OPTION 1: PERFORMANCE RATING METHOD

☒ I confirm that the energy simulation software used for this project has all capabilities described in EITHER section `G2 Simulation General Requirements' in Appendix G of ASHRAE 90.1-2004 OR the analogous section of the alternative qualifying energy code used.

☒ I confirm that the baseline building and proposed building in this project's energy simulation runs use the assumptions and modeling methodology described in EITHER Appendix G of ASHRAE 90.1-2004 OR the analogous section of the alternative qualifying energy code used.

Complete the following sections to document compliance using Option 1:

Section 1.1 - General Information
Section 1.2 - Space Summary
Section 1.3 - Advisory Messages
Section 1.4 - Comparison of Proposed Design Versus Baseline Design Energy Model Inputs
Section 1.5 - Energy Type Summary
Section 1.6 - On-Site Renewable Energy *(if applicable)*
Section 1.7 - Exceptional Calculation Measure Summary *(if applicable)*
Section 1.8 - Performance Rating Method Compliance Report

Section 1.1 - General Information

Provide the following data for your project

Simulation Program:	eQuest Energy Simulation Tool	Quantity of Stories:	3
Principal Heating Source:	Electricity	Weather File:	Phoenix TMY
Energy Code Used:	ASHRAE 90.1-2004 Appendix G	Climate Zone:	2B Climate Zone
New Construction Percent:	100 %	Existing Renovation Percent:	0 %

Enter the Target Finder score for your building from the Energy Star website (http://www.energystar.gov/index.cfm?fuseaction=target_finder.&CFID=154897). The score has no bearing on the number of EAc1 points earned. Use the following process to evaluate the Target Finder score:

1. Enter the facility information
2. Enter the facility characteristics. Select each primary and secondary space type that applies to the project. Then complete the required information for each space type.
4. Enter the total energy use per energy source for your project based on the totals reflected in the Proposed Design energy simulation output report.

Target Finder Score: 89

Section 1.2 - Space Summary

Provide the space summary for your project
(click "CLEAR" to clear the contents of any row All numeric entries must be entered as whole numbers without commas):

Table 1.2 - Space Summary

Building Use (Occupancy Type)	Conditioned Area (sf)	Unconditioned Area (sf)	Total Area (sf)	
Building A Classroom	76,500		76,500	CLEAR
Building B Classroom	65,500		65,500	CLEAR
Building C Classroom	76,400		76,400	CLEAR
				CLEAR
				CLEAR
				CLEAR
				CLEAR
				CLEAR
				CLEAR
				CLEAR
				CLEAR
Total:	218,400		218,400	

Section 1.3 - Advisory Messages

Complete the following information from the simulation output files (all entries should be entered as whole numbers, without commas)

TABLE 1.3 - Advisory Messages	Proposed Building	Baseline Building (0 deg. rotation)	Difference
Number of hours heating loads not met:	248	244	4
Number of hours cooling loads not met:	248	244	4
Number of warning messages:	0	0	0
Number of error messages:	0	0	0
Number of defaults overridden:	0	0	0

Section 1.4 - Comparison of Proposed Design Versus Baseline Design Energy Model Inputs

Use **Table 1.4** to document the Baseline and Proposed design energy model inputs for your project. Include descriptions for:

1. Exterior wall, underground wall, roof, floor, and slab assemblies including framing type, assembly R-values, assembly U-factors, and roof reflectivity when modeling cool roofs. (Refer to ASHRAE 90.1 Appendix A)
2. Fenestration types, assembly U-factors (including the impact of the frame on the assembly), SHGCs, and visual light transmittances, overall window-to-gross wall ratio, fixed shading devices, and automated movable shading devices.
3. Interior lighting power densities, exterior lighting power, process lighting power, and lighting controls modeled for credit.
4. Receptacle equipment, elevators or escalators, refrigeration equipment, and other process loads.
5. HVAC system information including types and efficiencies, fan control, fan supply air volume, fan power, economizer control, demand control ventilation, exhaust heat recovery, pump power and controls, and any other pertinent system information. (Include the ASHRAE 90.1-2004 Table G.3.1.1B Baseline System Number).
6. Domestic hot water system type, efficiency and storage tank volume.
7. General schedule information

Documentation should be sufficient to justify the energy and cost savings numbers reported in the Performance Rating Table.

(Click "CLEAR" to clear the contents of any row.)

TABLE 1.4 - Comparison of Proposed Design Versus Baseline Design

Model Input Parameter	Proposed Design Input	Baseline Design Input	
Exterior Wall Construction	CMU w/R-19 (U-0.102) (ALL BLDGS)	R-13 Steel Framed (U-0.124)(ALL BLDGS)	CLEAR
Roof Construction	R-30 (U-0.34)(ALL BLDGS)	R-15ci (U-0.63)(ALL BLDGS)	CLEAR
Floor/Slab Construction	Concrete(ALL BLDGS)	Concrete(ALL BLDGS)	CLEAR
Window-to-gross wall ratio	BLDG A = 21% BLDG B=16% BLDG C=22.7%	BLDG A = 21% BLDG B=16% BLDG C=22.7%	CLEAR
Fenestration type	Dual Pane Low-e(ALL BLDGS)	Single Pane Tint(ALL BLDGS)	CLEAR
Fenestration U-factor	0.29 plus frames(ALL BLDGS)	1.22 Assembly(ALL BLDGS)	CLEAR
Fenestration SHGC - North	0.44(ALL BLDGS)	0.25(ALL BLDGS)	CLEAR
Fenestration SHGC - Non-North	0.44(ALL BLDGS)	0.25(ALL BLDGS)	CLEAR
Fenestration Visual Light Transmittance	0.7(ALL BLDGS)	0.7(ALL BLDGS)	CLEAR
Shading Devices	Yes(ALL BLDGS)	No(ALL BLDGS)	CLEAR
			CLEAR
Interior Lighting Power Density (W/sf)	BLDG A = 1.04 BLDG B=1.06 BLDG C=.91(over all lighting is 1.00) Every space was dialed in at its individual Lighting power density (See Report	BLDG A = 1.19 BLDG B=1.18 BLDG C=1.16 (Over all lighting is 1.18)Every space was dialed in at its individual ASHRAE Lighting power density (See	CLEAR

TABLE 1.4 - Comparison of Proposed Design Versus Baseline Design

Model Input Parameter	Proposed Design Input	Baseline Design Input	
Daylighting Controls	No(ALL BLDGS)	No(ALL BLDGS)	CLEAR
Other Lighting Control Credits	Occupancy Sensors (10% lighting Credit Method on individual spaces that utilized Occupancy Sensors. See Report appendix for details on each	No	CLEAR
Exterior Lighting Power (kW)	47.2 (Site)	64.7(Site)	CLEAR
Process Lighting (kW)			CLEAR
Receptacle Equipment Power Density (W/sf)	Office - 1.5; Classroom - 1.0(ALL BLDGS)	Office - 1.5; Classroom - 1.0(ALL BLDGS)	CLEAR
Domestic Hot Water	Two type Electric Storage and smaller Instant Electric	Electric Storage	CLEAR
Primary HVAC System Type	Variable Air Volume	BLDG A&C Table G3.1.1B System # 6 - Pkg VAV w/ PFPB; BLDG B Table G3.1.1B System # 4 - PSZ-HP	CLEAR
Other HVAC System Type	100% OA Lab Unit (Heating Via Boiler)	100% OA Lab Unit (Heating Via Boiler)	CLEAR
Fan Supply Volume	275,300	378,200	CLEAR
Fan Power	243.3	329.2 kW	CLEAR
Economizer Control	Yes	Yes	CLEAR
Demand Control Ventilation	Yes(DCV was modeled by reduced the OA levels by approximately 30%.?CO2 minimum OA levels? shown on the Mechanical Schedule in addition t	No	CLEAR
Unitary Equipment Cooling Efficiency	n/a	BLDG A&C 9.5 EER BLDG B 12 SEER	CLEAR
Unitary Equipment Heating Efficiency	n/a	Elec Resistance***	CLEAR
Chiller parameters	600 Tons, 0.59 kW/Ton	n/a	CLEAR
Chilled water loop & pump parameters	44 deg Setpoint, 16 deg dT; High Efficiency, VFD pumps	n/a	CLEAR
Boiler parameters	87% Efficiency	80% Efficiency	CLEAR
Hot water loop & pump parameters	High Efficiency	High Efficiency	CLEAR
Cooling tower parameters	VFD Fans	n/a	CLEAR
Condenser water loop & pump parameters	WB Reset	n/a	CLEAR
Energy Recovery	Energy Recovery was not Utilized	Energy Recovery was required in areas served by unit 4B-1	CLEAR

Section 1.5 - Energy Type Summary

List the energy types used by your project (i.e. electricity, natural gas, purchased chilled water or steam, etc.) for either the Baseline or Proposed design. Also describe the utility rate used for each energy type (i.e. Feswick County Electric LG-S), as well as the units of energy used, and the units of demand used. (Click "CLEAR" to clear the contents of any row):

TABLE 1.5 - Energy Type Summary

Energy Type	Utility Rate Description	Units of Energy	Units of demand	
Electricity	SRP E-61 TOU	kWh	kW	CLEAR
Natural Gas	SW Gas SG-5	therms	MBH	CLEAR
				CLEAR
				CLEAR

Energy Units:

1 kBtu = 1,000 Btu	1 MBtu = 1,000 kBtu
1 kWh = 3.412 kBtu	1 MWh = 3,412 kBtu
1 therm = 100 kBtu	1 ton hr = 12 kBtu

Demand Units

1 MBH = 1,000 Btu/h	1 MMBtuh = 1,000 MBH
1 kW = 3.412 MBH	1 ton = 12 MBH

Section 1.6 - On-Site Renewable Energy

If the project does not include on-site renewable energy, skip to Section 1.7

☐ The project includes On-Site Renewable Energy

How is the on-site renewable energy cost calculated?

- ◉ This form will automatically calculate the *Renewable Energy Cost* based on the "virtual" energy rate from the proposed design energy model results. This form will subtract the *Renewable Energy Cost* from the proposed design energy model results to calculate the *Proposed Building Performance Rating*. (You do NOT need to fill out the "Renewable Energy Cost" field in Table 1.6 below)
- ○ Renewable Energy Cost for each on-site renewable source is analyzed separately from the energy model based on local utility rate structures. The Renewable Energy Cost for each renewable source is reported in Table 1.6 below, This form will subtract the reported Renewable Energy Cost from the proposed design energy model results to calculate the Proposed Building Performance Rating.
- ○ On-site renewable energy is modeled directly in the energy model. *Renewable Energy Cost* is already credited in the proposed design energy model results (i.e. the energy model already reflects zero cost for on-site renewable energy, and this form will NOT subtract the *Renewable Energy Cost* a second time).

Indicate the on-site renewable energy source(s) used, the backup energy type for each source (i.e. the fuel that is used when the renewable energy source is unavailable - ASHRAE 90.1-2004, Section G2.4), the rated capacity for the source, and the annual energy generated from each source.

TABLE 1.6 - Renewable Energy Source Summary

Renewable Source	Backup Energy Type	Annual Energy Generated		Rated Capacity	Renewable Energy Cost	
						CLEAR
						CLEAR

Section 1.7 - Exceptional Calculation Measure Summary

(If the energy analysis does not include exceptional calculation methods, skip to Section 1.8)

☒ The energy analysis includes exceptional calculation method(s) (ASHRAE 90.1-2004, G2.5)

How is the exceptional calculation measure cost savings determined?

○ This form will automatically calculate the exceptional calculation measure cost savings based on the "virtual" energy rate from the proposed design energy model results. This form will subtract this cost savings from the proposed design energy model results to calculate the *Proposed Building Performance Rating*.

◉ Exceptional calculation measure cost for each exceptional calculation measure is analyzed based on local utility rate structures. The *cost savings* for each exceptional calculation is reported below, This form will subtract the reported exceptional calculation cost savings from the proposed design energy model results to calculate the *Proposed Building Performance Rating*.

For each exceptional calculation method employed, document the predicted energy savings by energy type , the energy cost savings (if option 2 above is selected), and a narrative explaining the exceptional calculation method performed, and theoretical or empirical information supporting the accuracy of the method. Reference any applicable Credit Interpretation Rulings. [Note: if an end-use has an energy loss rather than an energy savings, enter it as a negative number]

Exceptional Calculation Measure Short Description: Demand Controlled Ventilation — CLEAR

Energy Type(s)	Annual Energy Savings by Energy Type	Annual Cost Savings
Electricity	9,254 (kWh)	$10,818
Natural Gas	2 (therms)	$2

Exceptional Calculation Measure Narrative:
Yes(DCV was modeled by reduced the OA levels by approximately 30%.?CO2 minimum OA levels? shown on the Mechanical Schedule in addition to the design minimum OA levels)

Exceptional Calculation Measure Short Description: — CLEAR

Energy Type(s)	Annual Energy Savings by Energy Type	Annual Cost Savings

Exceptional Calculation Measure Narrative:

Section 1.8 - Performance Rating Method Compliance Report *(Option 1 Compliance Only)*

In **Table 1.8.1**, list each energy end use for your project (including all end uses reflected in the baseline and proposed designs). Then check whether the end-use is a process load, select the energy type, and list the energy consumption and peak demand for each end-use for all four Baseline Design orientations. In **Table 1.8.1(b)** indicate the total baseline energy cost for each energy type for all four Baseline Design orientations. If either the baseline or proposed design uses more than one energy type for a single end use (i.e. electric resistance reheat, and central natural gas heating), enter each energy type as a separate end use (i.e. *Heating - Electric*, and *Heating, NG*).

Fill out the Proposed Design energy consumption and peak demand for each end use in **Table 1.8.2.** In **Table 1.8.2 (b)** indicate the total proposed energy cost for each energy type. [Note: Process loads for the proposed design must equal those listed in the Baseline design. Any process load energy savings for the project must be reported in Section 1.7.]

(Click "CLEAR" to clear the contents of any end use)

Table 1.8.1 - Baseline Performance - Performance Rating Method Compliance

End Use	Process?	Baseline Design Energy Type	Units of Annual Energy & Peak Demand	Baseline (0° rotation)	Baseline (90° rotation)	Baseline (180° rotation)	Baseline (270° rotation)	Baseline Design	
Interior Lighting	☐	Electricity	Energy Use (kWh)	732,264	732,264	732,264	732,264	732,264	CLEAR
			Demand (kW)	253.7	253.7	253.7	253.7	253.7	
Exterior Lighting	☐	Electricity	Energy Use (kWh)	232,776	232,776	232,776	232,776	232,776	CLEAR
			Demand (kW)	64.7	64.7	64.7	64.7	64.7	
Space Heating	☐	Electricity	Energy Use (kWh)	468,312	443,714	417,846	450,314	445,046.5	CLEAR
			Demand (kW)	1,874.9	1,859.9	1,849.6	1,847.3	1,857.9	
Space Cooling	☐	Electricity	Energy Use (kWh)	1,800,145	1,835,874	1,824,072	1,843,676	1,825,941.8	CLEAR
			Demand (kW)	1,354.2	1,365.7	1,359.3	1,385	1,366.1	
Pumps	☐	Electricity	Energy Use (kWh)	4,950	4,966	4,898	4,942	4,939	CLEAR
			Demand (kW)	1	1	1	1	1	
Heat Rejection	☐	Electricity	Energy Use (kWh)						CLEAR
			Demand (kW)						
Fans - Interior	☐	Electricity	Energy Use (kWh)	664,781	664,343	671,262	662,282	665,667	CLEAR
			Demand (kW)	282.9	285.1	282.4	291.7	285.5	
Fans - Parking Garage	☐	Electricity	Energy Use (kWh)						CLEAR
			Demand (kW)						
Service Water Heating	☐	Natural Gas	Energy Use (therms)	1,998	1,998	1,998	1,998	1,998	CLEAR
			Demand (MBH)						
Receptacle Equipment	☒	Electricity	Energy Use (kWh)	298,281	298,281	298,281	298,281	298,281	CLEAR
			Demand (kW)	82.4	82.4	82.4	82.4	82.4	

Table 1.8.1 - Baseline Performance - Performance Rating Method Compliance

End Use	Process?	Baseline Design Energy Type	Units of Annual Energy & Peak Demand	Baseline (0° rotation)	Baseline (90° rotation)	Baseline (180° rotation)	Baseline (270° rotation)	Baseline Design	
Interior Lighting (Process)	☒	Electricity	Energy Use (kWh)						CLEAR
			Demand (kW)						
Refrigeration	☒	Electricity	Energy Use (kWh)						CLEAR
			Demand (kW)						
Data Center Equipment	☒	Electricity	Energy Use (kWh)						CLEAR
			Demand (kW)						
Cooking	☒		Energy Use						CLEAR
			Demand						
Elevators & Escalators	☒	Electricity	Energy Use (kWh)						CLEAR
			Demand (kW)						
Space Heating	☐	Natural Gas	Energy Use (therms)	2,828	2,679	2,844	2,692	2,760.8	CLEAR
			Demand (MBH)						
Baseline Energy Totals:		Total Annual Energy Use (MBtu/year)		14,818	14,840	14,751	14,883	14,823	
		Annual Process Energy (MBtu/year)						1,018	

Note: Process Cost accounts for 7% of Baseline Performance. Process cost must equal at least 25% of Baseline Performance, or the narrative at the end of this form must document why this building's process costs are less than 25%

Table 1.8.1(b) - Baseline Energy Costs

Energy Type	Baseline Cost (0° rotation)	Baseline Cost (90° rotation)	Baseline Cost (180° rotation)	Baseline Cost (270° rotation)	Baseline Building Performance
Electricity	$303,480	$303,818	$302,309	$304,886	$303,623
Natural Gas	$10,379	$10,024	$10,375	$10,059	$10,209
Total Baseline Costs:	$313,859	$313,842	$312,684	$314,945	$313,832

Table 1.8.2 - Performance Rating Table - Performance Rating Method Compliance

End Use	Process?	Proposed Design Energy Type	Proposed Design Units	Proposed Building Results	Baseline Building Units	Baseline Building Results	Percent Savings
Interior Lighting		Electricity	Energy Use (kWh)	603,887	Energy Use (kWh)	732,264	17.5 %
			Demand (kW)	209.2	Demand (kW)	253.7	17.6 %

Exterior Lighting		Electricity	Energy Use (kWh)	169,795	Energy Use (kWh)	232,776	27.1	%
			Demand (kW)	47.2	Demand (kW)	64.7	27.3	%
Space Heating		Electricity	Energy Use (kWh)	454,906	Energy Use (kWh)	445,046.5	-2.2	%
			Demand (kW)	1,939.2	Demand (kW)	1,857.9	-4.3	%
Space Cooling		Electricity	Energy Use (kWh)	927,021	Energy Use (kWh)	1,825,941.8	49.2	%
			Demand (kW)	412.8	Demand (kW)	1,366.1	69.8	%
Pumps		Electricity	Energy Use (kWh)	271,726	Energy Use (kWh)	4,939	-5401.92	%
			Demand (kW)	80.5	Demand (kW)	1	-9033.33	%
Heat Rejection		Electricity	Energy Use (kWh)	21,683	Energy Use (kWh)		0	%
			Demand (kW)	21.4	Demand (kW)		0	%
Fans - Interior		Electricity	Energy Use (kWh)	339,341	Energy Use (kWh)	665,667	49	%
			Demand (kW)	171.5	Demand (kW)	285.5	39.9	%
Fans - Parking Garage		Electricity	Energy Use (kWh)		Energy Use (kWh)		0	%
			Demand (kW)		Demand (kW)		0	%
Service Water Heating		Natural Gas	Energy Use (therms)	1,998	Energy Use (therms)	1,998	0	%
			Demand (MBH)		Demand (MBH)		0	%
Receptacle Equipment	X	Electricity	Energy Use (kWh)	298,281	Energy Use (kWh)	298,281	0	%
			Demand (kW)	82.4	Demand (kW)	82.4	0	%
Interior Lighting (Process)	X	Electricity	Energy Use (kWh)		Energy Use (kWh)		0	%
			Demand (kW)		Demand (kW)		0	%
Refrigeration	X	Electricity	Energy Use (kWh)		Energy Use (kWh)		0	%
			Demand (kW)		Demand (kW)		0	%
Data Center Equipment	X	Electricity	Energy Use (kWh)		Energy Use (kWh)		0	%
			Demand (kW)		Demand (kW)		0	%
Cooking	X		Energy Use		Energy Use		0	%
			Demand		Demand		0	%
Elevators & Escalators	X	Electricity	Energy Use (kWh)		Energy Use (kWh)		0	%
			Demand (kW)		Demand (kW)		0	%
Space Heating		Natural Gas	Energy Use (therms)	3,644	Energy Use (therms)	2,760.8	-32	%
			Demand (MBH)		Demand (MBH)		0	%
Energy Totals:		Total Annual Energy Use (MBtu/year)		11,096		14,823	25.1	%
		Annual Process Energy (MBtu/year)		1018		1,018	0	%

Table 1.8.2(b) - Energy Cost and Consumption by Energy Type - Performance Rating Method Compliance

	Proposed Design		Baseline Design		Percent Savings	
Energy Type	Energy Use	Cost	Energy Use	Cost	Energy Use	Cost
Electricity	3,086,640 kWh	$212,121	4,204,914 kWh	$303,623	26.6 %	30.1 %
Natural Gas	5,642 therms	$11,651	4,758 therms	$10,209	-18.6 %	-14.1 %
	0		0		0 %	0 %
	0		0		0 %	0 %
Subtotal (Model Outputs):	11,096 (MBtu/year)	$223,772	14,823 (MBtu/year)	$313,832	25.1 %	28.7 %

On-Site Renewable Energy	Energy Generated	Renewable Energy Cost	

Exceptional Calculations	Energy Savings	Cost Savings	
Demand Controlled Ventilatic	31 (MBtu/year)	$10,820	(subtracted from model results to reflect Proposed Building Performance)

	Proposed Design		Baseline Design		Percent Savings	
	Energy Use	Cost	Energy Use	Cost	Energy	Cost
Total:	11,065 (MBtu/year)	$212,952	14,823 (MBtu/year)	$313,832	25.4 %	32.1 %

DOCUMENTATION DESCRIPTION LOG

Please upload the compliance summaries for ASHRAE 90.1-2004 (or qualifying local energy code) and/or LEED if available from the energy simulation software used. Please also upload the energy rate tariff from the project's energy providers if the project is not using the default rates in the LEED-NC v2.2 Reference Guide.

If the software is incapable of producing the energy code or LEED compliance summaries please provide output summaries and example input summaries for both the baseline and proposed buildings that support the data entered in the template tables above.

* Output summaries must include simulated energy consumption by end use as well as total building energy consumption and cost by energy type used in the building.
* Example input summaries must be a sampling of model input assumptions, focusing on the most common systems present in the building. The example input summaries should be taken from the simulation software's standard input reports if available; if the software will not produce input summary reports then screen captures of representative inputs are acceptable. The example input summaries must include samples of the following input information:

1. Occupancy and usage patterns
2. Assumed envelope component sizes and traits (area, R-value, U-value, etc.)
3. Assumed mechanical equipment types and traits (capacity, efficiency, etc.)

Please note that uploaded documents should be SUMMARIES, and not large quantities of detailed data

Documentation Description Log

In the text box below, please reference the file name of each uploaded file (e.g. simulationsummary.pdf)

Polytech LEED-NC v2.2 EA Report 091208.pdf

☒ I have provided the appropriate supporting documentation in the document upload section of LEED Online. Please refer to the above sheets.

OPTION 2: ASHRAE ADVANCED ENERGY DESIGN GUIDE FOR SMALL OFFICE BUILDINGS, 2004

The building complies with all the prescriptive measures of the ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004. The following restrictions are applicable:

☐ The project is less than 20,000 square feet.

☐ The project is office occupancy.

☐ The project has fully complied with all applicable criteria as established in the Advanced Energy Design Guide for the climate zone in which the building is located

_____ Climate zone

OPTION 3: ADVANCED BUILDINGS BENCHMARK ™ VERSION 1.1

☐ The project fully complies with the Basic Criteria and Prescriptive Measures of the Advanced Buildings Benchmark™ Version 1.1 with the exception of the following sections: 1.7 Monitoring and Trend-logging, 1.11 Indoor Air Quality, and 1.14 Networked Computer Monitor Control.

_____ Climate zone