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Project 2 LEED

Table of Contents

1. Summary from Project.... 3
 - a. Figure 1.... 4
 - b. Building 1.... 4
 - c. Building 2.... 5
 - d. Building 3.... 6
2. Air Quality & Heat.... 6
3. Thermal Comfort & Health.... 7
4. Climate & Site Design.... 7
5. Solar Geometry.... 7
6. Passive Solar Heating.... 7
7. Active Solar Heating.... 8
8. Passive Cooling & Shading.... 8
9. Natural & Man-Made Lighting.... 8
10. Thermal Envelope.... 8
11. HVAC Techniques.... 9
12. Acoustical Details.... 9
13. LEED Checklist.... 10
14. Closing.... 10

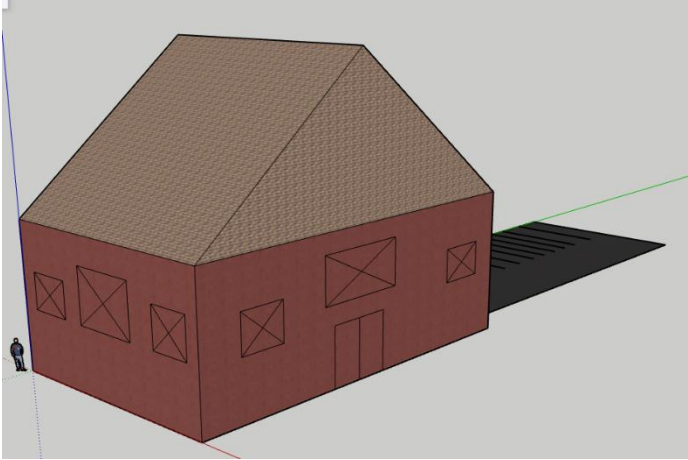
1. Summary of Project 1

To recap Project 1, our team intends to design three new buildings to be located near the solar panel field on the Northwest edge of Elizabethtown College's campus. These three buildings and one outdoor feature will include a Chick-fil-a, Wawa, a sports bar, and a Japanese garden. You can see our placement plans in Figure 1. We will be following LEED certification standards by thinking of factors like the climate patterns, geography, urban design concepts and solar geometry. Our goal is to preserve the college's identity as an accepting and open community by allowing for spaces that both students and residents can enjoy. The gardens will allow for a peaceful space of meditation and serenity, while the sports bar will allow for a joyful and exciting spot for students to blow off some steam from intense workloads. The Chick-fil-a will offer more variety of food choices, and a 24/7 Wawa will give students anything they need at any time within walking distance. This report will go in depth to the specifics of LEED platinum certification and what exactly each building will have to meet these requirements.

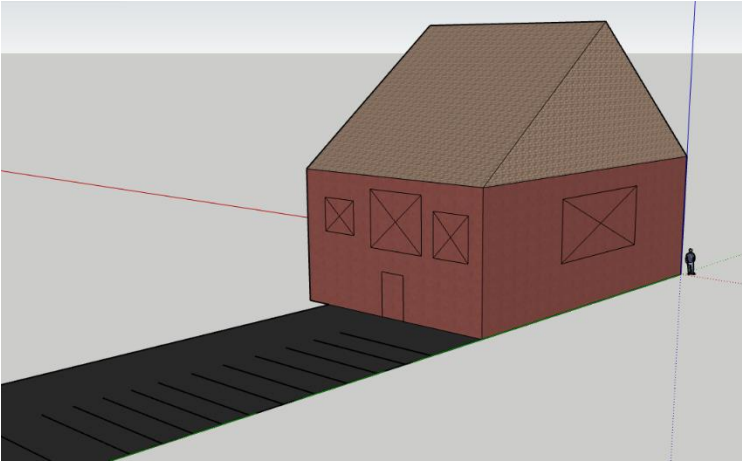
Figure 1: Placement Plans



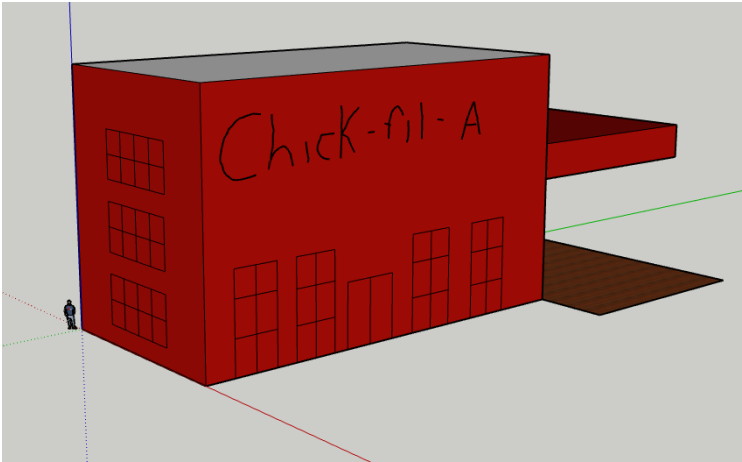
Building 1: Convenience Store
View: Front side of the building and left side of the building



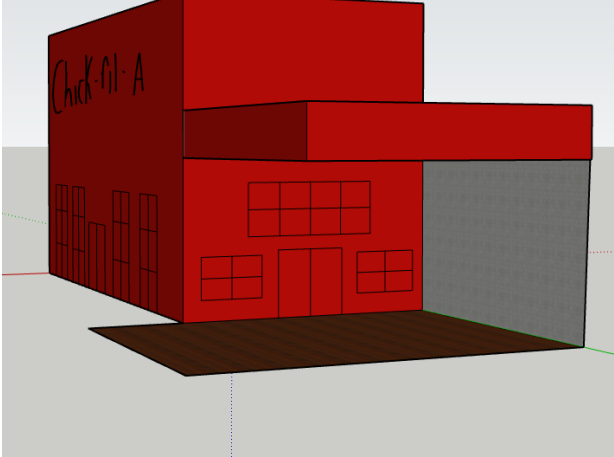
View: Right side of building and back of building



Building 2: Chick-fil-a
View: Front and left side of building

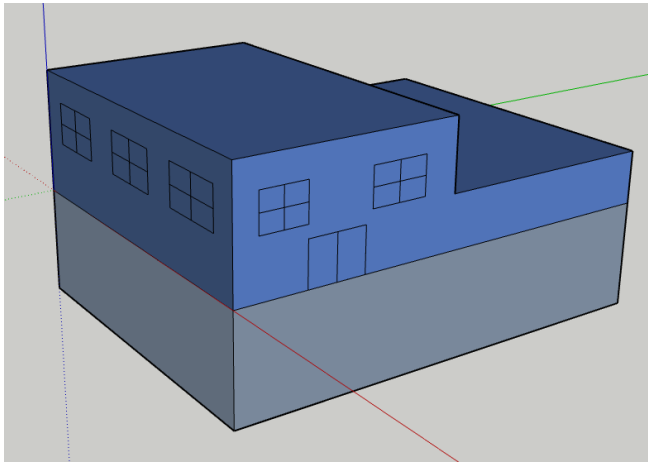


View: Right side of building/outdoor seating area

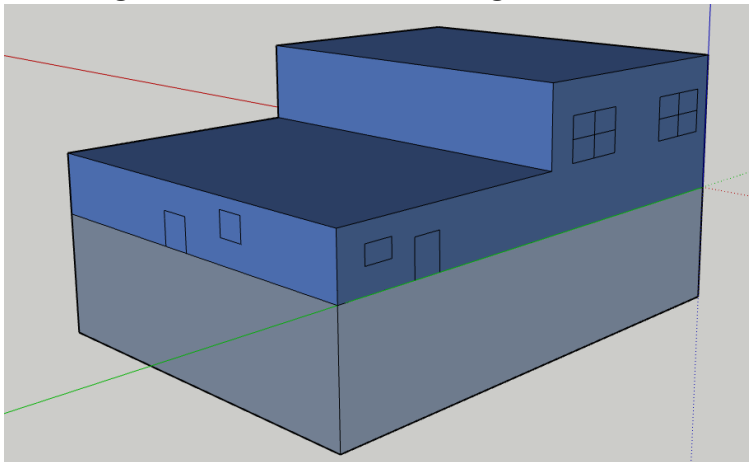


Building 3: Sports bar

View: Front and left side of building



View: Right and back side of building



2. Air Quality & Heat

As we know, air quality is extremely important for the well-being of both humans and the environment. Unhealthy conditions can cause respiratory health issues like asthma, bronchitis and even lung cancer. Children, the elderly, and individuals with pre-existing conditions are most at risk when dealing with poor air quality. Air pollution can also harm the ecosystem, damaging vegetation, soil, and bodies of water resulting in an ecological imbalance. To prevent this, we will use an energy recovery ventilator (ERV) in our three buildings. An ERV brings in fresh outdoor air and releases stale indoor air. This exchange will remove indoor pollutants and revitalize oxygen levels.

3. Thermal Comfort & Health

ERV systems also have a heat exchanger core that transfers heat between the air streams. In the cooler months, warm indoor air transfer heat to the cold outdoor air before it has a chance to enter the building, reducing the need for heating. When the temperatures start increasing, the system works to cool the outdoor air before it enters the building. This reduces costs and carbon emissions that would come from needing these supplementary heating and cooling systems. Moisture is also taken care of because it can be transferred between air streams, helping to control indoor humidity levels, and preventing issues of mold and moisture damage. These are crucial for maintaining comfort within our buildings.

4. Climate & Site Design

We performed several site walk-throughs to ensure the placement of our new structures would be satisfactory not only to us, but to the existing features of the landscape. Dealing with slight sloping, natural structures of trees and vegetation, and manufactured structures of the solar panel field we had to be mindful of our positioning. Thinking of design strategies like building orientation, natural landscaping and site shading we picked clear areas for each building so that construction and foot traffic would not cause large disturbances within the ecosystem.

5. Solar Geometry

Solar Geometry is specific to the area and its position in relation to the sun, Lancaster Pennsylvania is about 40 degrees north latitude, which is what influences its geometry. Knowing this we want to optimize the buildings orientation, window placement and shading devices to maximize natural daylighting and reduce reliance on artificial lighting. Specifically, for our sports bar we would like to use natural lighting during the day to create a warm light ambience. The benefits of this would be a cozy, inviting atmosphere making customers feel more comfortable and at ease to socialize and decompress themselves from a stressful week.

6. Passive Solar Heating

Designing passive solar heating in any retail space involves using the principles of passive solar design to maximize solar gain during the winter months while reducing overheating in the summer months. We would like to use thermal mass materials like brick, concrete and tile flooring in our Wawa, Chick-fil-a, and sports bar to help absorb and store solar heat in the daytime and release it slowly at night. This will help to stabilize the indoor temperatures and lower the cost of heating requirements.

7. Active Solar Heating

Including active solar heating in our structures with renewable energy will reduce the need for fossil fuels, which would be extremely beneficial for the nearby environment on the campus. Solar water heaters are devices that use sunlight to heat water for whatever need you can think of. Our buildings will have these systems installed on a suitable mounting such as the ground, with the correct orientation based on the areas solar geometry to enhance solar absorption. This will reduce the cost of utility bills and greenhouse gas emissions, while enjoying all the benefits of hot water.

8. Passive Cooling & Shading

So far, we have been focusing on the buildings and how to make them LEED certified. However, in this section I would like to turn our attention to the Japanese garden we are planning to create. We will consider passive cooling and shading by looking at the natural landscaping and how we can enhance its features to fit our needs. Our garden will have shade trees, several native ones we have looked at that are known to provide shade and cooling benefits are the following: the Japanese Zelkova is known for its graceful, spreading canopy and tolerance to urban conditions, it can provide ample shade on a hot summer day, while still allowing natural sunlight to be filtered through its open canopy. The next tree is a Japanese Maple, it has beautiful foliage, and the same offer of shade beneath its leaves. Lastly a Japanese Cedar is ideal because it grows fast and produces dense foliage acting as a natural umbrella from the sun.

9. Natural & Man-Made Lighting

We have already discussed how building orientation and window placement will maximize exposure to natural daylight within our buildings. The manufactured lighting that we can create will include energy efficient lighting fixtures like LED luminaires, and fluorescent tubes to minimize energy consumption and reduce costs. Ambient lighting fixtures in our Chick-fil-a like wall scones will provide illumination and a visually pleasing space to enjoy a meal with friends. Lighting controls like dimmers, and timers will enhance comfort and flexibility in lighting levels.

10. Thermal Envelope.

This is the physical barrier in a structure that separates the interior conditioned spaces from the exterior environment. It helps to regulate indoor factors like humidity and temperature. Proper insulation will ensure that our buildings are not at risk of heat loss in the winter and cooling in the summer. When thinking about which materials to use we must consider their R-

values, this measures the resistance of a material to heat flow, the higher the value the better the performance. The different insulation types we will include in our buildings are fiberglass and mineral wool, they will be installed on the walls, ceilings, floors, roofs, and foundation walls. Air sealing in our windows with caulking will also be an additional measure taken to reduce air leakage.


11. HVAC Techniques

HVAC stands for heating, ventilation, and air conditioning. This can be a diverse method covering things like heating, cooling, ventilation, and indoor air quality. We will use energy-efficient systems like high-efficiency air conditioners and heat pumps to help regulate temperature conditions alongside the ERV systems. Programmable thermostats will also allow for users to customize temperature based on foot traffic, reducing their use when spaces are unoccupied. These smart thermostats with advanced features like motion sensors and remote monitoring will offer energy saving benefits.

12. Acoustical Details

Lastly, considering the acoustical details in a space is important for creating a comfortable, functional indoor environment. It helps lower noise transfer between rooms. If users would like to use the Chick-fil-a drive through instead of walking in to order, we do not want them to hear people dining through the speaker while they are trying to order. To prevent this, we will be designing doors and windows with double-glazed or laminated glass with insulated frames to reduce noise intrusion.

13. LEED Checklist

 LEED v4 for BD+C: New Construction and Major Renovation Project Checklist		Project Name:	
Y ? N 0 0 0 Integrative Process 1		Date:	
0 0 0 Location and Transportation 16		0 0 0 Materials and Resources 13	
1 0	Credit LEED for Neighborhood Development Location 16	Y	Prereq Storage and Collection of Recyclables Required
1	Credit Sensitive Land Protection 1	Y	Prereq Construction and Demolition Waste Management Planning Required
1	Credit High Priority Site 2	4	Credit Building Life-Cycle Impact Reduction 5
4	Credit Surrounding Density and Diverse Uses 5	1	Credit Building Product Disclosure and Optimization - Environmental Product Declarations 2
4	Credit Access to Quality Transit 5	1	Credit Building Product Disclosure and Optimization - Sourcing of Raw Materials 2
1	Credit Bicycle Facilities 1	1	Credit Building Product Disclosure and Optimization - Material Ingredients 2
1	Credit Reduced Parking Footprint 1	1	Credit Construction and Demolition Waste Management 2
0	Credit Green Vehicles 1		
0 0 0 Sustainable Sites 10		0 0 0 Indoor Environmental Quality 16	
Y	Prereq Construction Activity Pollution Prevention Required	Y	Prereq Minimum Indoor Air Quality Performance Required
1	Credit Site Assessment 1	2	Credit Environmental Tobacco Smoke Control Required
1	Credit Site Development - Protect or Restore Habitat 2	2	Credit Enhanced Indoor Air Quality Strategies 2
1	Credit Open Space 1	1	Credit Low-Emitting Materials 3
2	Credit Rainwater Management 3	1	Credit Construction Indoor Air Quality Management Plan 1
2	Credit Heat Island Reduction 2	1	Credit Indoor Air Quality Assessment 2
1	Credit Light Pollution Reduction 1	2	Credit Thermal Comfort 1
		3	Credit Interior Lighting 2
		1	Credit Daylight 3
		1	Credit Quality Views 1
		1	Credit Acoustic Performance 1
0 0 0 Water Efficiency 11		0 0 0 Innovation 6	
Y	Prereq Outdoor Water Use Reduction Required	4	Credit Innovation 5
Y	Prereq Indoor Water Use Reduction Required	0	Credit LEED Accredited Professional 1
Y	Prereq Building-Level Water Metering Required		
2	Credit Outdoor Water Use Reduction 2		
4	Credit Indoor Water Use Reduction 6		
2	Credit Cooling Tower Water Use 2		
1	Credit Water Metering 1		
0 0 0 Energy and Atmosphere 33		0 0 0 Regional Priority 4	
Y	Prereq Fundamental Commissioning and Verification Required	0	Credit Regional Priority: Specific Credit 1
Y	Prereq Minimum Energy Performance Required	0	Credit Regional Priority: Specific Credit 1
Y	Prereq Building-Level Energy Metering Required	0	Credit Regional Priority: Specific Credit 1
Y	Prereq Fundamental Refrigerant Management Required	0	Credit Regional Priority: Specific Credit 1
4	Credit Enhanced Commissioning 6		
1 2	Credit Optimize Energy Performance 18		
1	Credit Advanced Energy Metering 1		
1	Credit Demand Response 2		
2	Credit Renewable Energy Production 3		
1	Credit Enhanced Refrigerant Management 1		
1	Credit Green Power and Carbon Offsets 2		
0 0 0 TOTALS		Possible Points: 110 Certified: 40 to 49 points, Silver: 50 to 59 points, Gold: 60 to 79 points, Platinum: 80 to 110	
100 Total Points			

14. Closing

By incorporating these architectural details and strategies into the design and construction of the building, it can achieve LEED Platinum certification to LEED version 4.1 standards, demonstrating exceptional performance in sustainability, energy efficiency, and occupant comfort.