

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

Infiltration

See detailed load report for all settings
 Stories: Two
 Type: Detached
 Air Tightness: Energy Tight
 Heating Air Changes: 0.30 /hr
 Cooling Air Changes: 0.03 /hr

Floorplan/Levels

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

Indoor Conditions

Heating
 Room Temp: 70 °F °F
 Design ΔT: 111.8 °F

Cooling
 Room Temp: 75 °F °F
 Design ΔT: 2.0 °F

Ventilation

Num Occupants: 2
Heating
 Air Changes: 0.28 /hr
 Flowrate: 100 cfm
 Effectiveness*: 0.6

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

Total Heat Loss: 34,372 Btu/hr

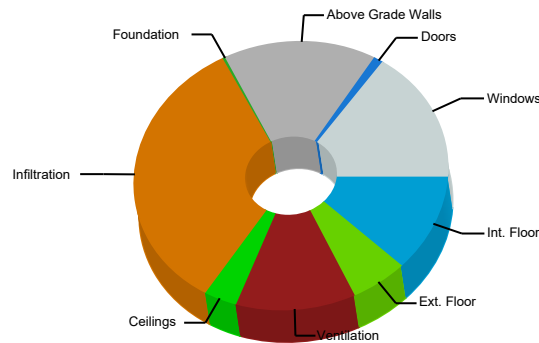
Total Heat Gain: 10,111 Btu/hr

Latent Factor: 1.3

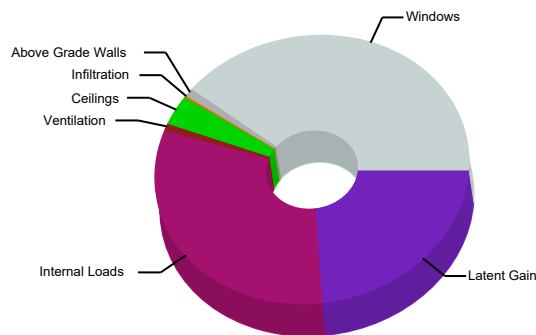
Load Breakdown

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	13,114	23
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	2,251	0
Internal Floor Radiant Panel Loss	4,563	0
Total Sensible	34,372	7,778
Latent Gain	0	2,333
Total Load	34,372	10,111
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

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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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Software Version:23.0.0180 R

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



Load Details

CSA F280 Load Calculation

Project #:L211

October 03, 2023

Project Information

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 Name: Matthew Holmes
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Notes:

CSA Load Details

Total Heating: 34,372 Btu/hr **Total Cooling: 10,111 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: Energy Tight
 Building Site: Suburban, forest
 Walls Shielding: Very heavy
 Flue Shielding: Heavy
 Building Type/Foundation: Detached/ Full
 Flue Diameters: 4 in, 4 in
 Building Volume / Height: 22,093 ft³ / 24'-11"
 Heating Air Changes: 0.30 /hr
 Cooling Air Changes: 0.03 /hr

Ventilation

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

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

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

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Version:23.0.0180 R

See end of report for important Notes and Disclaimers.

Constructions

Doors

Description	R-Value	Area	Heating	Cooling
Insulated fiberglass—Polystyrene 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

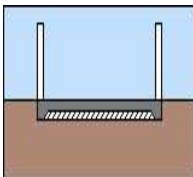
Glazing

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	2,353	Slab Insulation: 20.0 hr-ft ² -°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.

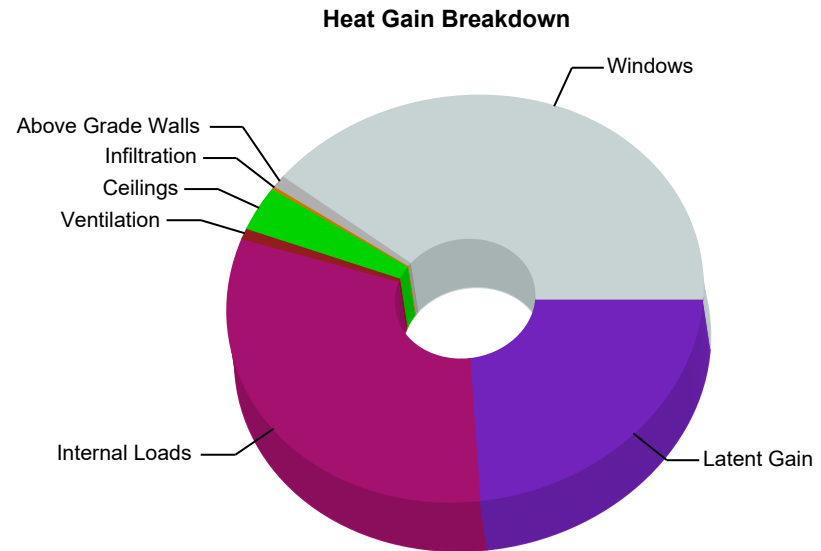
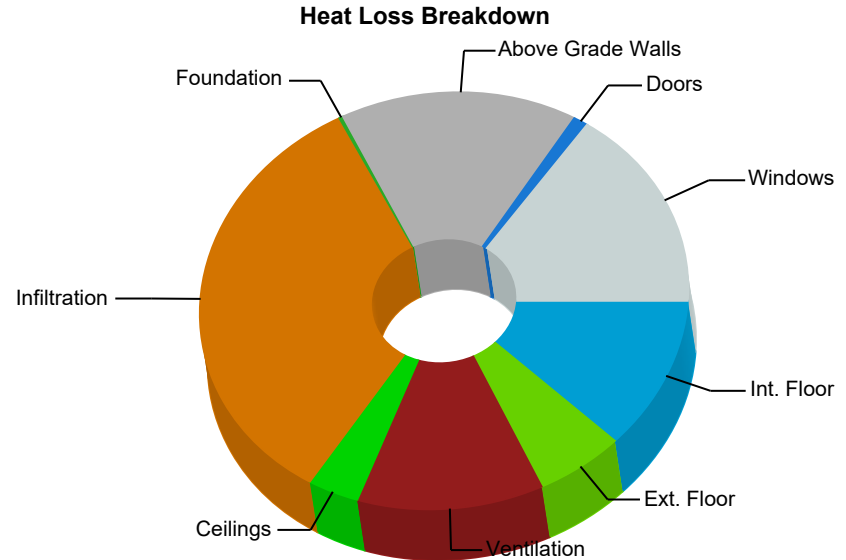
Internal Loads

Occupants: 2
Total Internal Heat Gain: 10,111 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	13,114	23
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	2,251	0
Internal Floor Radiant Panel Loss	4,563	0
Total Sensible	34,372	7,778
Latent Gain	0	2,333
Total Load	34,372	10,111
Total Area	2,066 ft ²	2,131 ft ²



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

Heating Zones

Zone	Area	Room Temp	Total Load
Zone 101	524	70	10,290
Zone 102	476	70	8,462
Zone 201	1,066	70	15,620

Heating Rooms

Room	Area	Room Temp	Total Load
Corridor / Entry	266	70	5,577
Dining	476	70	8,462
Downstair WC	45	70	1,017
Pantry	73	70	1,127
Rumpus Room	141	70	2,568
Bedroom 1	146	70	1,789
Bedroom 2	154	70	2,641
Laundry	57	70	389
Library/Office/Upstairs Corridor	341	70	4,031
Primary WC	91	70	1,922
PrimaryBedroom	207	70	3,474
Upstair WC	69	70	1,375

Cooling Zones

Zone	Area	Room Temp	Total Load
C1	2,131	75	10,111

Cooling Rooms

Room	Area	Room Temp	Total Load
Corridor / Entry	266	75	1,379
Dining	476	75	2,508
Downstair WC	45	75	163
Mechanical ROom	66	75	138
Pantry	73	75	143
Rumpus Room	141	75	563
Bedroom 1	146	75	689
Bedroom 2	154	75	731
Laundry	57	75	137
Library/Office/Upstairs Corridor	341	75	1,440

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

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

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Primary WC	91	75	692
PrimaryBedroom	207	75	1,130
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	2,280	3
Ventilation	733	12
Internal Loads	0	400
External Floor Radiant Panel Loss	651	0
Total Sensible	5,577	1,061
Total Floor Area	266 ft ²	266 ft ²

Constructions

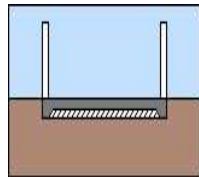
Type	Description	R-Value	Area	Heating	Cooling
Doors	Insulated fiberglass—Polystyrene core	4.83	17	386	0
Walls	Wall	48.0	315	734	15

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	651	Slab Insulation: 20.0 hr·ft ² ·°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

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	3,465	6
Ventilation	1,114	23
Internal Loads	0	716
External Floor Radiant Panel Loss	922	0
Total Sensible	8,462	1,929
Total Floor Area	476 ft ²	476 ft ²

Constructions

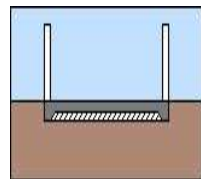
Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	449	1,046	12

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	1,018	Slab Insulation: 20.0 hr-ft ² -°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

Downstair WC (Ground Floor)

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	208	56
Above Grade Walls	154	0
Foundation	6	0
Infiltration	417	0
Ventilation	134	1
Internal Loads	0	68
External Floor Radiant Panel Loss	98	0
Total Sensible	1,017	126
Total Floor Area	45 ft ²	45 ft ²

Constructions

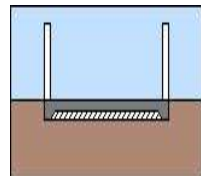
Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	66	154	0

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·ft ² ·°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

Mechanical ROom (Ground Floor)

Load Breakdown

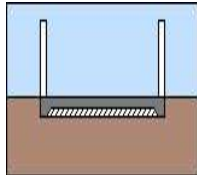
Name	Heat Loss	Heat Gain
Above Grade Walls	0	7
Infiltration	0	0
Ventilation	0	0
Internal Loads	0	99
Total Sensible	0	106
Total Floor Area	0 ft ²	66 ft ²

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·ft ² ·°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

Pantry (Ground Floor)

Load Breakdown

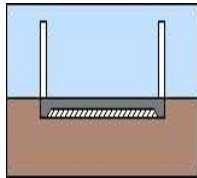
Name	Heat Loss	Heat Gain
Above Grade Walls	324	0
Infiltration	458	0
Ventilation	147	0
Internal Loads	0	110
External Floor Radiant Panel Loss	197	0
Total Sensible	1,127	110
Total Floor Area	73 ft ²	73 ft ²

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	197	Slab Insulation: 20.0 hr·ft ² ·°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

Rumpus Room (Ground Floor)

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	260	207
Above Grade Walls	542	10
Infiltration	1,047	1
Ventilation	337	4
Internal Loads	0	211
External Floor Radiant Panel Loss	383	0
Total Sensible	2,568	433
Total Floor Area	141 ft ²	141 ft ²

Constructions

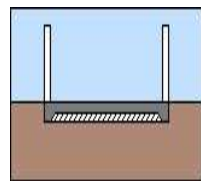
Type	Description	R-Value	Area	Heating	Cooling
Walls	Wall	48.0	233	542	10

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	383	Slab Insulation: 20.0 hr-ft ² -°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

Bedroom 1 (Main Floor)

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	436	254
Above Grade Walls	276	0
Infiltration	624	2
Ceiling	186	48
Ventilation	267	6
Internal Loads	0	220
Internal Floor Radiant Panel Loss	373	0
Total Sensible	1,789	530
Total Floor Area	146 ft ²	146 ft ²

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	373	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	921	2
Ceiling	196	51
Ventilation	395	6
Internal Loads	0	232
Internal Floor Radiant Panel Loss	1,731	0
Total Sensible	2,641	562
Total Floor Area	154 ft ²	154 ft ²

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	1,731	0

Glazings

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

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

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Laundry (Main Floor)**Load Breakdown**

Name	Heat Loss	Heat Gain
Above Grade Walls	122	0
Infiltration	135	0
Ceiling	72	19
Ventilation	58	0
Internal Loads	0	86
Internal Floor Radiant Panel Loss	93	0
Total Sensible	389	105
Total Floor Area	57 ft ²	57 ft ²

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	93	0

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Version:23.0.0180 R

Library/Office/Upstairs Corridor (Main)

Load Breakdown

Name	Heat Loss	Heat Gain
Windows	941	468
Above Grade Walls	648	0
Infiltration	1,406	3
Ceiling	434	112
Ventilation	603	11
Internal Loads	0	514
Internal Floor Radiant Panel Loss	984	0
Total Sensible	4,031	1,108
Total Floor Area	341 ft ²	341 ft ²

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	984	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	670	2
Ceiling	116	30
Ventilation	287	7
Internal Loads	0	137
Internal Floor Radiant Panel Loss	385	0
Total Sensible	1,922	532
Total Floor Area	91 ft ²	91 ft ²

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	1,211	3
Ceiling	263	68
Ventilation	519	10
Internal Loads	0	312
Internal Floor Radiant Panel Loss	716	0
Total Sensible	3,474	869
Total Floor Area	207 ft ²	207 ft ²

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	716	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	479	1
Ceiling	87	23
Ventilation	206	4
Internal Loads	0	103
Internal Floor Radiant Panel Loss	281	0
Total Sensible	1,375	307
Total Floor Area	69 ft ²	69 ft ²

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

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

(*) 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

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Version:23.0.0180 R

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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:	17,915 Btu/hr
Outdoor Temperature:	-41.8 °F			Radiant Back Losses:	2,251 Btu/hr
Floorplans / Levels:		Total RH Circuits:	10	Total Heating Load:	34,372 Btu/hr
Ground Floor	1,000 ft ²	Total Manifolds:	1		
Main Floor	1,066 ft ²	Total Zones:	3	Radiant Heating:	31,173 Btu/hr
Total Area:	2,066 ft ²			Radiant Back Losses:	2,251 Btu/hr
		Fluid Type:	30% Propylene Glycol	Other:	947 Btu/hr
		Total Tubing Volume:	21.35 USG	Total Heating Load:	34,372 Btu/hr
		Glycol Volume:	6.41 USG		
		Surface Temperature:	83 - 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	10,039	250	10,290
Zone 102	476	Embedded Slab	RH	2	516	1	0.93	3.5	8,462	0	8,462
Zone 201	1,066	Concrete Thin Slab	RH,OTH	5	1,226	1	2.35	4.3	19,486	697	20,183

(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.

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 (2023-10-20)
Version: 23.0.0180 R

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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	120	27.5	5,577	0	5,577
Zone 101	Downstair WC	RH, OTH	29	27	Manifold 1	1/2"	1	10	34	0.5	120	28.6	767	250	1,017
Zone 101	Pantry	RH	48	48	n/a	n/a	0	10	55	0.5	0	23.4	1,127	0	1,127
Zone 101	Rumpus Room	RH	107	107	Manifold 1	1/2"	1	10	124	0.5	115	24.0	2,568	0	2,568
Zone 102	Dining	RH	406	352	Manifold 1	1/2"	2	10	419	0.5	117	24.0	8,462	0	8,462

(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	104	18.5	2,162	0	2,162
Zone 201	Bedroom 2	RH	119	119	n/a	n/a	0	10	155	0.5	0	36.8	4,372	0	4,372
Zone 201	Laundry	RH	40	40	Manifold 1	1/2"	1	10	53	0.5	95	12.0	481	0	481
Zone 201	Library/Office/ Upstairs Corridor	RH	279	232	Manifold 1	1/2"	1	10	287	0.5	108	21.6	5,016	0	5,016
Zone 201	Primary WC	RH, OTH	65	62	n/a	n/a	0	10	80	0.5	0	31.2	1,921	387	2,307
Zone 201	PrimaryBedroom	RH	166	166	Manifold 1	1/2"	1	10	205	0.5	113	25.2	4,189	0	4,189
Zone 201	Upstair WC	RH, OTH	46	43	Manifold 1	1/2"	1	10	50	0.5	120	31.5	1,345	311	1,656

(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	4.61	5.0	120	120	20	Stainless Steel	Circuit	10	-	-
Total	3	10	4.61	5.0	-	-	-	-	-	10	-	-

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

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Project Information

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

Notes:

Design Conditions and Summary

Load Calculation Method:	CSA F280-12	Total Tubing Lengths:		Component Losses:	14,206 Btu/hr
Design Location:	Whitehorse, Yukon Territory	Barrier PEX 1/2"	2,320 ft	Infiltration/Ventilation:	17,915 Btu/hr
Outdoor Temperature:	-41.8 °F			Radiant Back Losses:	2,251 Btu/hr
Floorplans / Levels:		Total RH Circuits:	10	Total Heating Load:	34,372 Btu/hr
Ground Floor	1,000 ft ²	Total Manifolds:	1		
Main Floor	1,066 ft ²	Total Zones:	3	Radiant Heating:	31,173 Btu/hr
Total Area:	2,066 ft ²			Radiant Back Losses:	2,251 Btu/hr
		Fluid Type:	30% Propylene Glycol	Other:	947 Btu/hr
		Total Tubing Volume:	21.35 USG	Total Heating Load:	34,372 Btu/hr
		Glycol Volume:	6.41 USG		

Zone Heating Summary

Zone #	Area	Heating Types	RH Circuits	Flowrate	Head Loss	Supplemental	Rooms
101	524	RH,OTH	3	1.33	2.9	250	Pantry, Rumpus Room, Corridor / Entry, Downstair WC
102	476	RH	2	0.93	4.1	0	Dining
201	1,066	RH,OTH	5	2.35	5.0	697	Primary WC, Laundry, Primary Bedroom, Bedroom 1, Bedroom 2, Library/Office/Upstairs Corridor, Upstair WC
Total	2,066	RH,OTH	10	4.61	5.0	947	

*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
 Heated by: RH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.5

Radiant Heating:
 Heated Area: 203 ft²
 Tubing in Floor: 272 ft
 Circuits in Room: 1
 Tube Spacing: 10
 Required Surface Temp: 83 °F
 Required Water Temp: 120 °F
 Est. Peak Output: 5,030 Btu/hr

Load/Loss Summary:
Room Design Load: 4,926 Btu/hr
 Radiant Load: 5,577 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 0 Btu/hr
 Radiant Back Loss: 651 Btu/hr
 Recovered Back Loss: 0 Btu/hr
 Total Heat Loss: 5,577 Btu/hr

Dining

Total Area: 476 ft²
 Heated by: RH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.5

Radiant Heating:
 Heated Area: 352 ft²
 Tubing in Floor: 434 ft
 Circuits in Room: 2
 Tube Spacing: 10
 Required Surface Temp: 82 °F
 Required Water Temp: 117 °F
 Est. Peak Output: 8,196 Btu/hr

Load/Loss Summary:
Room Design Load: 7,540 Btu/hr
 Radiant Load: 8,462 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 0 Btu/hr
 Radiant Back Loss: 922 Btu/hr
 Recovered Back Loss: 0 Btu/hr
 Total Heat Loss: 8,462 Btu/hr

Downstair WC

Total Area: 45 ft²
 Heated by: RH,OTH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.5

Radiant Heating:
 Heated Area: 27 ft²
 Tubing in Floor: 36 ft
 Circuits in Room: 1
 Tube Spacing: 10
 Required Surface Temp: 83 °F
 Required Water Temp: 120 °F
 Est. Peak Output: 669 Btu/hr

Supplemental Req'd: 250 Btu/hr

Load/Loss Summary:
Room Design Load: 669 Btu/hr
 Radiant Load: 767 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 250 Btu/hr
 Radiant Back Loss: 98 Btu/hr
 Recovered Back Loss: 0 Btu/hr
 Total Heat Loss: 1,017 Btu/hr

Pantry

Total Area: 73 ft²
 Heated by: RH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.5

Radiant Heating:
 Heated Area: 48 ft²
 Tubing in Floor: 58 ft
 Circuits in Room: 0
 Tube Spacing: 10
 Required Surface Temp: 81 °F
 Required Water Temp: 112 °F
 Est. Peak Output: 1,167 Btu/hr

Load/Loss Summary:
Room Design Load: 930 Btu/hr
 Radiant Load: 1,127 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 0 Btu/hr
 Radiant Back Loss: 197 Btu/hr
 Recovered Back Loss: 0 Btu/hr
 Total Heat Loss: 1,127 Btu/hr

Rumpus Room

Total Area: 141 ft²
 Heated by: RH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.5

Radiant Heating:
 Heated Area: 107 ft²
 Tubing in Floor: 128 ft
 Circuits in Room: 1
 Tube Spacing: 10
 Required Surface Temp: 81 °F
 Required Water Temp: 115 °F
 Est. Peak Output: 2,608 Btu/hr

Load/Loss Summary:
Room Design Load: 2,186 Btu/hr
 Radiant Load: 2,568 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 0 Btu/hr
 Radiant Back Loss: 383 Btu/hr
 Recovered Back Loss: 0 Btu/hr
 Total Heat Loss: 2,568 Btu/hr

Main Floor

Bedroom 1

Total Area:	146 ft ²	<u>Radiant Heating:</u>		<u>Load/Loss Summary:</u>	
Heated by:	RH	Heated Area:	117 ft ²	Room Design Load:	1,789 Btu/hr
Room Temperature:	70 °F	Tubing in Floor:	147 ft	Radiant Load:	2,162 Btu/hr
Floor Covering (RV):	0.5	Circuits in Room:	1	Baseboard Load:	0 Btu/hr
		Tube Spacing:	10	Forced Air Load	0 Btu/hr
		Required Surface Temp:	78 °F	Other Load:	0 Btu/hr
		Required Water Temp:	104 °F		
		Est. Peak Output:	2,890 Btu/hr	Radiant Back Loss:	373 Btu/hr
				Recovered Back Loss:	-373 Btu/hr
				Total Heat Loss:	1,789 Btu/hr

Bedroom 2

Total Area:	154 ft ²	<u>Radiant Heating:</u>		<u>Load/Loss Summary:</u>	
Heated by:	RH	Heated Area:	119 ft ²	Room Design Load:	2,641 Btu/hr
Room Temperature:	70 °F	Tubing in Floor:	159 ft	Radiant Load:	4,372 Btu/hr
Floor Covering (RV):	0.5	Circuits in Room:	0	Baseboard Load:	0 Btu/hr
		Tube Spacing:	9	Forced Air Load	0 Btu/hr
		Required Surface Temp:	82 °F	Other Load:	0 Btu/hr
		Required Water Temp:	109 °F		
		Est. Peak Output:	3,014 Btu/hr	Radiant Back Loss:	1,731 Btu/hr
				Recovered Back Loss:	-1,731 Btu/hr
				Total Heat Loss:	2,641 Btu/hr

Laundry

Total Area:	57 ft ²	<u>Radiant Heating:</u>		<u>Load/Loss Summary:</u>	
Heated by:	RH	Heated Area:	40 ft ²	Room Design Load:	389 Btu/hr
Room Temperature:	70 °F	Tubing in Floor:	54 ft	Radiant Load:	481 Btu/hr
Floor Covering (RV):	0.5	Circuits in Room:	1	Baseboard Load:	0 Btu/hr
		Tube Spacing:	10	Forced Air Load	0 Btu/hr
		Required Surface Temp:	75 °F	Other Load:	0 Btu/hr
		Required Water Temp:	95 °F		
		Est. Peak Output:	1,013 Btu/hr	Radiant Back Loss:	93 Btu/hr
				Recovered Back Loss:	-93 Btu/hr
				Total Heat Loss:	389 Btu/hr

Library/Office/Upstairs Corridor

Total Area: 341 ft²
 Heated by: RH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.5

Radiant Heating:
 Heated Area: 232 ft²
 Tubing in Floor: 293 ft
 Circuits in Room: 1
 Tube Spacing: 10
 Required Surface Temp: 80 °F
 Required Water Temp: 108 °F
 Est. Peak Output: 5,765 Btu/hr

Load/Loss Summary:
Room Design Load: 4,031 Btu/hr
 Radiant Load: 5,016 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 0 Btu/hr
 Radiant Back Loss: 984 Btu/hr
 Recovered Back Loss: -984 Btu/hr
 Total Heat Loss: 4,031 Btu/hr

Primary WC

Total Area: 91 ft²
 Heated by: RH,OTH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.5

Radiant Heating:
 Heated Area: 62 ft²
 Tubing in Floor: 81 ft
 Circuits in Room: 0
 Tube Spacing: 9
 Required Surface Temp: 84 °F
 Required Water Temp: 120 °F
 Est. Peak Output: 1,536 Btu/hr

Supplemental Req'd: 387 Btu/hr

Load/Loss Summary:
Room Design Load: 1,536 Btu/hr
 Radiant Load: 1,921 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 387 Btu/hr
 Radiant Back Loss: 385 Btu/hr
 Recovered Back Loss: -385 Btu/hr
 Total Heat Loss: 1,922 Btu/hr

Primary Bedroom

Total Area: 207 ft²
 Heated by: RH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.5

Radiant Heating:
 Heated Area: 166 ft²
 Tubing in Floor: 210 ft
 Circuits in Room: 1
 Tube Spacing: 10
 Required Surface Temp: 81 °F
 Required Water Temp: 113 °F
 Est. Peak Output: 4,094 Btu/hr

Load/Loss Summary:
Room Design Load: 3,474 Btu/hr
 Radiant Load: 4,189 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 0 Btu/hr
 Radiant Back Loss: 716 Btu/hr
 Recovered Back Loss: -716 Btu/hr
 Total Heat Loss: 3,474 Btu/hr

Upstair WC

Total Area: 69 ft²
 Heated by: RH,OTH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.5

Radiant Heating:
 Heated Area: 43 ft²
 Tubing in Floor: 51 ft
 Circuits in Room: 1
 Tube Spacing: 10
 Required Surface Temp: 83 °F
 Required Water Temp: 120 °F
 Est. Peak Output: 1,064 Btu/hr

Supplemental Req'd: 311 Btu/hr

Load/Loss Summary:
Room Design Load: 1,064 Btu/hr
 Radiant Load: 1,345 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 311 Btu/hr
 Radiant Back Loss: 281 Btu/hr
 Recovered Back Loss: -281 Btu/hr
 Total Heat Loss: 1,375 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	4.61	5.0	120	120	20	Stainless Steel	Circuit	10	-	-
Total	3	10	4.61	5.0	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	4,032	Yes
A-2	Dining	253	10	192	Barrier PEX 1/2"	0.49	3.5	20	4,618	Yes
A-3	Corridor / Entry	193	10	130	Barrier PEX 1/2"	0.44	2.2	20	3,360	Yes
A-4	Rumpus Room	192	10	126	Barrier PEX 1/2"	0.44	2.2	20	3,145	Yes
A-5	Downstair WC	193	10	125	Barrier PEX 1/2"	0.44	2.2	20	3,276	Yes
B-1	Laundry	246	10	161	Barrier PEX 1/2"	0.44	2.9	20	3,478	Yes
B-2	Library/Office/Upstairs Corridor	253	10	157	Barrier PEX 1/2"	0.44	2.9	20	3,391	Yes
B-3	Bedroom 1	248	10	152	Barrier PEX 1/2"	0.44	2.9	20	3,287	Yes
B-4	Upstair WC	229	10	150	Barrier PEX 1/2"	0.58	4.3	20	5,163	Yes
B-6	PrimaryBedroom	251	10	158	Barrier PEX 1/2"	0.44	2.9	20	4,166	Yes
Total	-	2,320		1,518	-	4.61	4.3		37,918	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	4.61	5.0	37,918	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	4.61	120	120	Stainless Steel	-	-	0.7	4.3	0.0	5.0
Total	10	4.61	-	-	-	-	-	0.7	4.3	0.0	5.0

(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	4,032	Yes
A-2	Dining	253	10	192	Barrier PEX 1/2"	0.49	3.5	20	4,618	Yes
A-3	Corridor / Entry	193	10	128	Barrier PEX 1/2"	0.44	2.2	20	3,360	Yes
A-4	Rumpus Room	192	10	126	Barrier PEX 1/2"	0.44	2.2	20	3,145	Yes
A-5	Downstair WC	193	10	125	Barrier PEX 1/2"	0.44	2.2	20	3,276	Yes
B-1	Laundry	246	10	161	Barrier PEX 1/2"	0.44	2.9	20	3,478	Yes
B-2	Library/Office/Upstairs Corridor	253	10	157	Barrier PEX 1/2"	0.44	2.9	20	3,391	Yes
B-3	Bedroom 1	248	10	152	Barrier PEX 1/2"	0.44	2.9	20	3,287	Yes
B-4	Upstair WC	229	10	150	Barrier PEX 1/2"	0.58	4.3	20	5,163	Yes
B-6	PrimaryBedroom	251	10	158	Barrier PEX 1/2"	0.44	2.9	20	4,166	Yes
Total	-	2,320		1,515	-	4.61	4.3	-	37,918	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.

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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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Project Information

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

Notes:

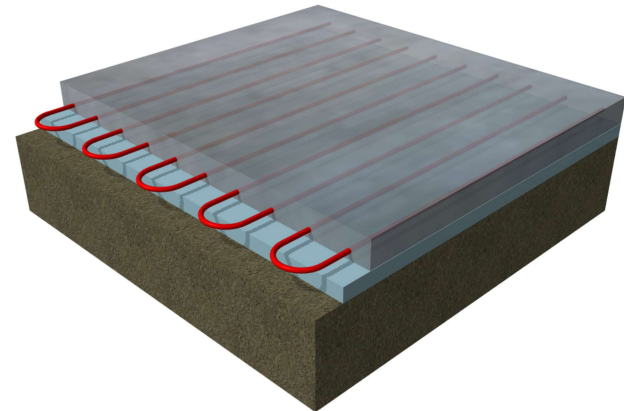
Design Conditions and Summary

Load Calculation Method:	CSA F280-12	Component Losses:	14,206 Btu/hr
Design Location:	Whitehorse, Yukon Territory	Infiltration/Ventilation:	17,915 Btu/hr
Outdoor Temperature:	-41.8 °F	Radiant Back Losses:	2,251 Btu/hr
Floorplans / Levels:		Total Heating Load:	34,372 Btu/hr
Ground Floor	1,000 ft ²		
Main Floor	1,066 ft ²	Radiant Heating:	31,173 Btu/hr
Total Area:	2,066 ft ²	Radiant Back Losses:	2,251 Btu/hr
		Other:	947 Btu/hr
		Total Heating Load:	34,372 Btu/hr

Radiant Panel Details

Panel Type #1 - Embedded Slab

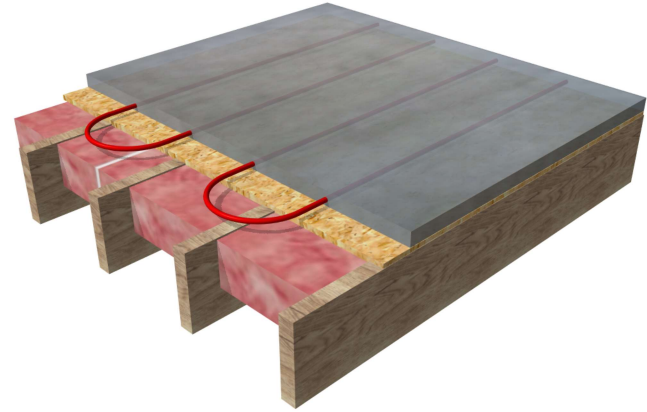
Slab Thickness:	4.0 in
Tube Depth:	2.5 in
Slab R per Inch (Embedding Material):	0.15 °F•ft ² •hr/(Btu•in)
Spacing:	10 in
Floorplans:	
Ground Floor	798 ft ²



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

Panel Type #2 - Concrete Thin Slab

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

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