

Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 1

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,702

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
15,318

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 428 119.84

Skylights

Instructions

U-Factor X Area = UA  
0.50 0 ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 0

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 546 10.92

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 1,342 75.15

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 2,127 53.18

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 0

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 0

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 98 35.28

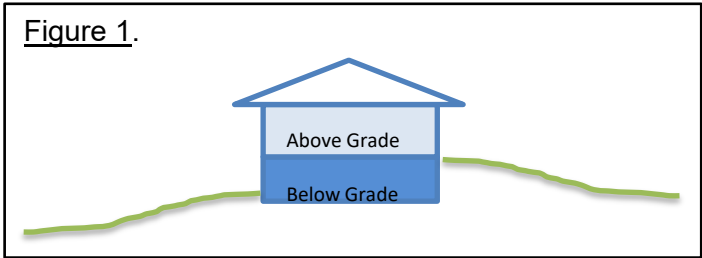
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA	294.37
Envelope Heat Load	13,541 Btu / Hour
Sum of UA x $\Delta T$	
Air Leakage Heat Load	7,610 Btu / Hour
Volume x 0.6 x $\Delta T$ x 0.018	
Building Design Heat Load	21,151 Btu / Hour
Air leakage + envelope heat loss	
Building and Duct Heat Load	21,151 Btu / Hour
Ducts in unconditioned space: sum of building heat loss x 1.10	
Ducts in conditioned space: sum of building heat loss x 1	
Maximum Heat Equipment Output	26,439 Btu / Hour
Building and duct heat loss x 1.40 for forced air furnace	
Building and duct heat loss x 1.25 for heat pump	



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Project Information

Licton Woodlawn Unit 2

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,699

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
15,291

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 428 = 119.84

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 = ---

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 545 = 10.90

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 1,278 = 71.57

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,166 = 54.15

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 = ---

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 = ---

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 97 = 34.92

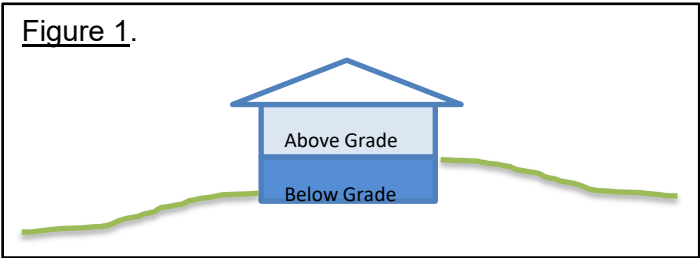
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 291.38  
Envelope Heat Load 13,403 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 7,597 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 21,000 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 21,000 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 26,250 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$



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Project Information

Licton Woodlawn Unit 3

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,422

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
12,798

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 236 = 66.08

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 =

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 483 = 9.66

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 630 = 35.28

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 1,845 = 46.13

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 =

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 =

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 87 = 31.25

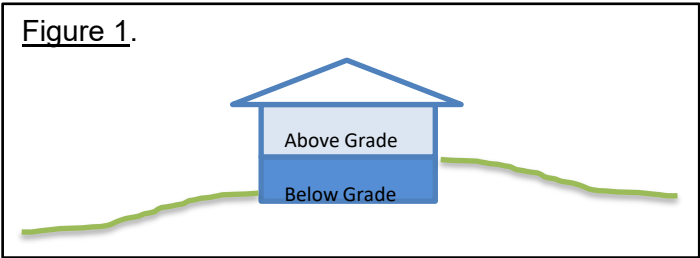
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 188.39  
Envelope Heat Load 8,666 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 6,358 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 15,024 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 15,024 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 18,780 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$



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Project Information

Licton Woodlawn Unit 4

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,422

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
12,798

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 236 = 66.08

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 = ---

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 483 = 9.66

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 937 = 52.47

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 1,845 = 46.13

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 = ---

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 = ---

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 87 = 31.25

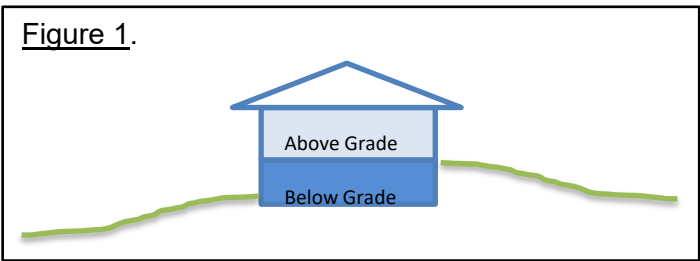
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 205.59  
Envelope Heat Load 9,457 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 6,358 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 15,815 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 15,815 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 19,769 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$





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Project Information

Licton Woodlawn Unit 5

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,656

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
14,904

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 260 = 72.80

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 =

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 583 = 11.66

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 976 = 54.66

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,440 = 61.00

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 =

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 =

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 88 = 31.68

Location of Ducts

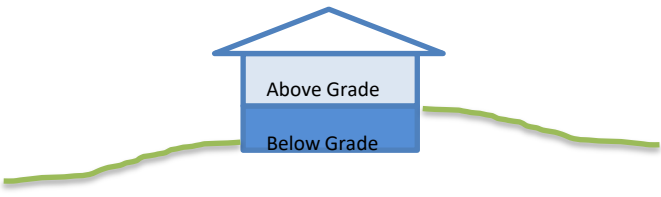
Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 231.80  
Envelope Heat Load 10,663 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 7,404 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 18,067 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 18,067 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 22,584 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$

Figure 1.



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Project Information

Licton Woodlawn Unit 6

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,665

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
14,985

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 271 = 75.88

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 =

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 589 = 11.78

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 571 = 31.98

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,446 = 61.15

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 =

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 =

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 88 = 31.68

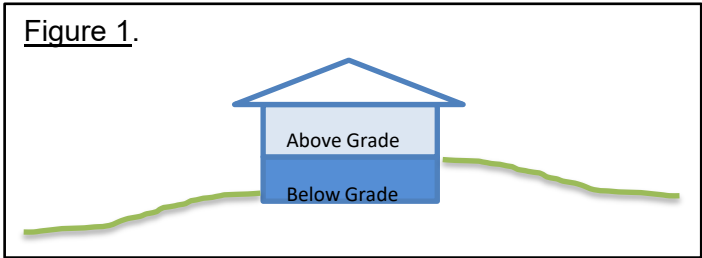
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA	212.47
Envelope Heat Load	9,773 Btu / Hour
Sum of UA x $\Delta T$	
Air Leakage Heat Load	7,445 Btu / Hour
Volume x 0.6 x $\Delta T$ x 0.018	
Building Design Heat Load	17,218 Btu / Hour
Air leakage + envelope heat loss	
Building and Duct Heat Load	17,218 Btu / Hour
Ducts in unconditioned space: sum of building heat loss x 1.10	
Ducts in conditioned space: sum of building heat loss x 1	
Maximum Heat Equipment Output	21,522 Btu / Hour
Building and duct heat loss x 1.40 for forced air furnace	
Building and duct heat loss x 1.25 for heat pump	



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Project Information

Licton Woodlawn Unit 7

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,711

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
15,399

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 146 = 40.88

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 =

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 612 = 12.24

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 2,007 = 112.39

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,524 = 63.10

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 =

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 =

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 88 = 31.68

Location of Ducts

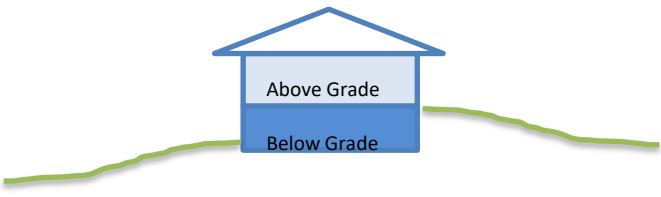
Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 260.29  
Envelope Heat Load 11,973 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 7,650 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 19,624 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 19,624 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 24,530 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$

Figure 1.



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Project Information

Licton Woodlawn Unit 8

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,673

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
15,057

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 387 = 108.36

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 =

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 515 = 10.30

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 1,906 = 106.74

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,028 = 50.70

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 =

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 =

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 81 = 29.16

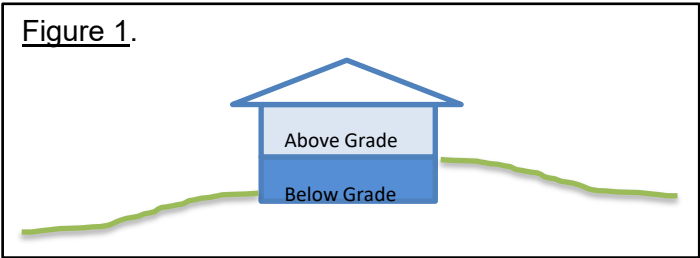
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 305.26  
Envelope Heat Load 14,042 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 7,480 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 21,522 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 21,522 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 26,903 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$





Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 9

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,713

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
15,417

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 457 = 127.96

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 = ---

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 567 = 11.34

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 708 = 39.65

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,243 = 56.08

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 = ---

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 = ---

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 70 = 25.20

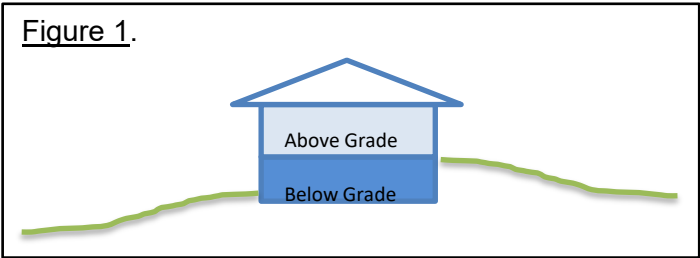
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 260.22  
Envelope Heat Load 11,970 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 7,659 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 19,629 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 19,629 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 24,537 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$



Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 10

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,713

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
15,417

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 325 = 91.00

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 =

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 567 = 11.34

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 792 = 44.35

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,243 = 56.08

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 =

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 =

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 70 = 25.20

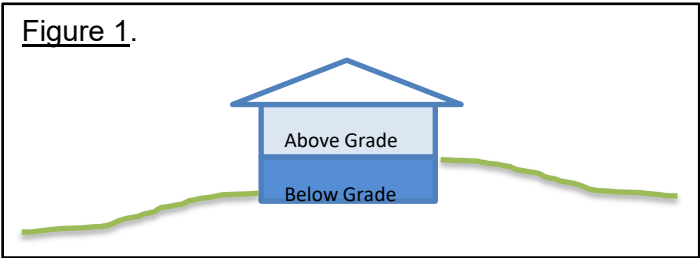
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 227.97  
Envelope Heat Load 10,486 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 7,659 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 18,146 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 18,146 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 22,682 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$



Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 11

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,768

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
15,912

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 331 = 92.68

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 =

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 591 = 11.82

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 1,992 = 111.55

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,338 = 58.45

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 =

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 =

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 72 = 25.92

Location of Ducts

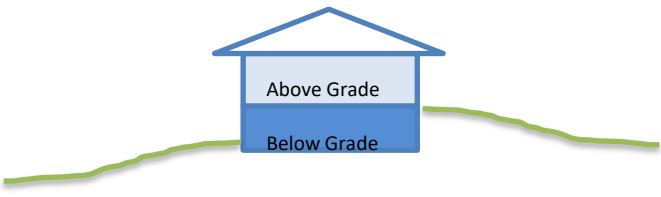
Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 300.42  
Envelope Heat Load 13,819 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 7,905 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 21,724 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 21,724 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 27,156 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$

Figure 1.



Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 12

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,768

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
15,912

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 484 = 135.52

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 = ---

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 591 = 11.82

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 1,386 = 77.62

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,338 = 58.45

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 = ---

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 = ---

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 72 = 25.92

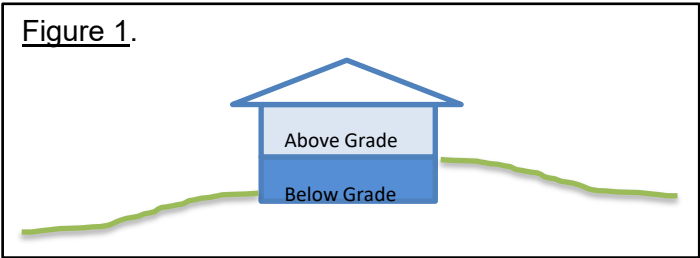
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 309.33  
Envelope Heat Load 14,229 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 7,905 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 22,134 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 22,134 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 27,668 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$





Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 13 and 14

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,713

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
15,417

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 331 = 92.68

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 =

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 567 = 11.34

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 791 = 44.30

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,243 = 56.08

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 =

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 =

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 70 = 25.20

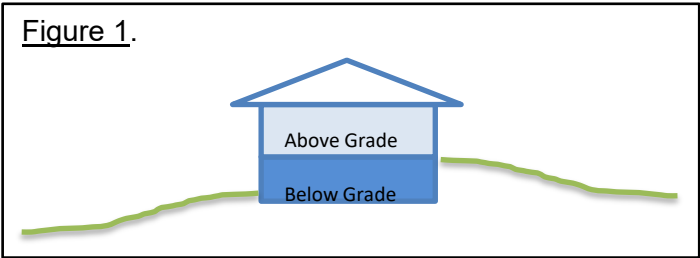
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 229.59  
Envelope Heat Load 10,561 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 7,659 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 18,220 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 18,220 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 22,775 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$



Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 15

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,713

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
15,417

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 325 91.00

Skylights

Instructions

U-Factor X Area = UA  
0.50 0 ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 0

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 567 11.34

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 797 44.63

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 2,243 56.08

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 0

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 0

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 70 25.20

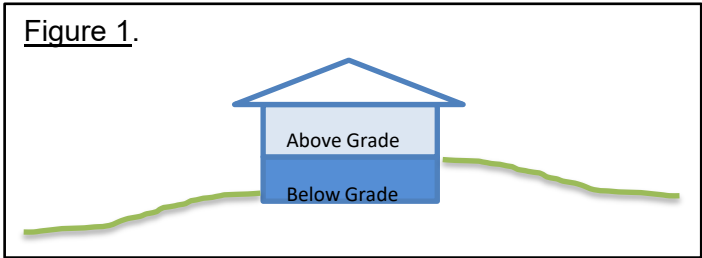
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA	228.25
Envelope Heat Load	10,499 Btu / Hour
Sum of UA x $\Delta T$	
Air Leakage Heat Load	7,659 Btu / Hour
Volume x 0.6 x $\Delta T$ x 0.018	
Building Design Heat Load	18,159 Btu / Hour
Air leakage + envelope heat loss	
Building and Duct Heat Load	18,159 Btu / Hour
Ducts in unconditioned space: sum of building heat loss x 1.10	
Ducts in conditioned space: sum of building heat loss x 1	
Maximum Heat Equipment Output	22,698 Btu / Hour
Building and duct heat loss x 1.40 for forced air furnace	
Building and duct heat loss x 1.25 for heat pump	



Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 16

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,626

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
14,634

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 501 = 140.28

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 =

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 492 = 9.84

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 1,547 = 86.63

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 1,969 = 49.23

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 =

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 =

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 102 = 36.72

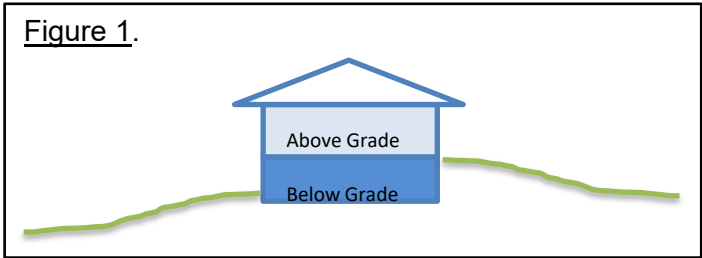
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA	322.70
Envelope Heat Load	14,844 Btu / Hour
Sum of UA x $\Delta T$	
Air Leakage Heat Load	7,270 Btu / Hour
Volume x 0.6 x $\Delta T$ x 0.018	
Building Design Heat Load	22,114 Btu / Hour
Air leakage + envelope heat loss	
Building and Duct Heat Load	22,114 Btu / Hour
Ducts in unconditioned space: sum of building heat loss x 1.10	
Ducts in conditioned space: sum of building heat loss x 1	
Maximum Heat Equipment Output	27,643 Btu / Hour
Building and duct heat loss x 1.40 for forced air furnace	
Building and duct heat loss x 1.25 for heat pump	



Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 17

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,382

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
12,438

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 371 = 103.88

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 = ---

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 463 = 9.26

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 1,771 = 99.18

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 1,845 = 46.13

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 = ---

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 = ---

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 86 = 30.96

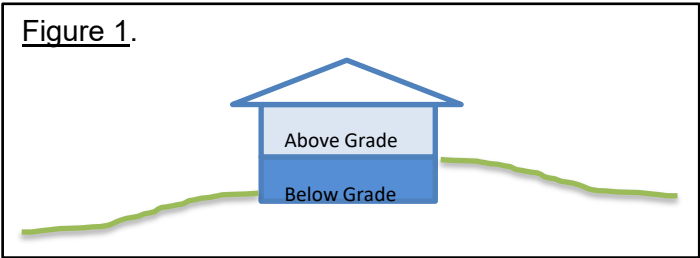
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 289.40  
Envelope Heat Load 13,312 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 6,179 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 19,492 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 19,492 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 24,365 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$





Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 18

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,564

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
14,076

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 514 = 143.92

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 = ---

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 600 = 12.00

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 1,735 = 97.16

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,357 = 58.93

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 = ---

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 = ---

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 106 = 38.16

Location of Ducts

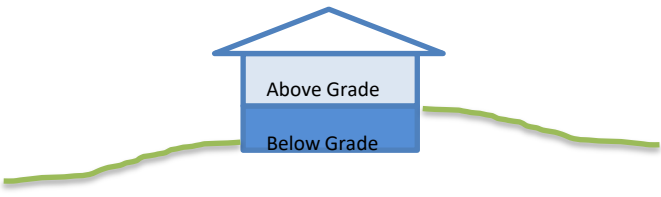
Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 350.17  
Envelope Heat Load 16,108 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 6,993 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 23,101 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 23,101 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 28,876 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$

Figure 1.



Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 19

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,566

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
14,094

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 326 = 91.28

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 =

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 592 = 11.84

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 796 = 44.58

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,335 = 58.38

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 =

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 =

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 106 = 38.16

Location of Ducts

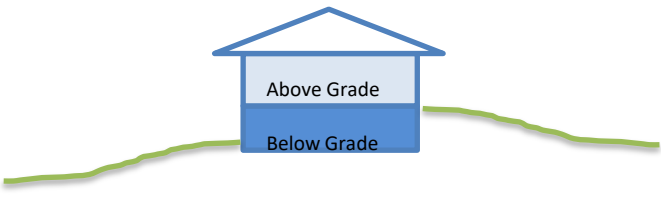
Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 244.23  
Envelope Heat Load 11,235 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 7,002 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 18,237 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 18,237 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 22,796 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$

Figure 1.



Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 20

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,567

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
14,103

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 428 = 119.84

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 = ---

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 600 = 12.00

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 1,821 = 101.98

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,357 = 58.93

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 = ---

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 = ---

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 106 = 38.16

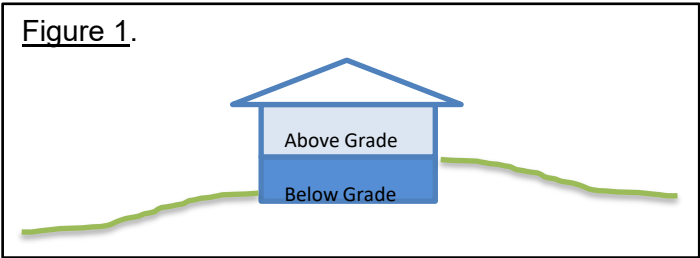
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 330.90  
Envelope Heat Load 15,221 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 7,006 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 22,228 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 22,228 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 27,785 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$



Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 21 and 26

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,711

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
15,399

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 391 = 109.48

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 = ---

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 612 = 12.24

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 1,772 = 99.23

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,524 = 63.10

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 = ---

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 = ---

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 88 = 31.68

Location of Ducts

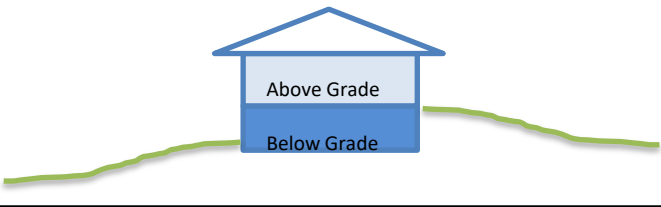
Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA 315.73  
Envelope Heat Load 14,524 Btu / Hour  
 $\text{Sum of UA} \times \Delta T$   
Air Leakage Heat Load 7,650 Btu / Hour  
 $\text{Volume} \times 0.6 \times \Delta T \times 0.018$   
Building Design Heat Load 22,174 Btu / Hour  
 $\text{Air leakage} + \text{envelope heat loss}$   
Building and Duct Heat Load 22,174 Btu / Hour  
 $\text{Ducts in unconditioned space: sum of building heat loss} \times 1.10$   
 $\text{Ducts in conditioned space: sum of building heat loss} \times 1$   
Maximum Heat Equipment Output 27,717 Btu / Hour  
 $\text{Building and duct heat loss} \times 1.40 \text{ for forced air furnace}$   
 $\text{Building and duct heat loss} \times 1.25 \text{ for heat pump}$

Figure 1.





Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 22 and 25

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,665

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
14,985

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 X 271 = 75.88

Skylights

Instructions

U-Factor X Area = UA  
0.50 X 0 = ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 X 0 =

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 X 589 = 11.78

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 X 571 = 31.98

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 X 2,446 = 61.15

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 X 0 =

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 X 0 =

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 X 88 = 31.68

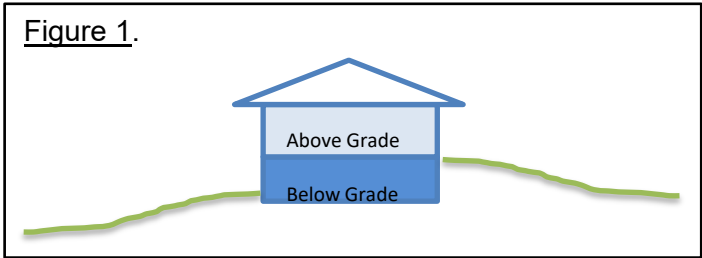
Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA	212.47
Envelope Heat Load	9,773 Btu / Hour
Sum of UA x $\Delta T$	
Air Leakage Heat Load	7,445 Btu / Hour
Volume x 0.6 x $\Delta T$ x 0.018	
Building Design Heat Load	17,218 Btu / Hour
Air leakage + envelope heat loss	
Building and Duct Heat Load	17,218 Btu / Hour
Ducts in unconditioned space: sum of building heat loss x 1.10	
Ducts in conditioned space: sum of building heat loss x 1	
Maximum Heat Equipment Output	21,522 Btu / Hour
Building and duct heat loss x 1.40 for forced air furnace	
Building and duct heat loss x 1.25 for heat pump	



Simple Heating System Size: Washington State

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Project Information

Licton Woodlawn Unit 23 and 24

9200 Woodlawn Ave N

Seattle, WA 98103

Contact Information

Vandervort Architects -Mark Wierenga

2000 Fairview AVE E - Suite 103

Seattle, WA 98102

Heating System Type: ☐ All Other Systems ☒ Heat Pump

To see detailed instructions for each section, place your cursor on the word "Instructions"

Design Temperature

Instructions

Seattle: Sea-Tac AP

Design Temperature Difference ( $\Delta T$ ) 46  
 $\Delta T = \text{Indoor (70 degrees)} - \text{Outdoor Design Temp}$

Area of Building

Conditioned Floor Area

Instructions

Conditioned Floor Area (sq ft)

1,711

Average Ceiling Height

Instructions

Average Ceiling Height (ft)

9.0

Conditioned Volume  
15,399

Glazing and Doors

Instructions

U-0.28

U-Factor X Area = UA  
0.280 398 111.44

Skylights

Instructions

U-Factor X Area = UA  
0.50 0 ---

Insulation

Attic

Instructions

R-49

U-Factor X Area = UA  
0.026 0

Single Rafter or Joist Vaulted Ceilings

Instructions

R-49 Advanced

U-Factor X Area = UA  
0.020 612 12.24

Above Grade Walls (see Figure 1)

Instructions

R-21 Intermediate

U-Factor X Area = UA  
0.056 1,765 98.84

Floors

Instructions

R-38

U-Factor X Area = UA  
0.025 2,524 63.10

Below Grade Walls (see Figure 1)

Instructions

No Below Grade Walls in this project.

U-Factor X Area = UA  
0.028 0

Slab Below Grade (see Figure 1)

Instructions

F-Factor X Length = UA  
0.303 0

Slab on Grade (see Figure 1)

Instructions

R-10 Fully Insulated

F-Factor X Length = UA  
0.360 88 31.68

Location of Ducts

Instructions

No Ducts

Duct Leakage Coefficient  
1.00

Sum of UA	317.30
Envelope Heat Load	14,596 Btu / Hour
Sum of UA x $\Delta T$	
Air Leakage Heat Load	7,650 Btu / Hour
Volume x 0.6 x $\Delta T$ x 0.018	
Building Design Heat Load	22,246 Btu / Hour
Air leakage + envelope heat loss	
Building and Duct Heat Load	22,246 Btu / Hour
Ducts in unconditioned space: sum of building heat loss x 1.10	
Ducts in conditioned space: sum of building heat loss x 1	
Maximum Heat Equipment Output	27,808 Btu / Hour
Building and duct heat loss x 1.40 for forced air furnace	
Building and duct heat loss x 1.25 for heat pump	

