

BUILDING & PLANT ENERGY ANALYSIS



TRY STREET TERMINAL BUILDING 620 SECOND AVENUE PITTSBURGH, PA

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MECHANICAL OPTION
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EXECUTIVE SUMMARY

The Try Street Terminal Building project involves renovations to the 10 story, 230,000 square foot building originally constructed in 1910. Although the main function is to provide apartments for the Art Institute of Pittsburgh, other features include: an atrium, exercise room, first-floor retail space and possibly a convenience store and casual dining restaurant.

In this document, the building was evaluated using the LEED-NC Version 2.2 Green Building Rating System and ASHRAE Standard 90.1. The lost rentable space and mechanical system first cost was also evaluated.

The LEED rating system is applicable to the Try Street Terminal Building because the building is a major renovation project. The six major categories of the rating system include: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation and Design Process. Of all the categories combined only a handful of points were awarded for the project. Thus, no LEED certification was achieved.

Next, a Standard 90.1 energy assessment was completed. This energy standard applies to the building envelope, as well as the HVAC, service water heating, lighting, and power systems and equipment. However, due to limited documentation, the main focus of this analysis was the building's envelope and lighting compliance. As can be seen from the tables below the building envelope complies with the standard, while the lighting does not.

BUILDING ENVELOPE SUMMARY		
ELEMENT	ASSESSMENT	COMPLIES?
WINDOW	%AREA	YES
SKYLIGHT	%AREA	YES
EXTERIOR WALL	U-Value	YES
	R-Value	YES
LIGHTWELL WALL	U-Value	YES
	R-Value	YES
ROOF	U-Value	YES
	R-Value	YES
WINDOW	U-Value	YES
	SHGC	YES

LIGHTING COMPLIANCE	
SPACE TYPE	COMPLIES?
CORRIDORS	NO
ELECTRICAL/MECHANICAL	YES
EXERCISE ROOM	YES
LAUNDRY	NO
LIVING AREAS - DORMATORY	YES
RESTROOMS	NO
STAIRS - ACTIVE	NO
STORAGE - INACTIVE	YES

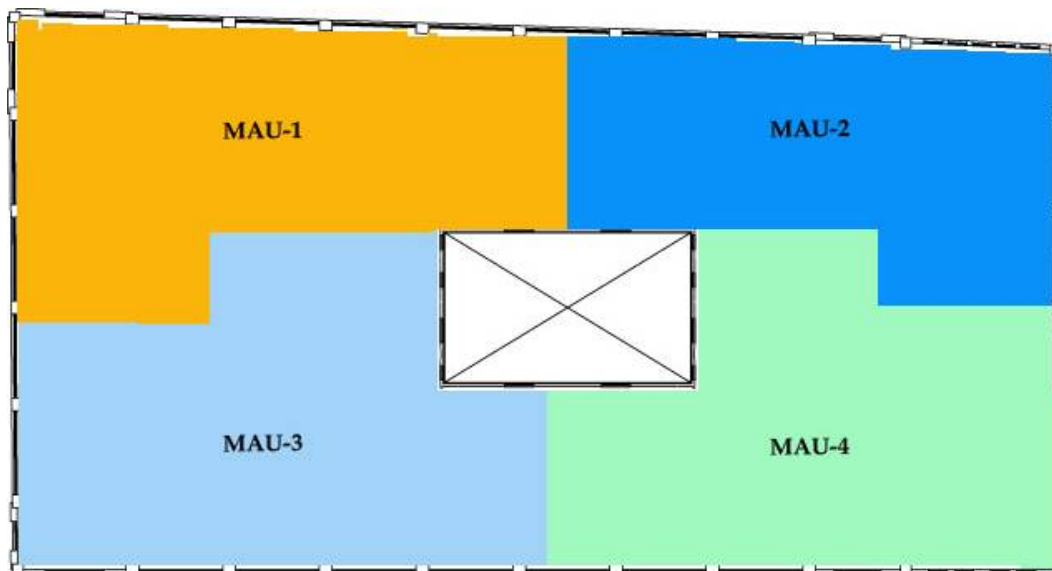
Mechanical system lost rentable space amounted to 2.82% and the HVAC first cost was \$2,014,00.00. After speaking with the mechanical design engineer, it was found that an energy analysis was not performed for the Try Street Terminal Building because first cost was the primary concern.



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BUILDING SYSTEMS OVERVIEW

The Try Street Terminal project includes renovations to the 230,000 square foot building. Water source heat pump fed by 2 boilers and a fluid cooler on the roof serve the apartments on the 1st through 9th floors. The required outdoor air for these apartments are brought in by 4 make up air units also located on the roof. A diagram is provided below to show the general distribution of the outdoor air supplied by these units. The 4 MAUs also serve the corridors on these floors.



The basement and first floor spaces are primarily served by the 4 air handling units located on the first floor. Since the majority of the spaces on these floors are unassigned a diagram can't be provided because the distribution of the air is unknown.

In addition to the units discussed above, a 10 ton FCU was designed. This unit supplies the required outdoor air to the exercise room located on the first floor.



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LEED GREEN BUILDING CERTIFICATION ASSESSMENT

The U.S. Green Building Council (USGBC) is comprised of a variety of leaders from every sector of the building industry. The Leadership in Energy and Environmental Design (LEED) rating systems were developed by USGBC committees and meant to encourage sustainable design practices. This rating system is applicable to new commercial construction, as well as major renovation projects. The LEED rating system consists of 6 major categories which include:

- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation and Design Process

The number of points earned in each of these categories is added to determine whether or not a building receives certification. The four levels of certification are:

- Certified (26 - 32 points)
- Silver (33 - 38 points)
- Gold (39 - 52 points)
- Platinum (53 - 69 points)

Due to limited documentation, the LEED assessment for the Try Street Terminal Building was completed by assigning zero points if there was insufficient information to prove certification. Therefore, the Try Street Terminal Building did not receive any points in this LEED assessment. In some categories, where possible credits could be obtained zero points were still awarded because of not being able to verify completion of the prerequisite(s). However, some of the possible credits that could have been obtained are discussed below.

- Sustainable Sites
 - Credit 2: The Try Street Terminal Building is located in downtown Pittsburgh which is expected to be within a 1/2 mile radius of ten basic services.



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- Credit 4.1: The building is expected to be within ¼ mile of one or more stops for two or more public/campus bus lines.
- Credit 4.2: Providing secure bicycle racks for 5% of building users and covered storage for 15% or more should be obtainable, especially considering that the occupants are students.
- Credit 4.4: No known parking is provided for the building.
- Materials & Resources
 - Prereq 1: An easily accessible area to the store and collection area of recyclables should be a credit to easily obtain.
 - Credit 1.1: Because the Try Street Terminal Building is a renovation project, it is possible that 75% of the walls, floors and roof were reused.
- Indoor Environmental Quality
 - Prereq 1: The building complies with the minimum ventilation requirements set forth in the IBC 2003.
 - Prereq 2: It is assumed that smoking is prohibited in the building.
 - Credit 8.1: Providing daylight to 75% of the spaces should be an obtainable credit because each apartment suite has several windows.
 - Credit 8.2: Providing views to 90% of the spaces should be an obtainable credit because each apartment suite has several windows with views to the outdoors.

As can be seen from above, even if the prerequisite(s) for each rating category were completed, only a handful of credits would be obtained. The Try Street Terminal Building still wouldn't earn any LEED certification. See **Appendix A** for the complete LEED chart.



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ASHRAE STANDARD 90.1 ASSESSMENT

The purpose of ASHRAE Standard 90.1 is to provide minimum requirements for the energy-efficient design of buildings with the exception of low-rise residential buildings. This standard applies to the building envelope, as well as the following systems and equipment used in buildings:

- heating, ventilation and air conditioning
- service water heating
- electric power distribution and metering provisions
- electric motors and belt drives
- lighting

While the other systems mentioned above will be discussed, the main focus of the Try Street Terminal building assessment will be on the building envelope and building lighting.

○ BUILDING ENVELOPE COMPLIANCE

The term ‘building envelope’ refers to the walls, windows, and roof that separate a building’s indoor conditioned spaces from the outdoor environment. In this part of the report, Section 5 of Standard 90.1 was used as a guide to determine if the Try Street Terminal Building complies with this ASHRAE standard.

The first step in the determining building envelope compliance is to decide which option to follow. The two choices are the Prescriptive Building Envelope Option or the Building Envelope Trade-Off Option. The distinguishing characteristics between these two are based on the vertical fenestration area and the skylight fenestration area. For each space-conditioning category, if the vertical fenestration area does not exceed 50% of the gross wall area and the skylight fenestration area does not exceed 5% of the gross roof area then the Prescriptive Building Envelope Option should be chosen. If these two criteria are not met then the Building Envelope Trade-Off Option should be chosen.

In the case of the Try Street Terminal Building, the prescriptive option was chosen because the vertical fenestration system area was less than 50% of the gross wall area and the skylight area did not to exceed 5%. For detailed results of this calculation, refer to **Appendix B**.



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Next, Table B-1 was used to determine the climate zone of 5A for the Pittsburgh area. This climate zone was then used to establish that Table 5.5-5 should be used to determine the Standard 90.1 compliance U-Values and Solar Heat Gain Coefficients. Finally, equipped with all this information the Standard 90.1 requirements can be compared to the design requirements for the Try Street Terminal building.

BUILDING ENVELOPE SUMMARY				
ELEMENT	ASSESSMENT	DESIGN	STANDARD 90	COMPLIES?
WINDOW	%AREA	24.7%	50%	YES
SKYLIGHT	%AREA	0.6%	5%	YES
EXTERIOR WALL	U-Value	0.056	0.09	YES
	R-Value	17.9	11.4	YES
LIGHTWELL WALL	U-Value	0.056	0.057	YES
	R-Value	17.9	13	YES
ROOF	U-Value	0.034	0.063	YES
	R-Value	29.4	15	YES
WINDOW	U-Value	0.631	0.67	YES
	SHGC	0.65	0.39 (all) 0.49 (north)	YES

As can be seen from the table above, the elements that the building envelope is comprised of comply with Standard 90. A detail of each of the properties of the typical elements in the building envelope may also be view in **Appendix B**.

○ **BUILDING LIGHTING COMPLIANCE**

The interior power lighting allowance for a building may be determined by either the Building Area Method or the Space-by-Space Method. While the Building Area Method may be a simplified approach, the Space-by-Space Method approach will be used to demonstrate the Try Street Terminal Building’s compliance.

The first step of the Space-by-Space Area Method is to determine the appropriate building type and allowed lighting power density from Table 9.6.1. For building types not listed in the table, the power density of a reasonably equivalent space should be used instead.



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Next, the gross lighted floor area of the building type should be determined and multiplied by the corresponding lighting power density. Finally, the interior lighting power allowance for the building is the sum of the lighting power allowances of all the building area types.

As can be seen from the summary table in **Appendix C**, of the eight space types evaluated for the Try Street Terminal Building only half of them complied with the requirements of Standard 90.1. Please note that unassigned spaces were not included in this assessment because a complete lighting layout was not available.

○ HEATING, VENTILATION, & AIR CONDITIONING COMPLIANCE

In order for the Try Street Terminal Building to comply with the Heating, Ventilation, & Air Conditioning section of Standard 90.1 its mechanical equipment must meet the minimum efficiency requirements. Compliance with Mandatory Provisions and the Prescriptive Path should be followed.

According to the requirements set forth in the Mandatory Provisions, the equipment listed in Tables 6.8.1A through 6.8.1G should have a minimum performance at the specified rating conditions when tested in accordance with the specified test procedure. Equipment not listed in these tables may still be used.

Due to limited information, several pieces of equipment could not be checked for compliance. The pieces that could be checked are discussed below.

- According to manufacturer's data, the two split system units (SS-1 and SS-2) have seasonal energy efficiency ratings (SEER) of 11.0 and 10.2, respectively. Both of these comply with the Standard 90.1 requirement of a minimum efficiency of 10 SEER.
- Type H Raypak boilers have thermal efficiencies of 82%. This efficiency is greater than the Standard 90.1 requirement of a minimum 75% thermal efficiency for gas-fired boilers between 300,000 and 2,500,000 BTU/hr. Therefore, both boilers comply.



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○ **SERVICE WATER HEATING COMPLIANCE**

According to section 7 of Standard 90.1, building service water heating systems and equipment should comply with this section. As listed in Table 7.8 of the standard, the performance required from a hot water supply boiler is 80% thermal efficiency. Therefore, the Type H Raypak boilers used in the Try Street Terminal project comply with this portion of the standard because they have a thermal efficiency of 82%.

○ **POWER COMPLIANCE**

This section of Standard 90.1 applies to all building power distribution systems. In order to comply with this power section, feeder conductors shall be designed for a maximum voltage drop of 2% at design load. Also, branch circuit conductors shall be sized for a maximum voltage drop of 3% at design load. However, due to limited documentation a power compliance check was not performed.

MECHANICAL SYSTEM LOST RENTABLE SPACE

The mechanical system lost rentable space can be best described as the space occupied by mechanical equipment, rooms and shafts. Because these mechanical spaces reduce the amount of space rentable by the tenants, the space is considered to be a lost profit by the owner.

For the Try Street Terminal Building, the lost rentable space appears to be minimized with only a 2.8% total impact on the basement through ninth floors. It is likely that this impact is minimized because of the mechanical penthouse and equipment, such as exhaust fans and make-up air units, being located on the roof. To view detailed calculations of this lost rentable space refer to **Appendix D**.

MECHANICAL FIRST COST

The total HVAC cost for the Try Street Terminal Building amounted to \$2,014,00.00 The approximate cost per square foot is \$8.58/ft². A breakdown of the mechanical cost was requested. However, this information was not currently available.



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ENERGY ANALYSIS

Energy modeling can be a very useful tool in the design of buildings. Various techniques can be used to determine building parameters that improve energy efficiency while maintaining thermal comfort and cost effectiveness. By providing details about the building design, estimates can be made comparing the energy consumption and operating costs of design alternatives.

The building design engineer who was contacted stated that an energy analysis was not performed on the Try Street Terminal Building. An analysis was not conducted for several reasons. One reason was that the renovation project was a speculative design and the intended occupant was unknown. Another reason was that the primary concern was the first cost of the project. Therefore, an energy analysis was not requested. Also, because the Try Street Terminal Building is still currently under construction actual energy data was not available.



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REFERENCES

ASHRAE Standard 90.1-2004

LEED-NC Version 2.2

McKamish, Documents for the Try Street Terminal Building.

TKA Architects, Documents and rendering for the Try Street Terminal Building.

The Pennsylvania State University Department of Architectural Engineering Faculty
Advisors

Past Penn State AE Thesis Technical Reports



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APPENDIX A - LEED ASSESSMENT

LEED - NC Version 2.2					
PROJECT CHECKLIST					
Y	N	SUSTAINABLE SITES			14 POSSIBLE POINTS
	1	Prereq 1	CONSTRUCTION ACTIVITY POLLUTION PREVENTION		Required
	1	Credit 1	SITE SELECTION		1
1		Credit 2	DEVELOPMENT DENSITY & COMMUNITY CONNECTIVITY		1
	1	Credit 3	BROWNFIELD REDEVELOPMENT		1
1		Credit 4.1	ALTERNATIVE TRANSPORTATION, Public Transportation Access		1
1		Credit 4.2	ALTERNATIVE TRANSPORTATION, Bicycle Storage & Changing Rooms		1
	1	Credit 4.3	ALTERNATIVE TRANSPORTATION, Low Emitting & Fuel Efficient Vehicles		1
1		Credit 4.4	ALTERNATIVE TRANSPORTATION, Parking Capacity		1
	1	Credit 5.1	SITE DEVELOPMENT, Protect or Restore Habitat		1
	1	Credit 5.2	SITE DEVELOPEMTN, Maximize Open Space		1
	1	Credit 6.1	STORMWATER DESIGN, Quantity Control		1
	1	Credit 6.2	STORMWATER DESIGN, Quality Control		1
	1	Credit 7.1	HEAT ISLAND EFFECT, Non-Roof		1
	1	Credit 7.2	HEAT ISLAND EFFECT, Roof		1
	1	Credit 8	LIGHT POLLUTION REDUCTION		1
Y	N	WATER EFFICIENCY			5 POSSIBLE POINTS
	1	Credit 1.1	WATER EFFICIENT LANDSCAPING, Reduce by 50%		1
	1	Credit 1.2	WATER EFFICIENT LANDSCAPING, No Potable Use or No Irrigation		1
	1	Credit 2	INNOVATIVE WASTEWATER TECHNOLOGIES		1
	1	Credit 3.1	WATER USE REDUCTION, 20% Reduction		1
	1	Credit 3.2	WATER USE REDUCTION, 30% Reduction		1
Y	N	ENERGY & ATMOSPHERE			17 POSSIBLE POINTS
	1	Prereq 1	FUNDAMENTAL COMMISSIONING OF THE BUILDING ENERGY SYSTEMS		Required
	1	Prereq 2	MINIMUM ENERGY PERFORMANCE		Required
	1	Prereq 3	FUNDAMENTAL REFRIGERANT MANAGEMENT		Required
	1	Credit 1	OPTIMIZE ENERGY PERFORMANCE		1 - 10
	1	Credit 2	ON-SITE RENEWABLE ENERGY		1 - 3
	1	Credit 3	ENHANCED COMMISSIONING		1
	1	Credit 4	ENHANCED REFRIGERANT MANAGEMENT		1
	1	Credit 5	MEASUREMENT & VERIFICATION		1
	1	Credit 6	GREEN POWER		1
Y	N	MATERIALS & RESOURCES			13 POSSIBLE POINTS
1		Prereq 1	STORAGE & COLLECTION OF RECYCLABLES		Required
1		Credit 1.1	BUILDING REUSE, Maintain 75% of Existing Walls, Floors & Roof		1
	1	Credit 1.2	BUILDING REUSE, Maintain 95% of Existing Walls, Floors & Roof		1
	1	Credit 1.3	BUILDING REUSE, Maintain 50% of Interior Non-Structural Elements		1
	1	Credit 2.1	CONSTRUCTION WASTE MANAGEMENT, Divert 50% from Disposal		1
	1	Credit 2.2	CONSTRUCTION WASTE MANAGEMENT, Divert 75% from Disposal		1
	1	Credit 3.1	MATERIALS REUSE, 5%		1
	1	Credit 3.2	MATERIALS REUSE, 10%		1
	1	Credit 4.1	RECYCLED CONTENT, 10% (post-consumer + 1/2 pre-consumer)		1
	1	Credit 4.2	RECYCLED CONTENT, 20% (post-consumer + 1/2 pre-consumer)		1
	1	Credit 5.1	REGIONAL MATERIALS, 10% Extracted, Procexxed & Manufactured Regionally		1
	1	Credit 5.2	REGIONAL MATERIALS, 20% Extracted, Procexxed & Manufactured Regionally		1
	1	Credit 6	RAPIDLY RENEWABLE MATERIALS		1
	1	Credit 7	CERTIFIED WOOD		1



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LEED - NC Version 2.2			
PROJECT CHECKLIST			
Y	N	INDOOR ENVIROMENTAL QUALITY	15 POSSIBLE POINTS
1		Prereq 1 MINIMEM IAQ PERFORMANCE	Required
1		Prereq 2 ENVIROMENTAL TOBACCO SMOKE (ETS) CONTROL	Required
	1	Credit 1 OUTDOOR AIR DELIVER MONITORING	1
	1	Credit 2 INCREASED VENTILATION	1
	1	Credit 3.1 CONSTRUCTION IAQ MANAGEMENT PLAN, During Construction	1
	1	Credit 3.2 CONSTRUCTION IAQ MANAGEMENT PLAN, Before Occupancy	1
	1	Credit 4.1 LOW-EMITTING MATERIALS, Adhesives & Sealants	1
	1	Credit 4.2 LOW-EMITTING MATERIALS, Paints & Coatings	1
	1	Credit 4.3 LOW-EMITTING MATERIALS, Carpet Systems	1
	1	Credit 4.4 LOW-EMITTING MATERIALS, Composite Wood & Agrifiber Products	1
	1	Credit 5 INDOOR CHEMICAL & POLLUTANT SOURCE CONTROL	1
	1	Credit 6.1 CONTROLLABILITY OF SYSTEMS, Lighting	1
	1	Credit 6.2 CONTROLLABILITY OF SYSTEMS, Thermal Comfort	1
	1	Credit 7.1 THERMAL COMFORT, Design	1
	1	Credit 7.2 THERMAL COMFORT, Verification	1
1		Credit 8.1 DAYLIGHT & VIEWS, Daylight 75% of Spaces	1
1		Credit 8.2 DAYLIGHT & VIEWS, Views 90% of Spaces	1
Y	N	INNOVATION & DESIGN PROCESS	5 POSSIBLE POINTS
	1	Credit 1.1 INNOVATION IN DESIGN	1
	1	Credit 1.2 INNOVATION IN DESIGN	1
	1	Credit 1.3 INNOVATION IN DESIGN	1
	1	Credit 1.4 INNOVATION IN DESIGN	1
	1	Credit 2 LEED ACCREDITED PROFESSIONAL	1
Y	N	PROJECT TOTALS	69 POSSIBLE POINTS
3		Certification?	NO CERTIFICATION



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APPENDIX B - BUILDING ENVELOPE COMPLIANCE

VERTICAL FENESTRATION AREA ASSESSMENT				
FLOOR	EXTERIOR WALLS	AREA		% WINDOW AREA
		WINDOW	TOTAL	
1	N	475	1638	
1A	N	635	1620	
2	N	775	2311	
3	N	845	2592	
4	N	845	2592	
5	N	845	2484	
6	N	845	2376	
7	N	845	2376	
8	N	705	2002	
9	N	705	2708	
NORTH WALL SUBTOTAL		7520	22699	33.13%
1	E	0	972	
1A	E	102	961.2	
2	E	0	1155.6	
3	E	0	1296	
4	E	0	1296	
5	E	0	1242	
6	E	0	1188	
7	E	0	1188	
8	E	170	1188	
9	E	170	1607.04	
EAST WALL SUBTOTAL		442	12093.84	3.65%
1	S	780	1638	
1A	S	635	1620	
2	S	775	2311	
3	S	845	2592	
4	S	845	2592	
5	S	845	2484	
6	S	845	2376	
7	S	845	2376	
8	S	705	2002	
9	S	705	2708	
SOUTH WALL SUBTOTAL		7825	22699	34.47%
1	W	56	1044	
1A	W	136	1032.4	
2	W	330	1241.2	
3	W	420	1392	
4	W	420	1392	
5	W	420	1334	
6	W	420	1276	
7	W	420	1276	
8	W	420	1276	
9	W	420	1726.08	
WEST WALL SUBTOTAL		3462	12989.68	26.65%
FLOORS	LIGHTWELL WALLS	AREA		% WINDOW AREA
		WINDOW	TOTAL	
2-9	N	368	4732	
2-9	E	336	2839	
2-9	S	368	4732	
2-9	W	845	2839	
LIGHTWELL SUBTOTAL		1917	15142	12.66%
BUILDING TOTAL		21166	85623.52	24.72%
COMPLIES IF % WINDOW AREA IS LESS THAN 50%				COMPLIES

VERTICAL FENESTRATION AREA ASSESSMENT			
ROOF	AREA		% SKYLIGHT AREA
	SKYLIGHT	TOTAL	
LIGHTWELL - 2nd FLOOR	123.77	1500	
MAIN	0	18850	
SKYLIGHT TOTAL	123.77	20350	0.61%
COMPLIES IF % SKYLIGHT AREA IS LESS THAN 5%			COMPLIES



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Wall Properties - [Exterior]

Wall Assembly Name: **Exterior**

Outside Surface Color: **Medium** Absorptivity: **0.675**

Layers: Inside to Outside	Thickness in	Density lb/ft ³	Specific Ht. BTU/lb/F	R-Value hr-ft ² -F/BTU	Weight lb/ft ²
Inside surface resistance	0.000	0.0	0.00	0.68500	0.0
Gypsum board	0.625	50.0	0.26	0.56000	2.6
Air space	0.000	0.0	0.00	0.91000	0.0
R-7 board insulation	2.000	2.0	0.22	13.88889	0.3
8-in common brick	8.000	120.0	0.20	1.58730	80.0
Outside surface resistance	0.000	0.0	0.00	0.33300	0.0
Totals	10.625			17.96	82.9

Overall U-Value: 0.056 BTU/hr/ft²/F

OK Cancel Help

Wall Properties - [Lightwell ext wall 2-9th]

Wall Assembly Name: **Lightwell ext wall 2-9th**

Outside Surface Color: **Medium** Absorptivity: **0.675**

Layers: Inside to Outside	Thickness in	Density lb/ft ³	Specific Ht. BTU/lb/F	R-Value hr-ft ² -F/BTU	Weight lb/ft ²
Inside surface resistance	0.000	0.0	0.00	0.68500	0.0
5/8-in gypsum board	0.625	50.0	0.26	0.56004	2.6
Air space	0.000	0.0	0.00	0.91000	0.0
densglass sheathing	0.500	1.9	0.00	0.56000	0.1
R-7 board insulation	2.000	2.0	0.22	13.88889	0.3
Air space	0.000	0.0	0.00	0.91000	0.0
corrugated metal panel	0.875	0.0	0.00	0.01000	0.0
Outside surface resistance	0.000	0.0	0.00	0.33300	0.0
Totals	4.000			17.86	3.0

Overall U-Value: 0.056 BTU/hr/ft²/F

OK Cancel Help



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Roof Properties - [ROOF]

Roof Assembly Name: **ROOF**

Outside Surface Color: **Dark** Absorptivity: **0.900**

Layers: Inside to Outside	Thickness in	Density lb/ft ³	Specific Ht. BTU/lb/F	R-Value hr-ft ² -F/BTU	Weight lb/ft ²
Inside surface resistance	0.000	0.0	0.00	0.68500	0.0
8-in HW concrete	8.000	140.0	0.20	0.66667	93.3
Board insulation	4.000	2.0	0.22	27.77778	0.7
Outside surface resistance	0.000	0.0	0.00	0.33300	0.0
Totals	12.000			29.46	94.0

Overall U-Value: 0.034 BTU/hr/ft²/F

OK Cancel Help

Window Properties - [Window]

Window Details

Name: **Window**

Detailed Input:

Height: **1.00** ft Width: **1.00** ft

Frame Type: **Aluminum with thermal breaks**

Internal Shade Type: **None**

Overall U-Value: **0.631** BTU/hr/ft²/F

Overall Shade Coefficient: **0.751**

Glass Details

Glazing	Glass Type	Transmissivity	Reflectivity	Absorptivity
Outer Glazing	1/4" clear	0.792	0.079	0.129
Glazing #2	1/4" clear	0.792	0.079	0.129
Glazing #3	not used			

Gap Type: **1/2" Air Space**

OK Cancel Help



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APPENDIX C - BUILDING LIGHTING COMPLIANCE

LIGHTING COMPLIANCE					
SPACE TYPE	DESIGN			STANDARD 90	
	TOTAL SPACE AREA (ft ²)	TOTAL SPACE WATTS (W)	LPD (W/ft ²)	LPD (W/ft ²)	COMPLIES?
CORRIDORS	24,313	15,190	0.62	0.5	NO
ELECTRICAL/MECHANICAL	2,114	1,890	0.89	1.5	YES
EXERCISE ROOM	2,750	560	0.20	0.9	YES
LAUNDRY	1,490	1,330	0.89	0.6	NO
LIVING AREAS - DORMATORY	120,455	94,220	0.78	1.1	YES
RESTROOMS	13,394	22,230	1.66	0.9	NO
STAIRS - ACTIVE	3,882	4,550	1.17	0.6	NO
STORAGE - INACTIVE	3,100	840	0.27	0.3	YES



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APPENDIX D - MECHANICAL SYSTEM LOST RENTABLE SPACE

LOST RENTABLE SPACE BY FLOOR					
SPACE TYPE	AREA (ft²)				
	BASEMENT	1	1A	2-7	8-9
ELECTRICAL ROOMS	500	60	60	60	60
PUMP ROOM	560	0	0	0	0
ELEVATOR SHAFTS	264	264	264	264	264
MECHANICAL ROOMS	0	421	0	0	0
VERTICAL SHAFTS	29	17	54	70	50
EQUIPMENT (i.e. FCUs)	24	130	78	102	84
TOTAL FLOOR AREA	20,520	20,520	16,984	23,124	19,020
LOST RENTABLE SPACE	6.7%	4.3%	2.7%	2.1%	2.4%

LOST RENTABLE SPACE BY TYPE		
SPACE TYPE	AREA (ft²)	% LOST AREA
ELECTRICAL ROOMS	1,100	0.5%
PUMP ROOM	560	0.2%
ELEVATOR SHAFTS	2,904	1.2%
MECHANICAL ROOMS	421	0.2%
VERTICAL SHAFTS	620	0.3%
EQUIPMENT (i.e. FCUs)	1,012	0.4%
LOST RENTABLE SPACE	6,617	2.8%