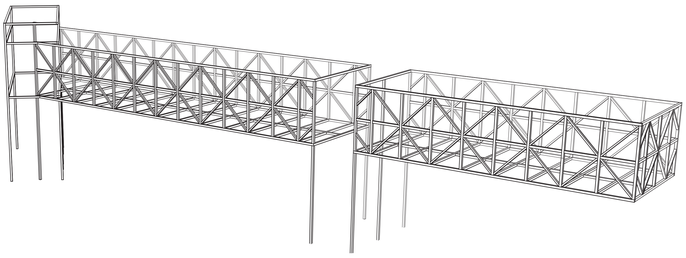
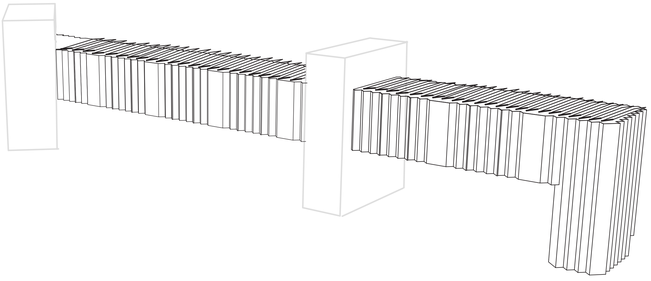
Structure and Connecting Structure

Right Production



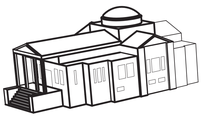
Solar+Heating Zones

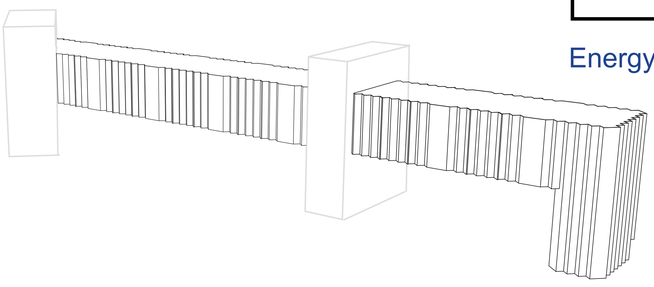
Right Sustenance



Facades+Ventilation

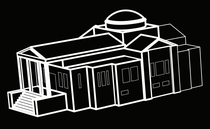
During the few months this building could use cooling it will take advantage of it's shape that maximizes air flow with operable windows and ceiling fans.
Triple paned glass is used on the facade to help keep the building insulated.

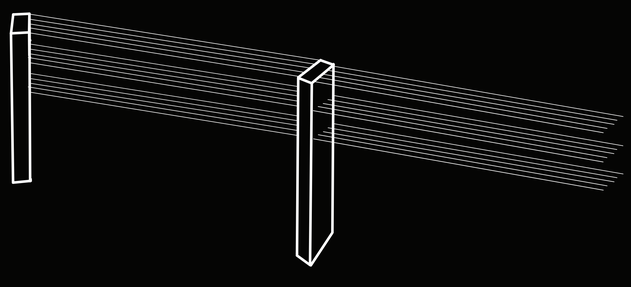




Plumbing+Electrical

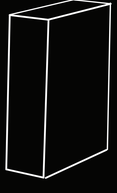
The wires and plumbing are brought up through the building in two small cores from the mechanical space in the basement. Space for these to run through the ceilings and floors is allocated and cast into the concrete that makes up the ceiling and floors.



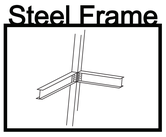


Life Safety+Security

A security system like the existing system on Renaissance Hall will be used on this building. If you are a student you will have to use your key access to the buildings after 5pm. Before 5pm the buildings are open to the public.

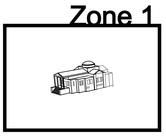


Steel Frame

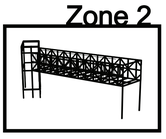


Thermal Comfort

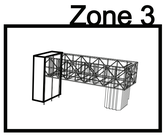
Zone 1



Zone 2



Zone 3



For every student using the building there is a .3 gallon water need.
.3 gallons of water **x** 1,500 students = 450
With this in mind, this building would use two water heaters that would use 25,312.5 watts each for a total wattage of 50,625.
25,312.5 watts **x** 2 water heaters = 50,625 watts
I estimate that this system would need to be in use for about 18 hours a day taking into consideration not needing to use them for about three months every summer.
18 hours **x** 50,625 watts = 911,250 WH/Day or
911.25 KWH/Day.

With this information I can start to look at what I would need for PV panels to generate enough energy to cover the heating needs of this building. The next step is to determine adjusted load. This considers PV system loss of 1.5.
50,625 watts **x** 1.5 = 75,937.5
The sun hours for Fargo, ND is 2. This will help find the required peak watts.

$$\frac{75,937.5}{2} = 37,968.75$$

To find the array size the previous answer is divided by the power rating of the pv panels. I chose a pv panel is a power rating of 16.

$$\frac{37,968.75}{16} = 2,373.04688$$

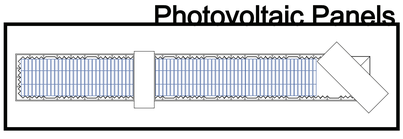
Each PV panel is 2.5' wide by 5' long.
2.5' **X** 5' = 12.5 square feet panels.
To find the total panels needed to create enough energy to heat this buildings you divide the overall array area by the area of a panel.

$$\frac{2,373.04688}{12.5} = \text{rounded 190 panels}$$

Considering the layout of these panels I decided to have 286 panels. This would generate enough energy heat this building but also cover the energy needed for other areas of the building. This building is not off the grid but is sufficient in generating a sustainable amount of energy. A minimum of $33,260.625 a year would be saved because of the PV panels from the savings on the energy for the water heater alone.
911.25kWH/Day **x** $.10/kWH = $33,260.625

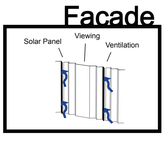
Energy Source

Photovoltaic Panels

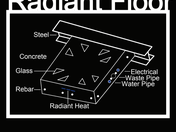


Energy, Viewing, and Ventilation

Facade

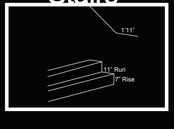


Radiant Floor



Circulation Cores

Stairs



2hr Exit Stairway