/2"	0.44	2.9	20	3,818	Yes
Total	-	2,320		1,515	-	4.56	4.2	-	33,065	10

(1) Head loss for circuit tubing only. (2) Design Temp Drop (Estimated Actual Drop). (3) Required load. Includes panel back losses. Does not reflect maximum capacity of the circuit.

Disclaimers

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Cold weather humidification, or some lifestyles that produce excessive moisture, may cause condensation to occur if the absolute humidity of the indoor air is too high for the momentary circumstances. Condensation can occur on surfaces or concealed within the structure, and can lead to mold, mildew, frost damage, and moisture damage. The software does not perform calculations for the estimation or detection of possible condensation problems, and it is the designers (i.e. software users) responsibility to do so independently if required.

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Radiant Panel Schedule

Project #:L211
October 03, 2023

Project Information

Project #: L211
Name: Matthew Holmes
Location: 10403, Y1A7A1, Whitehorse, Yukon, Canada

Notes:

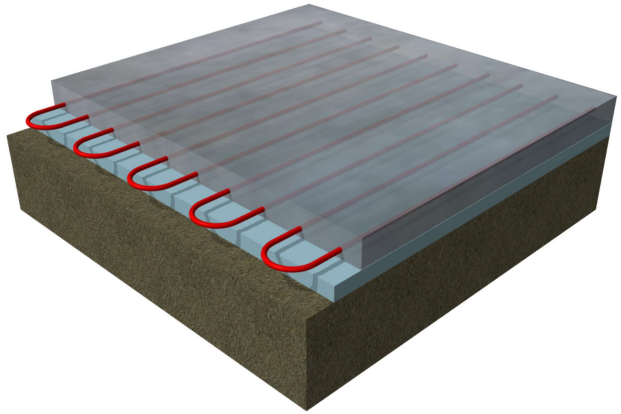
Design Conditions and Summary

Load Calculation Method:	CSA F280-12		Component Losses:	14,206 Btu/hr
Design Location:	Whitehorse, Yukon Territory		Infiltration/Ventilation:	12,896 Btu/hr
Outdoor Temperature:	-41.8 °F		Radiant Back Losses:	2,131 Btu/hr
Floorplans / Levels:			Total Heating Load:	29,233 Btu/hr
Ground Floor	1,000 ft²			
Main Floor	1,066 ft²		Radiant Heating:	26,752 Btu/hr
Total Area:	2,066 ft²		Radiant Back Losses:	2,131 Btu/hr
			Other:	350 Btu/hr
			Total Heating Load:	29,233 Btu/hr

Radiant Panel Details

Panel Type #1 - Embedded Slab

Slab Thickness:	4.0 in
Tube Depth:	2.5 in
Slab R per Inch (Embedding Material):	0.15 °F•ft²•hr/(Btu•in)
Spacing:	10 in
Floorplans:	
Ground Floor	798 ft²



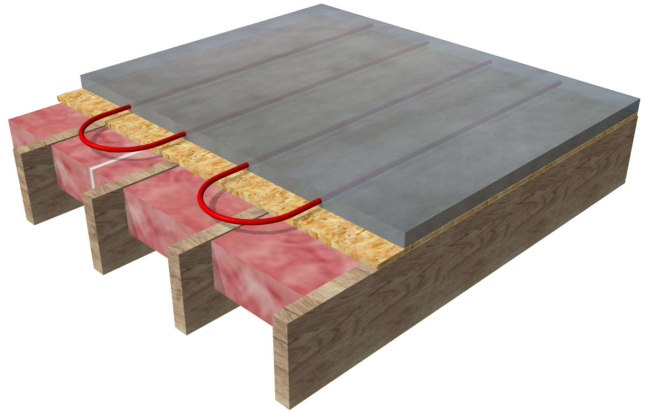
Note: Tube depth is measured from top of embedded layer to the centerline of the tubing.

Created Using LoopCAD 2023 (2023-10-24)
Version:23.0.0180 R

See end of report for important Notes and Disclaimers.

Panel Type #2 - Concrete Thin Slab

Over-pour Thickness:	2.0 in
Over-pour R per Inch:	0.15 °F•ft²•hr/(Btu•in)
Sub-Floor Thickness:	0.750 in
Sub-Floor Rv:	0.9 hr·ft²·°F/btu
Joist Construction:	Joist 2"x10" pine, 16" OC
Joist Spacing:	16 in
Joist Insulation Rv:	5.0 hr·ft²·°F/btu
Insulation Rv	5.0 hr·ft²·°F/btu
Spacing:	10 in
Floorplans:	
Main Floor	831 ft²



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