

To: UUFC
 From: Brian Melton of DiLoreto Architects
 Subject: Energy Efficiency and Sustainable Features of Building Enhancement Project
 Date: March 10, 2017

We strive to fundamentally have sustainable design practices embedded within the project through proper space planning, window placement, and volume design. These are the more passive approaches to the project that are part of the basic building costs. The more active sustainable approaches (solar electric generation, solar hot water, water reclamation, etc.) are the features that can be added to the project either now or later. We will plan for the future installation of said features if they can't be installed during the initial phase.

(Note: This information has been reformatted as a table by Carl English-Young to emphasize the features that are an inherent part of the design and those that are possible with additional cost.)

Building Envelope

Roof Structure	
<i>Included Features</i>	<i>Additional Features</i>
<p>The intent is to design the roof structure as a “cool roof,” meaning there will be no attic cavity and all insulation will be continuous rigid insulation to R-20 on the roof above the structure. This stops any “thermal bridging” (heat transferred through the structural members).</p>	<p>Furthermore, the intent is to have a green roof on the project, which will have additional insulation to stop the heat from transferring through the roof into the space, and the green roof will mitigate storm water treatment on site. Essentially the water coming off the roof will be clean and can then be dispersed onto the site without further treatment. It is our intention to have all these features on the project; however, if the budget constraints become a factor and we cannot plant the green roof at this time, we will have to deal with the storm water on site. We will have to weigh the cost benefits between treating the water on the roof before it enters the site or treating the water on site after it leaves the roof.</p>
	<p>And finally, if budget allows or at a future date, we plan on having an extensive array of photovoltaic panels on the south side of the roof for energy collection as well as solar hot water heating.</p>

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Other Building Elements	
<i>Included Features</i>	<i>Additional Features</i>
<p>Building Walls: Code requires all wall assemblies to have an insulation factor of R-21 with Batt insulation in the stud bays. Our intent is to have an additional 1” layer of rigid insulation on all exterior walls to stop “thermal bridging” of heat, bringing the R value up to R-26. This approach is much more effective, though, than an R-26 value given that it will stop thermal bridging.</p>	
<p>Building Floor: The intent is to have a concrete radiant floor system that heats the body...not the space. Additionally, there will be 2” of rigid insulation underneath and on the edges, insulating the heated concrete slab thus improving the thermal isolation of said slab.</p>	
<p>Utilizing proper placement of vegetation and trees, we will mitigate the heat gain from the sun entering the space</p>	
<p>All windows will be “thermally broken” to minimize heat gain entering the space through the window system structure.</p>	
<p>Building Ventilation: The space will be designed to be naturally ventilated. The renderings depicted a set of high window and a set of low windows. By opening both windows, the hot air that rises and escapes, and the high windows will draw cooler air from below through the space. With larger assembly spaces the bodies alone will generate heat that make the space hot and stuffy (as you all well know from your current worship space). By making the volume taller we utilize the natural process of heat dynamics that will occur to increase the flow of air as heat rises.</p>	<p>If budget allows we can increase this effect by adding landscape features that can help cool the air at the lower windows before it enters the building.</p>
<p>If budget doesn’t allow for the solar collection of energy during phase one, we will plan for it in the future by laying conduit where we will need it for solar collectors at a later date.</p>	
<p>The mechanical system(s) will have a heat recovery function that will take the hot exhaust air and preheat the incoming air as it enters the mechanical system.</p>	<p>If budget allows we would like to explore a ground source heat pump system for heating and cooling requirements.</p>

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Building Materials

<i>Included Features</i>	<i>Additional Features</i>
All interior finishes will be products low in volatile organic compounds to increase the quality of the air.	If budget allows, we will have Forest Stewardship Council-certified lumber throughout the project.
We strive to have a building of the place it is from—meaning using locally sourced materials as much as possible both inside and out to reduce the carbon foot print.	

Plumbing

<i>Included Features</i>	<i>Additional Features</i>
There is a balance to be achieved regarding a centralized hot water heating system vs. an on-demand point-of-use hot water system . Only through an analysis can we determine which system will be most efficient.	If budget allows, solar hot water collectors will be utilized.
	If budget allows, waterless urinals will be utilized throughout the project to reduce water consumption.
	If budget allows, a gray water system will be utilized for water closet use. Ideally, we would like to develop an onsite water treatment facility (living machine) that would make gray water potable for a variety of uses.

Electrical/Lighting

<i>Included Features</i>	<i>Additional Features</i>
All lighting will be low-energy LED technology.	
Assembly space lighting will have daylight sensors that will either dim or turn off lighting based on the amount of natural light entering the space from windows.	
The spaces will be designed to have a well-balanced natural light source to minimize the use of electric lighting throughout the day.	

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