

BUILDING ENERGY ANALYSIS REPORT

PROJECT:

450 ADU

Orland, CA 95963

Project Designer:

Jackson & Sands Engineering
1250 East Ave #10
Chico, CA 95926

Report Prepared by:

Jackson & Sands Engineering
1250 East Ave Suite 10
Chico, CA 95926
5307157184

Job Number:

23M-007

Date:

6/16/2023

The EnergyPro computer program has been used to perform the calculations summarized in this compliance report. This program has approval and is authorized by the California Energy Commission for use with both the Residential and Nonresidential 2022 Building Energy Efficiency Standards.

This program developed by EnergySoft, LLC – www.energysoft.com.

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E

Project Name: 450 ADU

Calculation Date/Time: 2023-05-17T12:45:07-07:00

(Page 1 of 12)

Calculation Description: Title 24 Analysis

Input File Name: 23M-007 Orland 450 ADU Energy.ribd22x

GENERAL INFORMATION					
01	Project Name	450 ADU			
02	Run Title	Title 24 Analysis			
03	Project Location	_			
04	City	Orland	05	Standards Version	2022
06	Zip code	95963	07	Software Version	EnergyPro 9.1
08	Climate Zone	11	09	Front Orientation (deg/ Cardinal)	All orientations
10	Building Type	Single family	11	Number of Dwelling Units	1
12	Project Scope	Newly Constructed	13	Number of Bedrooms	0
14	Addition Cond. Floor Area (ft ²)	0	15	Number of Stories	1
16	Existing Cond. Floor Area (ft ²)	n/a	17	Fenestration Average U-factor	0.3
18	Total Cond. Floor Area (ft ²)	448	19	Glazing Percentage (%)	11.60%
20	ADU Bedroom Count	n/a			

COMPLIANCE RESULTS	
01	Building Complies with Computer Performance
02	This building incorporates features that require field testing and/or verification by a certified HERS rater under the supervision of a CEC-approved HERS provider.
03	This building incorporates one or more Special Features shown below

Registration Number:

Registration Date/Time:

HERS Provider:

CA Building Energy Efficiency Standards - 2022 Residential Compliance

Report Version: 2022.0.000
 Schema Version: rev 20220901

Report Generated: 2023-05-17 12:45:37

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E

Project Name: 450 ADU

Calculation Date/Time: 2023-05-17T12:45:07-07:00

(Page 2 of 12)

Calculation Description: Title 24 Analysis

Input File Name: 23M-007 Orland 450 ADU Energy.ribd22x

ENERGY DESIGN RATINGS						
	Energy Design Ratings			Compliance Margins		
	Source Energy (EDR1)	Efficiency ¹ EDR (EDR2efficiency)	Total ² EDR (EDR2total)	Source Energy (EDR1)	Efficiency ¹ EDR (EDR2efficiency)	Total ² EDR (EDR2total)
Standard Design	34.6	42.3	38			
Proposed Design						
North Facing	30.5	38.2	35.5	4.1	4.1	2.5
East Facing	30.3	37.4	35.1	4.3	4.9	2.9
South Facing	30.6	38.8	35.9	4	3.5	2.1
West Facing	30.4	37.4	35	4.2	4.9	3
RESULT³: PASS						
¹ Efficiency EDR includes improvements like a better building envelope and more efficient equipment ² Total EDR includes efficiency and demand response measures such as photovoltaic (PV) system and batteries ³ Building complies when source energy, efficiency and total compliance margins are greater than or equal to zero and unmet load hour limits are not exceeded						
<ul style="list-style-type: none"> Standard Design PV Capacity: 1.67 kWdc Proposed PV Capacity Scaling: North (1.67 kWdc) East (1.67 kWdc) South (1.67 kWdc) West (1.67 kWdc) 						

Registration Number:

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CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E

Project Name: 450 ADU

Calculation Date/Time: 2023-05-17T12:45:07-07:00

(Page 3 of 12)

Calculation Description: Title 24 Analysis

Input File Name: 23M-007 Orland 450 ADU Energy.ribd22x

ENERGY USE SUMMARY						
Energy Use	Standard Design Source Energy (EDR1) (kBtu/ft ² -yr)	Standard Design TDV Energy (EDR2) (kTDV/ft ² -yr)	Proposed Design Source Energy (EDR1) (kBtu/ft ² -yr)	Proposed Design TDV Energy (EDR2) (kTDV/ft ² -yr)	Compliance Margin (EDR1)	Compliance Margin (EDR2)
Space Heating	5.1	22.46	5.18	41.54	-0.08	-19.08
Space Cooling	2.7	56.51	1.91	43.39	0.79	13.12
IAQ Ventilation	0.48	5.19	0.48	5.19	0	0
Water Heating	5.22	51.73	3.04	32.62	2.18	19.11
Self Utilization/Flexibility Credit				0		0
North Facing Efficiency Compliance Total	13.5	135.89	10.61	122.74	2.89	13.15
Space Heating	5.1	22.46	5.12	41.02	-0.02	-18.56
Space Cooling	2.7	56.51	1.8	41.22	0.9	15.29
IAQ Ventilation	0.48	5.19	0.48	5.19	0	0
Water Heating	5.22	51.73	3.04	32.63	2.18	19.1
Self Utilization/Flexibility Credit				0		0
East Facing Efficiency Compliance Total	13.5	135.89	10.44	120.06	3.06	15.83

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CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E

Project Name: 450 ADU

Calculation Date/Time: 2023-05-17T12:45:07-07:00

(Page 4 of 12)

Calculation Description: Title 24 Analysis

Input File Name: 23M-007 Orland 450 ADU Energy.ribd22x

ENERGY USE SUMMARY						
Energy Use	Standard Design Source Energy (EDR1) (kBtu/ft ² -yr)	Standard Design TDV Energy (EDR2) (kTDV/ft ² -yr)	Proposed Design Source Energy (EDR1) (kBtu/ft ² -yr)	Proposed Design TDV Energy (EDR2) (kTDV/ft ² -yr)	Compliance Margin (EDR1)	Compliance Margin (EDR2)
Space Heating	5.1	22.46	5.19	41.76	-0.09	-19.3
Space Cooling	2.7	56.51	1.97	45.21	0.73	11.3
IAQ Ventilation	0.48	5.19	0.48	5.19	0	0
Water Heating	5.22	51.73	3.04	32.62	2.18	19.11
Self Utilization/Flexibility Credit				0		0
South Facing Efficiency Compliance Total	13.5	135.89	10.68	124.78	2.82	11.11
Space Heating	5.1	22.46	5.19	41.83	-0.09	-19.37
Space Cooling	2.7	56.51	1.77	40.41	0.93	16.1
IAQ Ventilation	0.48	5.19	0.48	5.19	0	0
Water Heating	5.22	51.73	3.04	32.65	2.18	19.08
Self Utilization/Flexibility Credit				0		0
West Facing Efficiency Compliance Total	13.5	135.89	10.48	120.08	3.02	15.81

Registration Number:

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CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E

Project Name: 450 ADU

Calculation Date/Time: 2023-05-17T12:45:07-07:00

(Page 5 of 12)

Calculation Description: Title 24 Analysis

Input File Name: 23M-007 Orland 450 ADU Energy.ribd22x

ENERGY USE INTENSITY				
	Standard Design (kBtu/ft ² - yr)	Proposed Design (kBtu/ft ² - yr)	Compliance Margin (kBtu/ft ² - yr)	Margin Percentage
North Facing				
Gross EUI ¹	37.92	33.24	4.68	12.34
Net EUI ²	18.58	13.9	4.68	25.19
East Facing				
Gross EUI ¹	37.92	32.96	4.96	13.08
Net EUI ²	18.58	13.62	4.96	26.7
South Facing				
Gross EUI ¹	37.92	33.36	4.56	12.03
Net EUI ²	18.58	14.01	4.57	24.6
West Facing				
Gross EUI ¹	37.92	33.04	4.88	12.87
Net EUI ²	18.58	13.69	4.89	26.32
Notes 1. Gross EUI is Energy Use Total (not including PV) / Total Building Area. 2. Net EUI is Energy Use Total (including PV) / Total Building Area.				

This Certificate of Compliance is not registered

Registration Number:

Registration Date/Time:

HERS Provider:

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E

Project Name: 450 ADU

Calculation Date/Time: 2023-05-17T12:45:07-07:00

(Page 6 of 12)

Calculation Description: Title 24 Analysis

Input File Name: 23M-007 Orland 450 ADU Energy.ribd22x

REQUIRED PV SYSTEMS											
01	02	03	04	05	06	07	08	09	10	11	12
DC System Size (kWdc)	Exception	Module Type	Array Type	Power Electronics	CFI	Azimuth (deg)	Tilt Input	Array Angle (deg)	Tilt: (x in 12)	Inverter Eff. (%)	Annual Solar Access (%)
1.67	NA	Standard (14-17%)	Fixed	none	true	150-270	n/a	n/a	<=7:12	96	98

REQUIRED SPECIAL FEATURES
The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.
<ul style="list-style-type: none"> Insulation below roof deck Window overhangs and/or fins Variable capacity heat pump compliance option (verification details from VCHP Staff report, Appendix B, and RA3) Northwest Energy Efficiency Alliance (NEEA) rated heat pump water heater; specific brand/model, or equivalent, must be installed

HERS FEATURE SUMMARY
The following is a summary of the features that must be field-verified by a certified HERS Rater as a condition for meeting the modeled energy performance for this computer analysis. Additional detail is provided in the building tables below. Registered CF2Rs and CF3Rs are required to be completed in the HERS Registry
<ul style="list-style-type: none"> Indoor air quality ventilation Kitchen range hood Verified EER/EER2 Verified SEER/SEER2 Verified Refrigerant Charge Airflow in habitable rooms (SC3.1.4.1.7) Verified HSPF2 Verified heat pump rated heating capacity Wall-mounted thermostat in zones greater than 150 ft2 (SC3.4.5) Ductless indoor units located entirely in conditioned space (SC3.1.4.1.8)

BUILDING - FEATURES INFORMATION						
01	02	03	04	05	06	07
Project Name	Conditioned Floor Area (ft ²)	Number of Dwelling Units	Number of Bedrooms	Number of Zones	Number of Ventilation Cooling Systems	Number of Water Heating Systems
450 ADU	448	1	0	1	0	1

Registration Number:

Registration Date/Time:

HERS Provider:

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E

Project Name: 450 ADU

Calculation Date/Time: 2023-05-17T12:45:07-07:00

(Page 7 of 12)

Calculation Description: Title 24 Analysis

Input File Name: 23M-007 Orland 450 ADU Energy.ribd22x

ZONE INFORMATION						
01	02	03	04	05	06	07
Zone Name	Zone Type	HVAC System Name	Zone Floor Area (ft ²)	Avg. Ceiling Height	Water Heating System 1	Status
Zone 1	Conditioned	HVAC System1	448	9	DHW Sys 1	New

OPAQUE SURFACES							
01	02	03	04	05	06	07	08
Name	Zone	Construction	Azimuth	Orientation	Gross Area (ft ²)	Window and Door Area (ft ²)	Tilt (deg)
Front Wall	Zone 1	R-21 Wall	0	Front	144	23	90
Left Wall	Zone 1	R-21 Wall	90	Left	252	24	90
Rear Wall	Zone 1	R-21 Wall	180	Back	144	12	90
Right Wall	Zone 1	R-21 Wall	270	Right	252	13	90
Roof	Zone 1	R-38 Roof Attic	n/a	n/a	448	n/a	n/a

ATTIC							
01	02	03	04	05	06	07	08
Name	Construction	Type	Roof Rise (x in 12)	Roof Reflectance	Roof Emittance	Radiant Barrier	Cool Roof
Attic Zone 1	Attic RoofZone 1	Ventilated	6	0.1	0.85	No	No

FENESTRATION / GLAZING													
01	02	03	04	05	06	07	08	09	10	11	12	13	14
Name	Type	Surface	Orientation	Azimuth	Width (ft)	Height (ft)	Mult.	Area (ft ²)	U-factor	U-factor Source	SHGC	SHGC Source	Exterior Shading
Window	Window	Front Wall	Front	0	3	1	1	3	0.3	NFRC	0.23	NFRC	Bug Screen
Window 2	Window	Left Wall	Left	90	2	2	1	4	0.3	NFRC	0.23	NFRC	Bug Screen
Window 3	Window	Left Wall	Left	90	5	4	1	20	0.3	NFRC	0.23	NFRC	Bug Screen

Registration Number:

Registration Date/Time:

HERS Provider:

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E

Project Name: 450 ADU

Calculation Date/Time: 2023-05-17T12:45:07-07:00

(Page 8 of 12)

Calculation Description: Title 24 Analysis

Input File Name: 23M-007 Orland 450 ADU Energy.ribd22x

FENESTRATION / GLAZING													
01	02	03	04	05	06	07	08	09	10	11	12	13	14
Name	Type	Surface	Orientation	Azimuth	Width (ft)	Height (ft)	Mult.	Area (ft ²)	U-factor	U-factor Source	SHGC	SHGC Source	Exterior Shading
Window 4	Window	Rear Wall	Back	180	4	3	1	12	0.3	NFRC	0.23	NFRC	Bug Screen
Window 5	Window	Right Wall	Right	270	4	1	1	4	0.3	NFRC	0.23	NFRC	Bug Screen
Window 6	Window	Right Wall	Right	270	3	3	1	9	0.3	NFRC	0.23	NFRC	Bug Screen

OPAQUE DOORS			
01	02	03	04
Name	Side of Building	Area (ft ²)	U-factor
Door	Front Wall	20	0.2

OVERHANGS AND FINNS													
01	02	03	04	05	06	07	08	09	10	11	12	13	14
Window	Overhang					Left Fin				Right Fin			
	Depth	Dist Up	Left Extent	Right Extent	Flap Ht.	Depth	Top Up	Dist L	Bot Up	Depth	Top Up	Dist R	Bot Up
Window	8	0.1	8	8	0	0	0	0	0	0	0	0	0
Window 2	2	0.1	2	2	0	0	0	0	0	0	0	0	0
Window 3	2	0.1	2	2	0	0	0	0	0	0	0	0	0
Window 4	2	0.1	2	2	0	0	0	0	0	0	0	0	0
Window 5	2	0.1	2	2	0	0	0	0	0	0	0	0	0
Window 6	2	0.1	2	2	0	0	0	0	0	0	0	0	0

Registration Number:

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CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E

Project Name: 450 ADU

Calculation Date/Time: 2023-05-17T12:45:07-07:00

(Page 9 of 12)

Calculation Description: Title 24 Analysis

Input File Name: 23M-007 Orland 450 ADU Energy.ribd22x

SLAB FLOORS							
01	02	03	04	05	06	07	08
Name	Zone	Area (ft ²)	Perimeter (ft)	Edge Insul. R-value and Depth	Edge Insul. R-value and Depth	Carpeted Fraction	Heated
Slab	Zone 1	448	88	none	0	80%	No

OPAQUE SURFACE CONSTRUCTIONS							
01	02	03	04	05	06	07	08
Construction Name	Surface Type	Construction Type	Framing	Total Cavity R-value	Interior / Exterior Continuous R-value	U-factor	Assembly Layers
R-21 Wall	Exterior Walls	Wood Framed Wall	2x6 @ 16 in. O. C.	R-21	None / None	0.069	Inside Finish: Gypsum Board Cavity / Frame: R-21 / 2x6 Exterior Finish: 3 Coat Stucco
Attic RoofZone 1	Attic Roofs	Wood Framed Ceiling	2x4 @ 24 in. O. C.	R-19	None / 0	0.059	Roofing: Light Roof (Asphalt Shingle) Roof Deck: Wood Siding/sheathing/decking Cavity / Frame: R-13.0 / 2x4 Around Roof Joists: R-6.0 insul.
R-38 Roof Attic	Ceilings (below attic)	Wood Framed Ceiling	2x4 @ 24 in. O. C.	R-38	None / None	0.025	Over Ceiling Joists: R-28.9 insul. Cavity / Frame: R-9.1 / 2x4 Inside Finish: Gypsum Board

BUILDING ENVELOPE - HERS VERIFICATION				
01	02	03	04	05
Quality Insulation Installation (QII)	High R-value Spray Foam Insulation	Building Envelope Air Leakage	CFM50	CFM50
Not Required	Not Required	N/A	n/a	n/a

Registration Number:

Registration Date/Time:

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CF1R-PRF-01E

Project Name: 450 ADU

Calculation Date/Time: 2023-05-17T12:45:07-07:00

(Page 10 of 12)

Calculation Description: Title 24 Analysis

Input File Name: 23M-007 Orland 450 ADU Energy.ribd22x

WATER HEATING SYSTEMS								
01	02	03	04	05	06	07	08	09
Name	System Type	Distribution Type	Water Heater Name	Number of Units	Solar Heating System	Compact Distribution	HERS Verification	Water Heater Name (#)
DHW Sys 1	Domestic Hot Water (DHW)	Standard	DHW Heater 1	1	n/a	None	n/a	DHW Heater 1 (1)

WATER HEATERS - NEEA HEAT PUMP							
01	02	03	04	05	06	07	08
Name	# of Units	Tank Vol. (gal)	NEEA Heat Pump Brand	NEEA Heat Pump Model	Tank Location	Duct Inlet Air Source	Duct Outlet Air Source
DHW Heater 1	1	40	DirectEnergy	DirectEnergyECEPH4015	Outside	Zone 1	Zone 1

WATER HEATING - HERS VERIFICATION						
01	02	03	04	05	06	07
Name	Pipe Insulation	Parallel Piping	Compact Distribution	Compact Distribution Type	Recirculation Control	Shower Drain Water Heat Recovery
DHW Sys 1 - 1/1	Not Required	Not Required	Not Required	None	Not Required	Not Required

SPACE CONDITIONING SYSTEMS								
01	02	03	04	05	06	07	08	09
Name	System Type	Heating Unit Name	Heating Equipment Count	Cooling Unit Name	Cooling Equipment Count	Fan Name	Distribution Name	Required Thermostat Type
HVAC System1	Heat pump heating cooling	Heat Pump System 1	1	Heat Pump System 1	1	n/a	n/a	Setback

Registration Number:

Registration Date/Time:

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CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E

Project Name: 450 ADU

Calculation Date/Time: 2023-05-17T12:45:07-07:00

(Page 11 of 12)

Calculation Description: Title 24 Analysis

Input File Name: 23M-007 Orland 450 ADU Energy.ribd22x

HVAC - HEAT PUMPS												
01	02	03	04	05	06	07	08	09	10	11	12	13
Name	System Type	Number of Units	Heating				Cooling			Zonally Controlled	Compressor Type	HERS Verification
			Efficiency Type	HSPF / HSPF2 / COP	Cap 47	Cap 17	Efficiency Type	SEER / SEER2	EER / EER / CEER			
Heat Pump System 1	VCHP-ductless	1	HSPF2	9.5	17500	14525	EER2SEER2	16	12.5	Not Zonal	Single Speed	Heat Pump System 1-hers-htpump

HVAC HEAT PUMPS - HERS VERIFICATION								
01	02	03	04	05	06	07	08	09
Name	Verified Airflow	Airflow Target	Verified EER/EER2	Verified SEER/SEER2	Verified Refrigerant Charge	Verified HSPF/HSPF2	Verified Heating Cap 47	Verified Heating Cap 17
Heat Pump System 1-hers-htpump	Not Required	0	Not Required	Not Required	Yes	No	Yes	Yes

VARIABLE CAPACITY HEAT PUMP COMPLIANCE OPTION - HERS VERIFICATION									
01	02	03	04	05	06	07	08	09	10
Name	Certified Low-Static VCHP System	Airflow to Habitable Rooms	Ductless Units in Conditioned Space	Wall Mount Thermostat	Air Filter Sizing & Pressure Drop Rating	Low Leakage Ducts in Conditioned Space	Minimum Airflow per RA3.3 and SC3.3.3.4.1	Certified non-continuous Fan	Indoor Fan not Running Continuously
Heat Pump System 1	Not required	Required	Required	Required	Not required	Not required	Not required	Not required	Not required

INDOOR AIR QUALITY (IAQ) FANS								
01	02	03	04	05	06	07	08	09
Dwelling Unit	Airflow (CFM)	Fan Efficacy (W/CFM)	IAQ Fan Type	Includes Heat/Energy Recovery?	IAQ Recovery Effectiveness - SRE	Includes Fault Indicator Display?	HERS Verification	Status
SFam IAQVentRpt	28	0.35	Exhaust	No	n/a	No	Yes	

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CF1R-PRF-01E

Project Name: 450 ADU

Calculation Date/Time: 2023-05-17T12:45:07-07:00

(Page 12 of 12)

Calculation Description: Title 24 Analysis

Input File Name: 23M-007 Orland 450 ADU Energy.ribd22x

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT	
1. I certify that this Certificate of Compliance documentation is accurate and complete.	
Documentation Author Name:	Documentation Author Signature:
Company: Jackson & Sands Engineering	Signature Date: 6/16/2023
Address: 1250 East Ave Suite 10	CEA/ HERS Certification Identification (If applicable):
City/State/Zip: Chico, CA 95926	Phone: 5307157184
RESPONSIBLE PERSON'S DECLARATION STATEMENT	
I certify the following under penalty of perjury, under the laws of the State of California:	
<ol style="list-style-type: none"> I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design identified on this Certificate of Compliance. I certify that the energy features and performance specifications identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application. 	
Responsible Designer Name:	Responsible Designer Signature:
Company: Jackson & Sands Engineering	Date Signed:
Address: 1250 East Ave #10	License:
City/State/Zip: Chico, CA 95926	Phone:

Registration Number:

Registration Date/Time:

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CA Building Energy Efficiency Standards - 2022 Residential Compliance

Report Version: 2022.0.000
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Report Generated: 2023-05-17 12:45:37

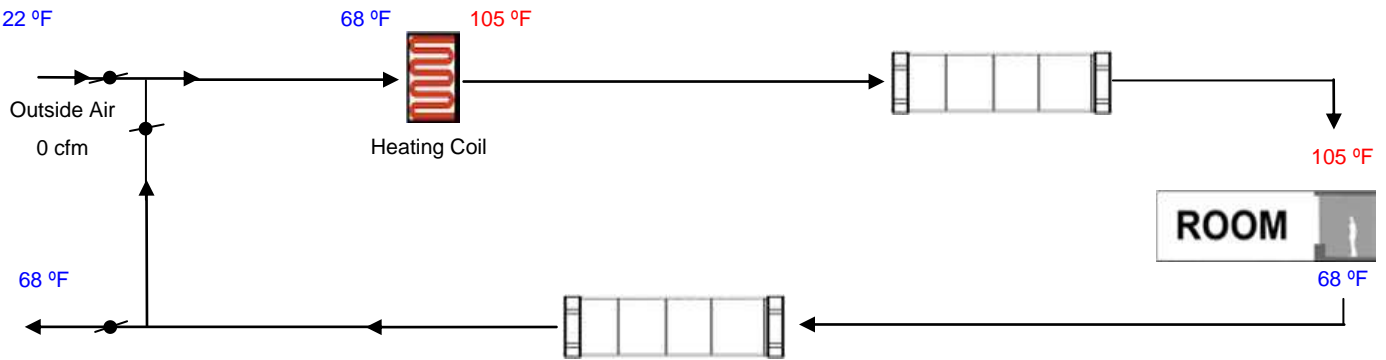
HVAC SYSTEM HEATING AND COOLING LOADS SUMMARY

Project Name 450 ADU	Date 6/16/2023
System Name HVAC System	Floor Area 448

ENGINEERING CHECKS		SYSTEM LOAD					
Number of Systems	1	Total Room Loads Return Vented Lighting Return Air Ducts Return Fan Ventilation Supply Fan Supply Air Ducts TOTAL SYSTEM LOAD	COIL COOLING PEAK			COIL HTG. PEAK	
Heating System			CFM	Sensible	Latent	CFM	Sensible
Output per System	17,500		211	4,513	151	201	7,940
Total Output (Btuh)	17,500			0			
Output (Btuh/sqft)	39.1			0			0
Cooling System				0			0
Output per System	15,000			0	0	0	0
Total Output (Btuh)	15,000			0			0
Total Output (Tons)	1.3			0			0
Total Output (Btuh/sqft)	33.5			0			0
Total Output (sqft/Ton)	358.4			4,513	151		7,940

Air System		HVAC EQUIPMENT SELECTION			
CFM per System	0	High Efficiency Heat Pump	13,229	0	9,755
Airflow (cfm)	0				
Airflow (cfm/sqft)	0.00				
Airflow (cfm/Ton)	0.0				
Outside Air (%)	0.0%	Total Adjusted System Output (Adjusted for Peak Design conditions)	13,229	0	9,755
Outside Air (cfm/sqft)	0.00				
Note: values above given at ARI conditions		TIME OF SYSTEM PEAK		Aug 3 PM	Jan 1 AM

HEATING SYSTEM PSYCHROMETRICS (Airstream Temperatures at Time of Heating Peak)



COOLING SYSTEM PSYCHROMETRICS (Airstream Temperatures at Time of Cooling Peak)

