



Heat Loss Summary

ASHRAE Load Calculation

Project #: LFM/RICHEY LEFT UNIT

August 15, 2022

Project Information

Project #: LFM/RICHEY LEFT UNIT
 Name: LFM/RICHEY
 Location: LOT 3 COPPER RIDGE PARK

Notes:

Load Calculation Summary

Design Location: (User Specified) steamboat springs , Colorado
 Load Calculation Method: ASHRAE
 Outdoor Temperature: -15.0 °F
 Floorplans / Levels:
 Ground Floor 1,259 ft²
 Main Floor 1,298 ft²
 Total Area: 2,556 ft²

Component Losses: 23,396 Btu/hr
 Infiltration/Ventilation: 21,252 Btu/hr
 Radiant Back Losses: 3,489 Btu/hr
 Total Heating Load: 48,137 Btu/hr
 Radiant Heating: 44,648 Btu/hr
 Radiant Back Losses: 3,489 Btu/hr
 Total Heating Load: 48,137 Btu/hr
 Surface Temperature: 80 - 83 °F

Load Calculation Results

Total Project

Room	Area	Heating Type	Room Temp	Walls	Windows	Doors	Skylights	Floor	Ceiling	Infiltration	Additional	Recovered Panel Loss	Design Load	Unit Loss
Total For Project	2,556	RH	70.0	8,789	6,444	5,893	0	5,347	2,251	21,252	0	-1,838	48,137	19.8

Ground Floor

Slab On Grade Construction

Room	Area	Heating Type	Room Temp	Walls	Windows	Doors	Skylights	Floor	Ceiling	Infiltration	Additional	Recovered Panel Loss	Design Load	Unit Loss
GARAGE	725	RH	70.0	2,187	309	5,893	0	1,843	0	5,916	0	0	16,149	23.3
OFFICE/BATH	189	RH	70.0	1,036	0	0	0	514	0	1,685	0	0	3,235	18.5
WORK SPACE	344	RH	70.0	1,316	309	0	0	927	0	3,062	0	0	5,615	17.2
Sub Total	1,259	RH	70.0	4,539	618	5,893	0	3,284	0	10,664	0	0	24,998	20.9

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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Main Floor**Suspended Construction**

Room	Area	Heating Type	Room Temp	Walls	Windows	Doors	Skylights	Floor	Ceiling	Infiltration	Additional	Recovered Panel Loss	Design Load	Unit Loss
BEDS&BATH	403	RH	70.0	1,686	1,807	0	0	586	699	3,290	0	-586	7,483	19.7
GREAT ROOM	894	RH	70.0	2,564	4,018	0	0	1,476	1,552	7,298	0	-1,252	15,656	18.2
Sub Total	1,298	RH	70.0	4,251	5,826	0	0	2,062	2,251	10,588	0	-1,838	23,139	18.7

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Heat Loss Detail

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Design Location:	(User Specified) steamboat springs , Colorado	Component Losses:	23,396 Btu/hr
Load Calculation Method:	ASHRAE	Infiltration/Ventilation:	21,252 Btu/hr
Outdoor Temperature:	-15.0 °F	Radiant Back Losses:	3,489 Btu/hr
Floorplans / Levels:		Total Heating Load:	48,137 Btu/hr
Ground Floor	1,259 ft ²	Radiant Heating:	44,648 Btu/hr
Main Floor	1,298 ft ²	Radiant Back Losses:	3,489 Btu/hr
Total Area:	2,556 ft ²	Total Heating Load:	48,137 Btu/hr
		Surface Temperature:	80 - 83 °F

Load Calculation Data

Project Summary

Room	Area	Heating Type	Room Temp	Walls	Windows	Doors	Skylights	Floor	Ceiling	Infiltration	Additional	Recovered Panel Loss	Design Load	Unit Loss
Ground Floor	1,259	RH	70.0	4,539	618	5,893	0	3,284	0	10,664	0	0	24,998	20.9
Main Floor	1,298	RH	70.0	4,251	5,826	0	0	2,062	2,251	10,588	0	-1,838	23,139	18.7
Total For Project	2,556	RH	70.0	8,789	6,444	5,893	0	5,347	2,251	21,252	0	-1,838	48,137	19.8

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
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Ground Floor

GARAGE

Total Area:	725 ft ²	Infiltration/Ventilation Load:	5,916 Btu/hr
Ceiling Height:	12' ft	Component Losses:	10,232 Btu/hr
Volume:	7,977 ft ³	Additional Losses:	0 Btu/hr
Exposed Perimeter:	78'-4" ft	Total Room Loss:	16,149 Btu/hr
Room Temperature:	70 °F	Recovered Floor Loss:	0 Btu/hr
Space Above:	Main Floor	Net Room Load:	16,149 Btu/hr

Heating System

Heating Type:	Radiant	Surface Temp:	80 °F
Floor Area:	694 ft ²	Net Room Load:	16,149 Btu/hr
Unheated Area:	0 ft ²	Floor Back Loss:	1,843 Btu/hr
Net Heated Area:	694 ft ²	Recovered Floor Loss:	0 Btu/hr
Floor Cover Rv:	0.5 hr-ft ² -°F/btu	Gross Upward Load:	14,306 Btu/hr
Panel Type:	Embedded Slab	Supplemental Heat Supply:	0 Btu/hr
Supplemental Heating Type:	Other	Net Upward Load:	14,306 Btu/hr
Required Supply Temp:	106 °F	Total Radiant Load:	16,149 Btu/hr

Component Losses

Component	Length	Width/Height	Area	Construction	Rv	Heat Loss	Unit Loss
Door	3'	8'	24	C2	3.0	680	1.0
Window	6'	2'	12	C3	3.3	309	0.4
Door	16'	10'	160	C2	3.0	4,533	6.5
Door	3'	8'	24	C2	3.0	680	1.0
Exposed Walls Above Grade	78'-4"	12'	720	C1	28.0	2,187	3.1
Slab	-	-	725	C4	Slab Insulation: 10.0 hr-ft ² -°F/btu	1,843	2.7
Exposed Ceiling	-	-	0	-	49.0	0	0.0
Total	-	-	-	-	-	10,232	14.7

OFFICE/BATH

Total Area: 189 ft²
 Ceiling Height: 12' ft
 Volume: 2,272 ft³
 Exposed Perimeter: 28'-5" ft
 Room Temperature: 70 °F
 Space Above: Main Floor
 Space Below: Sealed Crawlspace

Infiltration/Ventilation Load: 1,685 Btu/hr
 Component Losses: 1,550 Btu/hr
 Additional Losses: 0 Btu/hr
 Total Room Loss: 3,235 Btu/hr
 Recovered Floor Loss: 0 Btu/hr
 Net Room Load: 3,235 Btu/hr

Heating System

Heating Type: Radiant
 Floor Area: 175 ft²
 Unheated Area: 0 ft²
 Net Heated Area: 175 ft²
 Floor Cover Rv: 0.5 hr·ft²·°F/btu
 Panel Type: Joist Trak Plates Below
 Sub-floor
 Supplemental Heating Type: Other
 Required Supply Temp: 105 °F

Surface Temp: 78 °F
 Net Room Load: 3,235 Btu/hr
 Floor Back Loss: 514 Btu/hr
 Recovered Floor Loss: 0 Btu/hr
 Gross Upward Load: 2,721 Btu/hr
 Supplemental Heat Supply: 0 Btu/hr
 Net Upward Load: 2,721 Btu/hr
 Total Radiant Load: 3,235 Btu/hr

Component Losses

Component	Length	Width/Height	Area	Construction	Rv	Heat Loss	Unit Loss
Exposed Walls Above Grade	28'-5"	12'	341	C1	28.0	1,036	5.9
Floor	-	-	189	C6	30.0 (panel Insulation)	514	2.9
Exposed Ceiling	-	-	0	-	49.0	0	0.0
Total	-	-	-	-	-	1,550	8.8

WORK SPACE

Total Area: 344 ft²
 Ceiling Height: 12' ft
 Volume: 4,129 ft³
 Exposed Perimeter: 37'-2" ft
 Room Temperature: 70 °F
 Space Above: Main Floor
 Space Below: Sealed Crawlspace

Infiltration/Ventilation Load: 3,062 Btu/hr
 Component Losses: 2,552 Btu/hr
 Additional Losses: 0 Btu/hr
 Total Room Loss: 5,615 Btu/hr
 Recovered Floor Loss: 0 Btu/hr
 Net Room Load: 5,615 Btu/hr

Heating System

Heating Type: Radiant
 Floor Area: 326 ft²
 Unheated Area: 0 ft²
 Net Heated Area: 326 ft²
 Floor Cover Rv: 0.5 hr·ft²·°F/btu
 Panel Type: Joist Trak Plates Below
 Sub-floor
 Supplemental Heating Type: Other
 Required Supply Temp: 101 °F

Surface Temp: 77 °F
 Net Room Load: 5,615 Btu/hr
 Floor Back Loss: 927 Btu/hr
 Recovered Floor Loss: 0 Btu/hr
 Gross Upward Load: 4,688 Btu/hr
 Supplemental Heat Supply: 0 Btu/hr
 Net Upward Load: 4,688 Btu/hr
 Total Radiant Load: 5,615 Btu/hr

Component Losses

Component	Length	Width/Height	Area	Construction	Rv	Heat Loss	Unit Loss
Window	6'	2'	12	C3	3.3	309	0.9
Exposed Walls Above Grade	37'-2"	12'	434	C1	28.0	1,316	4.0
Floor	-	-	344	C6	30.0 (panel Insulation)	927	2.8
Exposed Ceiling	-	-	0	-	49.0	0	0.0
Total	-	-	-	-	-	2,552	7.8

Main Floor

BEDS&BATH

Total Area: 403 ft²
 Ceiling Height: 11' ft
 Volume: 4,436 ft³
 Exposed Perimeter: 56'-11" ft
 Room Temperature: 70 °F
 Space Above: Not Heated

Infiltration/Ventilation Load: 3,290 Btu/hr
 Component Losses: 4,779 Btu/hr
 Additional Losses: 0 Btu/hr
 Total Room Loss: 8,069 Btu/hr
 Recovered Floor Loss: -586 Btu/hr
 Net Room Load: 7,483 Btu/hr

Heating System

Heating Type: Radiant
 Floor Area: 380 ft²
 Unheated Area: 0 ft²
 Net Heated Area: 380 ft²
 Floor Cover Rv: 0.5 hr-ft²·°F/btu
 Panel Type: Joist Trak Plates Below Sub-floor
 Supplemental Heating Type: Other
 Required Supply Temp: 110 °F

Surface Temp: 80 °F
 Net Room Load: 7,483 Btu/hr
 Floor Back Loss: 586 Btu/hr
 Recovered Floor Loss: -586 Btu/hr
 Gross Upward Load: 7,483 Btu/hr
 Supplemental Heat Supply: 0 Btu/hr
 Net Upward Load: 7,483 Btu/hr
 Total Radiant Load: 8,069 Btu/hr

Component Losses

Component	Length	Width/Height	Area	Construction	Rv	Heat Loss	Unit Loss
Window	3'	5'	15	C3	3.3	386	1.0
Window	3'	5'	15	C3	3.3	386	1.0
Window	2'-6"	6'-10"	17	C3	3.3	440	1.2
Window	2'-6"	6'-10"	17	C3	3.3	440	1.2
Window	3'	2'	6	C3	3.3	155	0.4
Exposed Walls Above Grade	56'-11"	11'	556	C1	28.0	1,686	4.4
Floor	-	-	403	C6	30.0 (panel Insulation)	586	1.5
Exposed Ceiling	-	-	403	C5	49.0	699	1.8
Total	-	-	-	-	-	4,779	12.6

GREAT ROOM

Total Area: 894 ft²
 Ceiling Height: 11' ft
 Volume: 9,839 ft³
 Exposed Perimeter: 91' ft
 Room Temperature: 70 °F
 Space Above: Not Heated
 Space Below: Ground Floor/Open or Vented Crawlspace

Infiltration/Ventilation Load: 7,298 Btu/hr
 Component Losses: 9,610 Btu/hr
 Additional Losses: 0 Btu/hr
 Total Room Loss: 16,908 Btu/hr
 Recovered Floor Loss: -1,252 Btu/hr
 Net Room Load: 15,656 Btu/hr

Heating System

Heating Type: Radiant
 Floor Area: 859 ft²
 Unheated Area: 124 ft²
 Net Heated Area: 735 ft²
 Floor Cover Rv: 0.7 hr·ft²·°F/btu
 Panel Type: Joist Trak Plates Below
 Sub-floor
 Supplemental Heating Type: Other
 Required Supply Temp: 118 °F

Surface Temp: 81 °F
 Net Room Load: 15,656 Btu/hr
 Floor Back Loss: 1,476 Btu/hr
 Recovered Floor Loss: -1,252 Btu/hr
 Gross Upward Load: 15,451 Btu/hr
 Supplemental Heat Supply: 0 Btu/hr
 Net Upward Load: 15,451 Btu/hr
 Total Radiant Load: 16,908 Btu/hr

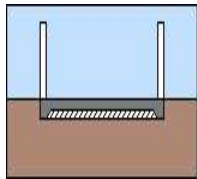
Component Losses

Component	Length	Width/Height	Area	Construction	Rv	Heat Loss	Unit Loss
Window	3'	5'	15	C3	3.3	386	0.4
Window	3'	5'	15	C3	3.3	386	0.4
Window	3'	5'	15	C3	3.3	386	0.4
Window	3'	5'	15	C3	3.3	386	0.4
Window	4'	6'	24	C3	3.3	618	0.7
Window	4'	6'	24	C3	3.3	618	0.7
Window	8'	2'	16	C3	3.3	412	0.5
Window	4'	6'	24	C3	3.3	618	0.7
Window	4'	2'	8	C3	3.3	206	0.2
Exposed Walls Above Grade	91'	11'	845	C1	28.0	2,564	3.0
Floor	-	-	894	C6	30.0 (panel Insulation)	1,476	1.7
Exposed Ceiling	-	-	894	C5	49.0	1,552	1.8
Total	-	-	-	-	-	9,610	11.2

Construction Legend

Construction Code	Component	R-Value	Source	Description
C1	Wall	28.0	User Specified	CUSTOM
C2	Door	3.0	User Specified	CUSTOM
C3	Window	3.3	User Specified	Operable windows - Double Glazing (e = 0.05 on surface 2 or 3), 6 mm air space, Aluminum With Thermal Break
C4	Slab	Slab Insulation: 10.0 hr·ft ² ·°F/btu	CSA 2012	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
C5	Ceiling	49.0	User Specified	CUSTOM
C6	Heated Floor	30.0 (panel Insulation)	User Specified	Joist Trak Plates Below Sub-floor

CSA Construction Legend



C4

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: 10.0 hr·ft²·°F/btu

Design Locaton

Location:	steamboat springs	Altitude:	7000' ft
Province/State:	Colorado	Standard Pressure:	11.7 Psi
Country:	United States		
Outdoor Heating Design Temp:	-15.0 °F	Humidity Ratio:	0.0004
Heating Degree Days:	4731	Mean Soil Temp:	47.2 °F
Average Air Temperatures:			
January:	0.0 °F	July:	67.1 °F
February:	10.0 °F	August:	65.1 °F
March:	33.3 °F	September:	56.1 °F
April:	42.1 °F	October:	43.9 °F
May:	51.3 °F	November:	30.2 °F
June:	59.7 °F	December:	18.0 °F

ASHRAE Custom

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Notes:

Project Summary

Load Calculation Method:	ASHRAE	Total Circuit Lengths:		Component Losses:	23,396 Btu/hr
Design Location:	(User Specified) steamboat springs , Colorado	hePEX 1/2"	3,725 ft	Infiltration/Ventilation:	21,252 Btu/hr
Outdoor Temperature:	-15.0 °F	Total RH Circuits:	21	Radiant Back Losses:	3,489 Btu/hr
Floorplans / Levels:		Total Manifolds:	5	Total Heating Load:	48,137 Btu/hr
Ground Floor	1,259 ft ²	Total Zones:	4	Radiant Heating:	44,648 Btu/hr
Main Floor	1,298 ft ²	Fluid Type:	100% Water	Radiant Back Losses:	3,489 Btu/hr
Total Area:	2,556 ft ²	Total Tubing Volume:	34.29 USG	Total Heating Load:	48,137 Btu/hr
		Surface Temperature:	80 - 83 °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	189	Joist Trak Plates Below Sub-floor	RH	2	270	1	0.32	0.3	3,235	0	3,235
Zone 102	1,069	multiple	RH	7	1,246	2	2.18	1.5	21,763	0	21,763
Zone 201	894	Joist Trak Plates Below Sub-floor	RH	8	1,565	1	1.70	0.8	16,908	0	16,908
Zone 202	403	Joist Trak Plates Below Sub-floor	RH	4	644	1	0.81	0.6	8,069	0	8,069

(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.

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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 102	GARAGE	RH	694	694	garage	1/2"	4	12	705	0.5	106	23.3	16,149	0	16,149

(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.

Joist Trak Plates Below Sub-floor

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	OFFICE/BATH	RH	175	175	office/bath	1/2"	2	8	257	0.5	105	18.5	3,235	0	3,235
Zone 102	WORK SPACE	RH	326	326	work space	1/2"	3	8	489	0.5	101	17.2	5,615	0	5,615
Zone 201	GREAT ROOM	RH	859	735	greatroom	1/2"	8	7	1,517	0.7	118	23.0	16,908	0	16,908
Zone 202	BEDS&BATH	RH	380	380	beds&bath	1/2"	4	8	619	0.5	110	21.3	8,069	0	8,069

(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
beds&bath	1	4	0.81	0.6	110	118	20	None Specified	Manifold	0	-	-
garage	1	4	1.62	1.5	106	118	20	None Specified	Manifold	0	-	-
greatroom	1	8	1.70	0.8	118	118	20	None Specified	Manifold	0	-	-
office/bath	1	2	0.32	0.3	105	118	20	None Specified	Manifold	0	-	-
work space	1	3	0.56	0.5	101	118	20	None Specified	Manifold	0	-	-
Total	4	21	5.01	1.5	-	-	-	-	-	0	-	-

(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 #: LFM/RICHEY LEFT UNIT

August 15, 2022

Project Information

Project #: LFM/RICHEY LEFT UNIT
 Name: LFM/RICHEY
 Location: LOT 3 COPPER RIDGE PARK

Notes:

Design Conditions and Summary

Load Calculation Method:	ASHRAE	Total Tubing Lengths:		Component Losses:	23,396 Btu/hr
Design Location:	(User Specified) steamboat springs , Colorado	hePEX 1/2"	3,725 ft	Infiltration/Ventilation:	21,252 Btu/hr
Outdoor Temperature:	-15.0 °F	Total RH Circuits:	21	Radiant Back Losses:	3,489 Btu/hr
Floorplans / Levels:		Total Manifolds:	5	Total Heating Load:	48,137 Btu/hr
Ground Floor	1,259 ft ²	Total Zones:	4	Radiant Heating:	44,648 Btu/hr
Main Floor	1,298 ft ²	Fluid Type:	100% Water	Radiant Back Losses:	3,489 Btu/hr
Total Area:	2,556 ft ²	Total Tubing Volume:	34.29 USG	Total Heating Load:	48,137 Btu/hr

Zone Heating Summary

Zone #	Area	Heating Types	RH Circuits	Flowrate	Head Loss	Supplemental	Rooms
101	189	RH	2	0.32	0.3	0	OFFICE/BATH
102	1,069	RH	7	2.18	1.5	0	GARAGE, WORK SPACE
201	894	RH	8	1.70	0.8	0	GREAT ROOM
202	403	RH	4	0.81	0.6	0	BEDS&BATH
Total	2,556	RH	21	5.01	1.5	0	

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

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 2022 Uponor(US) (8/18/2022)
 Version:22.0.0594 R

See end of report for important Notes and Disclaimers.

Room Heating Summary**Ground Floor****GARAGE**

Total Area: 725 ft²
 Heated by: RH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.5

Radiant Heating:
 Heated Area: 694 ft²
 Tubing in Floor: 721 ft
 Circuits in Room: 4
 Tube Spacing: 12
 Required Surface Temp: 80 °F
 Required Water Temp: 106 °F
 Est. Peak Output: 18,525 Btu/hr

Load/Loss Summary:
Room Design Load: 14,306 Btu/hr
 Radiant Load: 16,149 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 0 Btu/hr
 Radiant Back Loss: 1,843 Btu/hr
 Recovered Back Loss: 0 Btu/hr
 Total Heat Loss: 16,149 Btu/hr

OFFICE/BATH

Total Area: 189 ft²
 Heated by: RH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.5

Radiant Heating:
 Heated Area: 175 ft²
 Tubing in Floor: 262 ft
 Circuits in Room: 2
 Tube Spacing: 8
 Required Surface Temp: 78 °F
 Required Water Temp: 105 °F
 Est. Peak Output: 3,677 Btu/hr

Load/Loss Summary:
Room Design Load: 2,721 Btu/hr
 Radiant Load: 3,235 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 0 Btu/hr
 Radiant Back Loss: 514 Btu/hr
 Recovered Back Loss: 0 Btu/hr
 Total Heat Loss: 3,235 Btu/hr

WORK SPACE

Total Area: 344 ft²
 Heated by: RH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.5

Radiant Heating:
 Heated Area: 326 ft²
 Tubing in Floor: 500 ft
 Circuits in Room: 3
 Tube Spacing: 8
 Required Surface Temp: 77 °F
 Required Water Temp: 101 °F
 Est. Peak Output: 6,853 Btu/hr

Load/Loss Summary:
Room Design Load: 4,688 Btu/hr
 Radiant Load: 5,615 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 0 Btu/hr
 Radiant Back Loss: 927 Btu/hr
 Recovered Back Loss: 0 Btu/hr
 Total Heat Loss: 5,615 Btu/hr

Main Floor**BEDS&BATH**

Total Area: 403 ft²
 Heated by: RH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.5

Radiant Heating:
 Heated Area: 380 ft²
 Tubing in Floor: 636 ft
 Circuits in Room: 4
 Tube Spacing: 8
 Required Surface Temp: 80 °F
 Required Water Temp: 110 °F
 Est. Peak Output: 8,594 Btu/hr

Load/Loss Summary:
Room Design Load: 7,483 Btu/hr
 Radiant Load: 8,069 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 0 Btu/hr
 Radiant Back Loss: 586 Btu/hr
 Recovered Back Loss: -586 Btu/hr
 Total Heat Loss: 7,483 Btu/hr

GREAT ROOM

Total Area: 894 ft²
 Heated by: RH
 Room Temperature: 70 °F
 Floor Covering (Rv): 0.7 - 1/2 in.oak
 parquet and pad

Radiant Heating:
 Heated Area: 735 ft²
 Tubing in Floor: 1,563 ft
 Circuits in Room: 8
 Tube Spacing: 7
 Required Surface Temp: 81 °F
 Required Water Temp: 118 °F
 Est. Peak Output: 15,645 Btu/hr

Load/Loss Summary:
Room Design Load: 15,451 Btu/hr
 Radiant Load: 16,908 Btu/hr
 Baseboard Load: 0 Btu/hr
 Forced Air Load: 0 Btu/hr
 Other Load: 0 Btu/hr
 Radiant Back Loss: 1,457 Btu/hr
 Recovered Back Loss: -1,252 Btu/hr
 Total Heat Loss: 15,656 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
beds&bath	1	4	0.81	0.6	110	118	20	None Specified	Manifold	0	-	-
garage	1	4	1.62	1.5	106	118	20	None Specified	Manifold	0	-	-
greatroom	1	8	1.70	0.8	118	118	20	None Specified	Manifold	0	-	-
office/bath	1	2	0.32	0.3	105	118	20	None Specified	Manifold	0	-	-
work space	1	3	0.56	0.5	101	118	20	None Specified	Manifold	0	-	-
Total	4	21	5.01	1.5	118	-	-	-	-	0	-	-

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

Tubing Circuit Details

beds&bath

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss ¹	Temp Drop	Load	Actuator
B-9	BEDS&BATH	161	8	98	hePEX 1/2"	0.21	0.4	20	2,079	No
B-10	BEDS&BATH	147	8	87	hePEX 1/2"	0.18	0.3	20	1,841	No
B-11	BEDS&BATH	147	8	86	hePEX 1/2"	0.18	0.3	20	1,837	No
B-12	BEDS&BATH	189	8	109	hePEX 1/2"	0.23	0.6	20	2,313	No
Total	-	644		380	-	0.81	0.6		8,069	0

(1) Head loss for circuit tubing only

garage

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss ¹	Temp Drop	Load	Actuator
A-6	GARAGE	185	12	169	hePEX 1/2"	0.39	1.4	20	3,934	No
A-7	GARAGE	184	12	176	hePEX 1/2"	0.41	1.5	20	4,091	No
A-8	GARAGE	183	12	175	hePEX 1/2"	0.41	1.5	20	4,070	No
A-9	GARAGE	185	12	174	hePEX 1/2"	0.41	1.5	20	4,054	No
Total	-	737		694	-	1.62	1.5		16,149	0

(1) Head loss for circuit tubing only

greatroom

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss ¹	Temp Drop	Load	Actuator
B-1	GREAT ROOM	185	7	122	hePEX 1/2"	0.28	0.8	20	2,800	No
B-2	GREAT ROOM	198	7	117	hePEX 1/2"	0.27	0.8	20	2,699	No
B-3	GREAT ROOM	182	7	110	hePEX 1/2"	0.25	0.7	20	2,536	No
B-4	GREAT ROOM	187	7	78	hePEX 1/2"	0.18	0.4	20	1,801	No
B-5	GREAT ROOM	199	7	79	hePEX 1/2"	0.18	0.4	20	1,813	No
B-6	GREAT ROOM	211	7	79	hePEX 1/2"	0.18	0.4	20	1,813	No
B-7	GREAT ROOM	211	7	93	hePEX 1/2"	0.21	0.6	20	2,134	No
B-8	GREAT ROOM	193	7	57	hePEX 1/2"	0.13	0.2	20	1,313	No
Total	-	1,565		735	-	1.70	0.8		16,908	0

(1) Head loss for circuit tubing only

office/bath

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss ¹	Temp Drop	Load	Actuator
A-1	OFFICE/BATH	154	8	95	hePEX 1/2"	0.18	0.3	20	1,752	No
A-2	OFFICE/BATH	116	8	80	hePEX 1/2"	0.15	0.2	20	1,483	No
Total	-	270		175	-	0.32	0.3		3,235	0

(1) Head loss for circuit tubing only

work space

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss ¹	Temp Drop	Load	Actuator
A-3	WORK SPACE	162	8	109	hePEX 1/2"	0.19	0.4	20	1,875	No
A-4	WORK SPACE	189	8	115	hePEX 1/2"	0.20	0.5	20	1,987	No
A-5	WORK SPACE	158	8	102	hePEX 1/2"	0.18	0.3	20	1,753	No
Total	-	509		326	-	0.56	0.5		5,615	0

(1) Head loss for circuit tubing only

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Water Supply Summary

Project #: LFM/RICHEY LEFT UNIT

August 15, 2022

Project Information

Project #: LFM/RICHEY LEFT UNIT
Name: LFM/RICHEY
Location: LOT 3 COPPER RIDGE PARK

Notes:

Supply Summary

Name	Temp	Total Fluid Vol	Total Flow	Head Loss ¹	Load ²	# Circuits	# Zones
Water Temperature	118	34.29	5.01	1.5	49,976	21	4

(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
beds&bath	4	0.81	110	118	None Specified	-	-	0.0	0.6	0.0	0.6
garage	4	1.62	106	118	None Specified	-	-	0.0	1.5	0.0	1.5
greatroom	8	1.70	118	118	None Specified	-	-	0.0	0.8	0.0	0.8
office/bath	2	0.32	105	118	None Specified	-	-	0.0	0.3	0.0	0.3
work space	3	0.56	101	118	None Specified	-	-	0.0	0.5	0.0	0.5
Total	21	5.01	-	-	-	-	-	0.0	1.5	0.0	1.5

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

Water Temperature (118 °F)**beds&bath (118 °F, None Specified, 4 Circuits)**

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss ¹	Temp Drop ²	Load ³	Actuator
B-9	BEDS&BATH	161	8	98	hePEX 1/2"	0.21	0.4	20	2,079	No
B-10	BEDS&BATH	147	8	87	hePEX 1/2"	0.18	0.3	20	1,841	No
B-11	BEDS&BATH	147	8	86	hePEX 1/2"	0.18	0.3	20	1,837	No
B-12	BEDS&BATH	189	8	109	hePEX 1/2"	0.23	0.6	20	2,313	No
Total	-	644		380	-	0.81	0.6	-	8,069	0

(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.

garage (118 °F, None Specified, 4 Circuits)

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss ¹	Temp Drop ²	Load ³	Actuator
A-6	GARAGE	185	12	169	hePEX 1/2"	0.39	1.4	20	3,934	No
A-7	GARAGE	184	12	176	hePEX 1/2"	0.41	1.5	20	4,091	No
A-8	GARAGE	183	12	175	hePEX 1/2"	0.41	1.5	20	4,070	No
A-9	GARAGE	185	12	174	hePEX 1/2"	0.41	1.5	20	4,054	No
Total	-	737		694	-	1.62	1.5	-	16,149	0

(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.

greatroom (118 °F, None Specified, 8 Circuits)

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss ¹	Temp Drop ²	Load ³	Actuator
B-1	GREAT ROOM	185	7	122	hePEX 1/2"	0.28	0.8	20	2,800	No
B-2	GREAT ROOM	198	7	117	hePEX 1/2"	0.27	0.8	20	2,699	No
B-3	GREAT ROOM	182	7	110	hePEX 1/2"	0.25	0.7	20	2,536	No
B-4	GREAT ROOM	187	7	78	hePEX 1/2"	0.18	0.4	20	1,801	No
B-5	GREAT ROOM	199	7	79	hePEX 1/2"	0.18	0.4	20	1,813	No
B-6	GREAT ROOM	211	7	79	hePEX 1/2"	0.18	0.4	20	1,813	No
B-7	GREAT ROOM	211	7	93	hePEX 1/2"	0.21	0.6	20	2,134	No
B-8	GREAT ROOM	193	7	57	hePEX 1/2"	0.13	0.2	20	1,313	No
Total	-	1,565		735	-	1.70	0.8	-	16,908	0

(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.

office/bath (118 °F, None Specified, 2 Circuits)

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss ¹	Temp Drop ²	Load ³	Actuator
A-1	OFFICE/BATH	154	8	95	hePEX 1/2"	0.18	0.3	20	1,752	No
A-2	OFFICE/BATH	116	8	80	hePEX 1/2"	0.15	0.2	20	1,483	No
Total	-	270		175	-	0.32	0.3	-	3,235	0

(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.

work space (118 °F, None Specified, 3 Circuits)

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss ¹	Temp Drop ²	Load ³	Actuator
A-3	WORK SPACE	162	8	109	hePEX 1/2"	0.19	0.4	20	1,875	No
A-4	WORK SPACE	189	8	115	hePEX 1/2"	0.20	0.5	20	1,987	No
A-5	WORK SPACE	158	8	102	hePEX 1/2"	0.18	0.3	20	1,753	No
Total	-	509		326	-	0.56	0.5	-	5,615	0

(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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Project Information

Project #: LFM/RICHEY LEFT UNIT
 Name: LFM/RICHEY
 Location: LOT 3 COPPER RIDGE PARK

Notes:

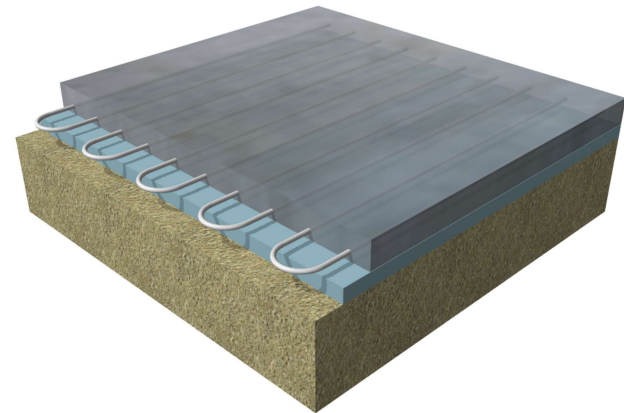
Design Conditions and Summary

Load Calculation Method:	ASHRAE	Component Losses:	23,396 Btu/hr
Design Location:	(User Specified) steamboat springs , Colorado	Infiltration/Ventilation:	21,252 Btu/hr
Outdoor Temperature:	-15.0 °F	Radiant Back Losses:	3,489 Btu/hr
Floorplans / Levels:		Total Heating Load:	48,137 Btu/hr
Ground Floor	1,259 ft ²	Radiant Heating:	44,648 Btu/hr
Main Floor	1,298 ft ²	Radiant Back Losses:	3,489 Btu/hr
Total Area:	2,556 ft ²	Total Heating Load:	48,137 Btu/hr

Radiant Panel Details

Panel Type #1 - Embedded Slab

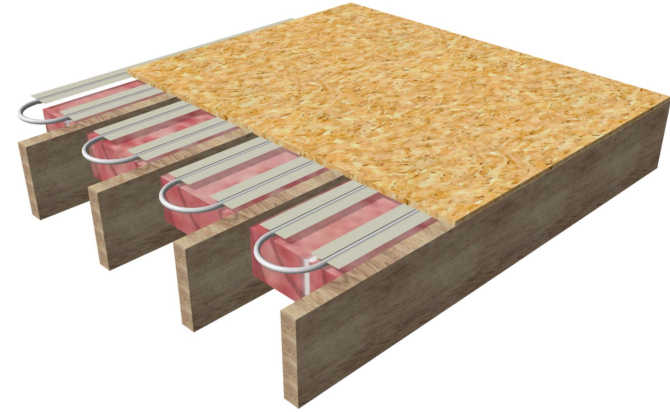
Slab Thickness:	4.0 in
Tube Depth:	2.5 in
Slab R per Inch (Embedding Material):	0.15 °F•ft ² •hr/(Btu•in)
Spacing:	12 in
Fastener:	2 Foam Staples
Floorplans:	
Ground Floor	694 ft ²



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

Panel Type #2 - Joist Trak Plates Below Sub-floor

Plate Description:	Joist Trak, extruded aluminum heat transfer plate.
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:	30.0 hr·ft ² ·°F/btu
Spacing:	8 in, 7 in
Floorplans:	
Ground Floor	501 ft ²
Main Floor	1,239 ft ²

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