

Il Potenziale del Sole

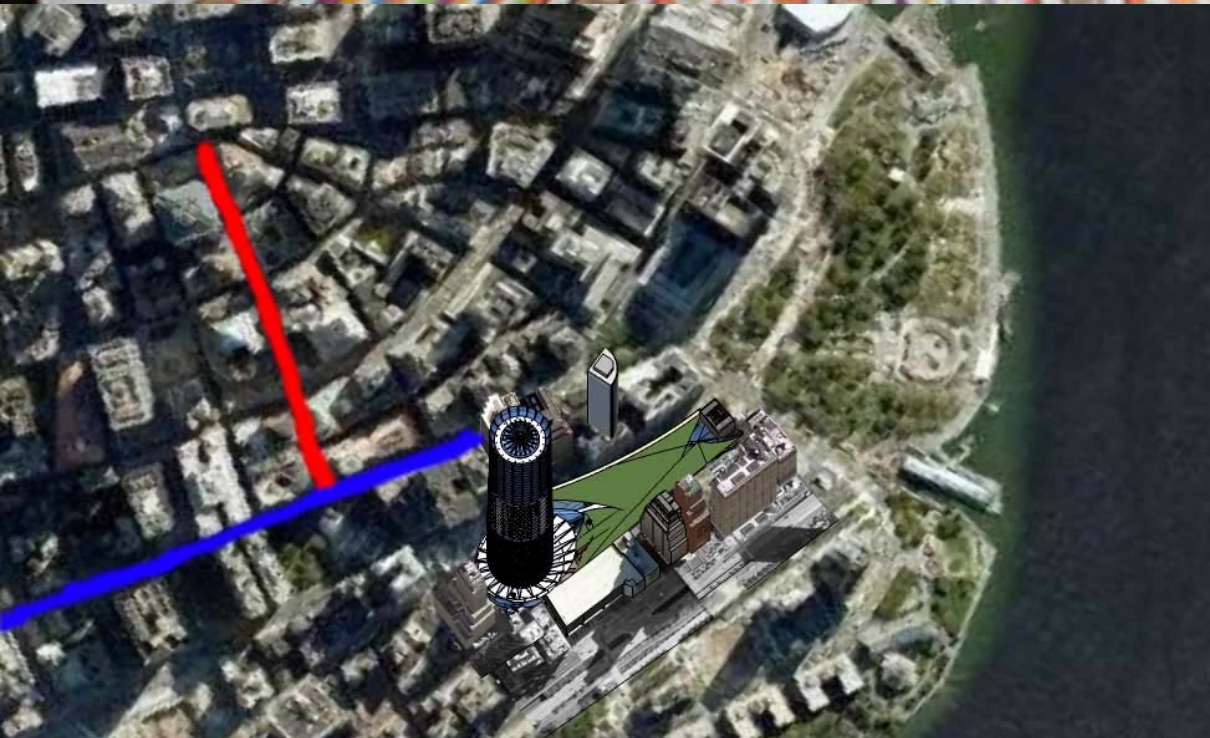
Isover Multi-Comfort House
Competition 2011

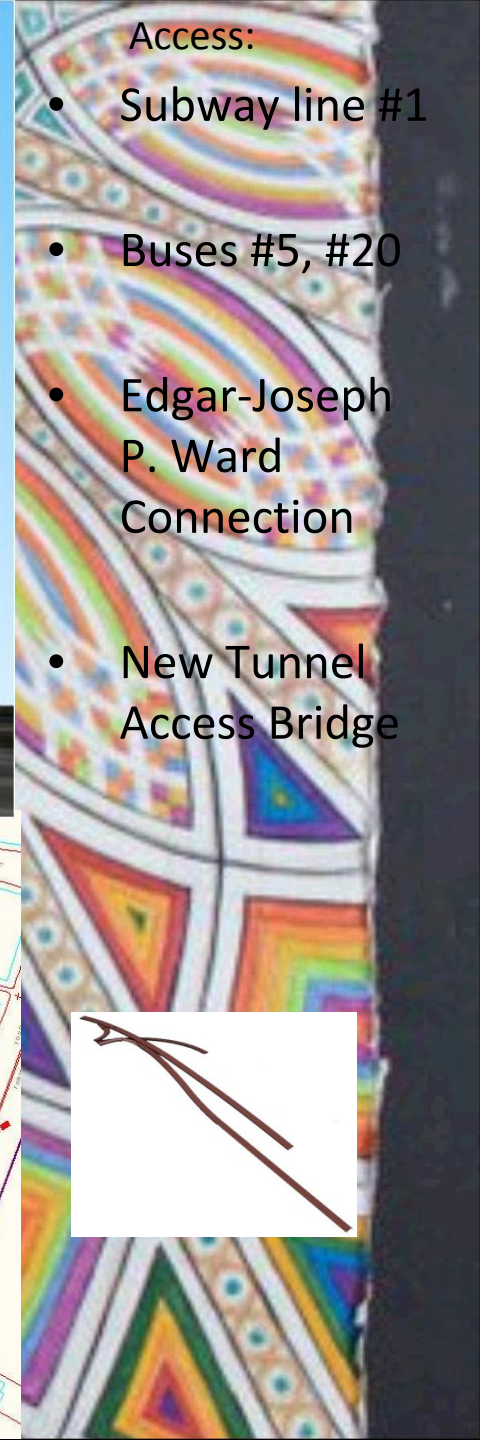




Site Context

- Tip of Manhattan
- Financial District NYSE
- Fashion Hub-Broadway
- Battery Park/Tunnel
- Greenwich Area
- WTC

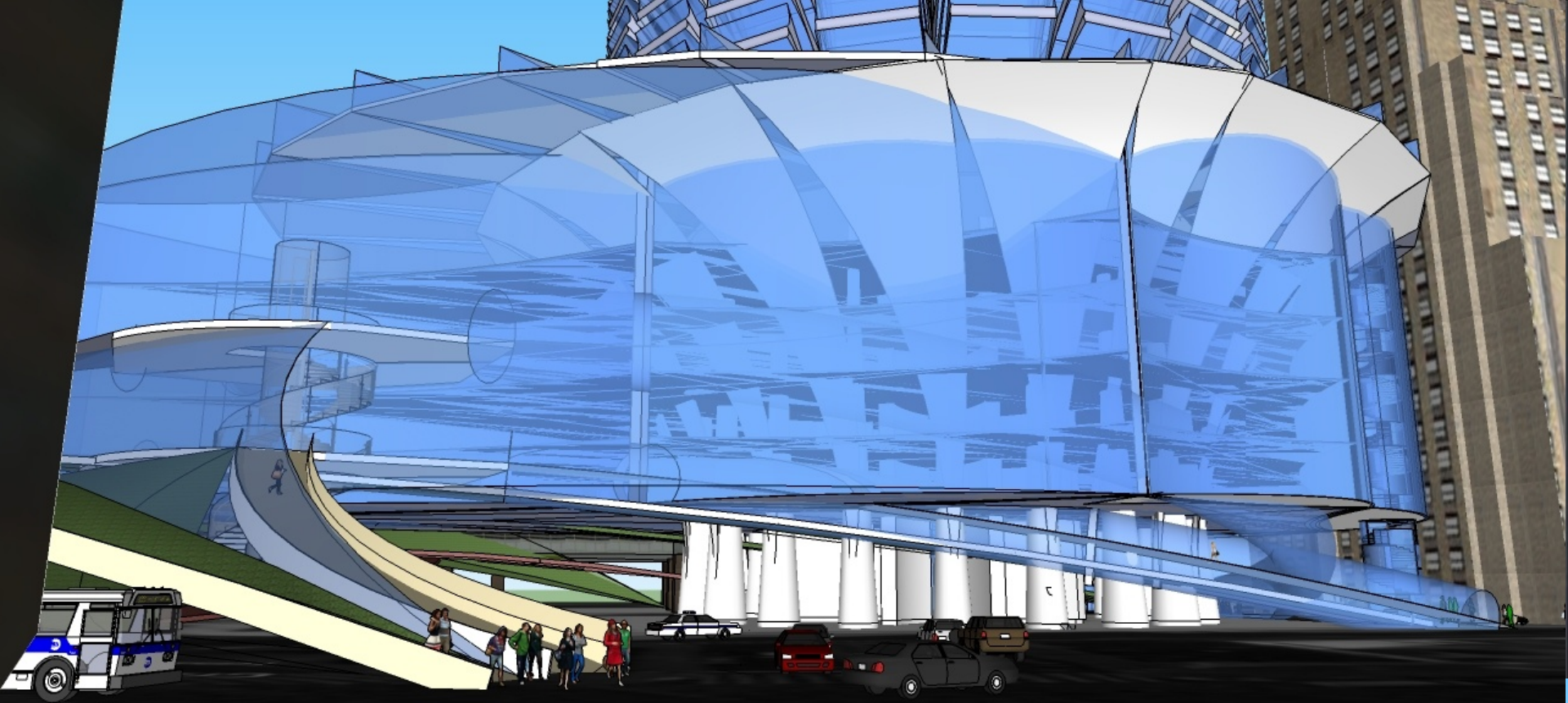




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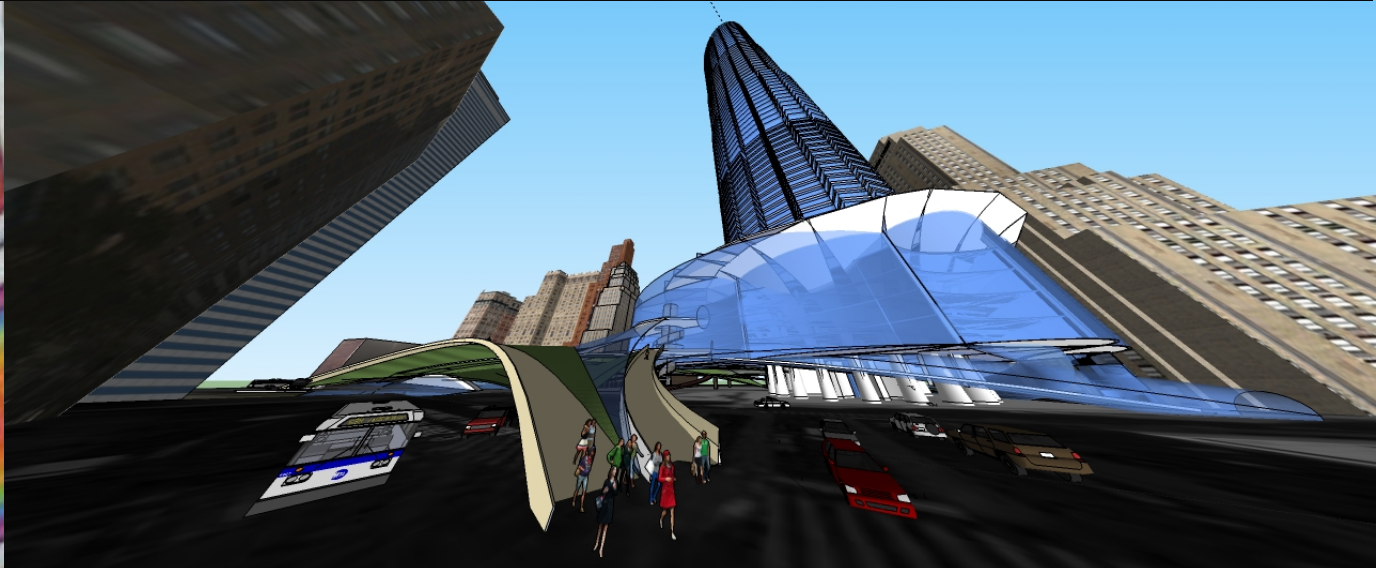
- Subway line #1
- Buses #5, #20
- Edgar-Joseph P. Ward Connection
- New Tunnel Access Bridge





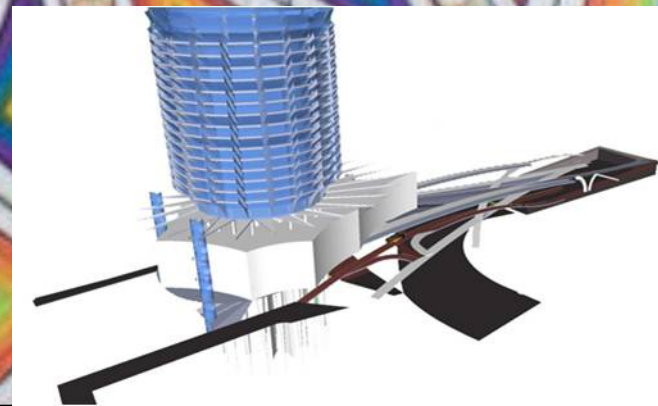
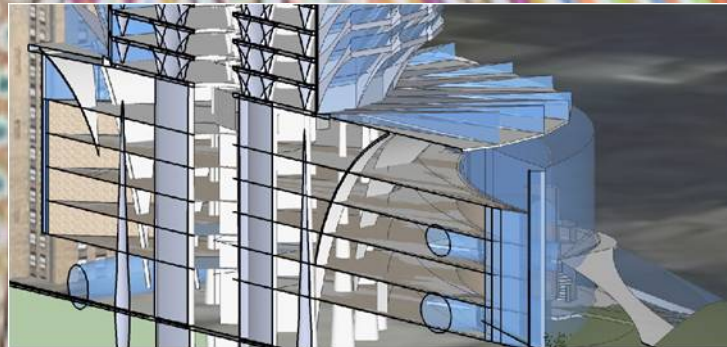
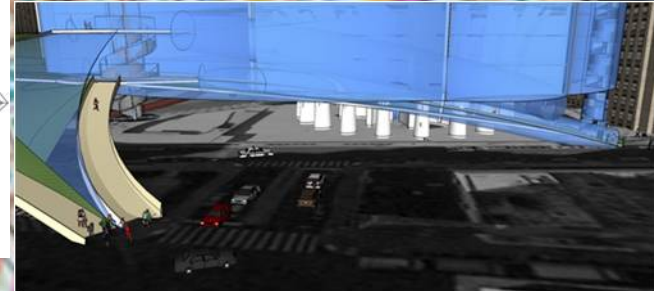
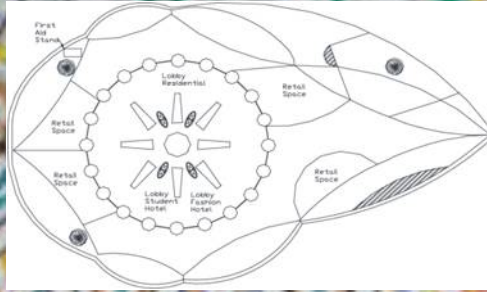
Pedestrian crossings
 Access to Bridge and Park
 Escalator Circulation in
 Base
 Relieves Rector Street of
 major Pedestrian/tourist
 traffic.

Pedestrian Benefits



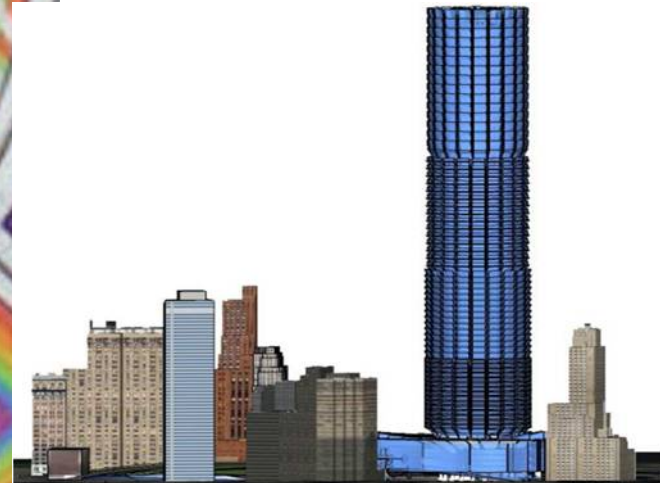
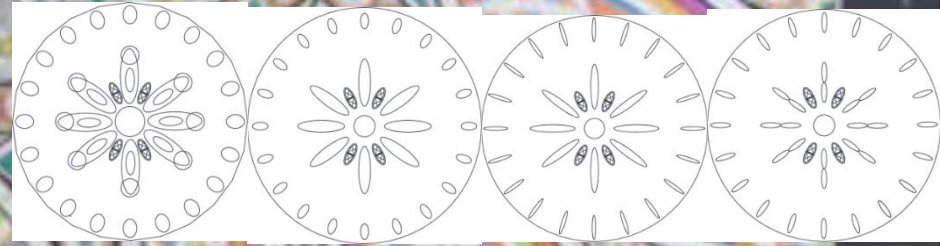
Design Concepts Base

- Multi-functional Design
- Base-Functions
- Open Ground Floor
- Building flow through the base
- The interior walls of the base will be insulated and the envelope will be supplemented by the exterior green spaces that are connected to the main floors.
- Inner ring of dividing and insulating fins
- Dual Skin system will serve as a buffer between the exterior of the building and the interior space of the pedestal.
- Access to Edgar Street via ramp.
- Outer Stair Case



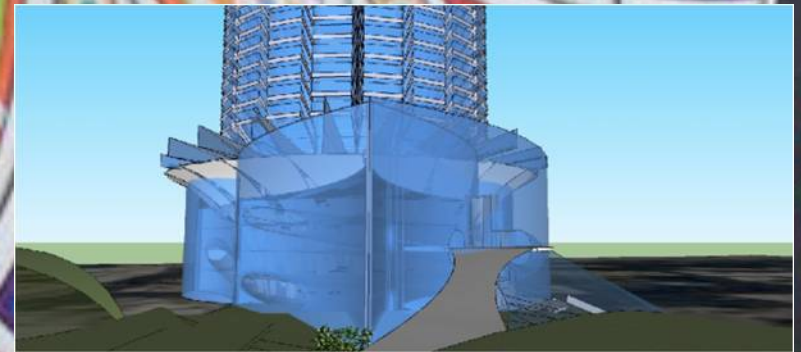
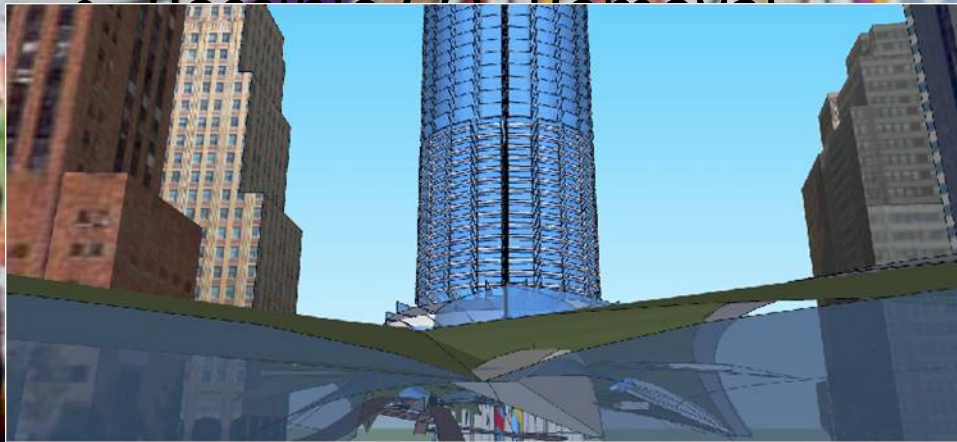
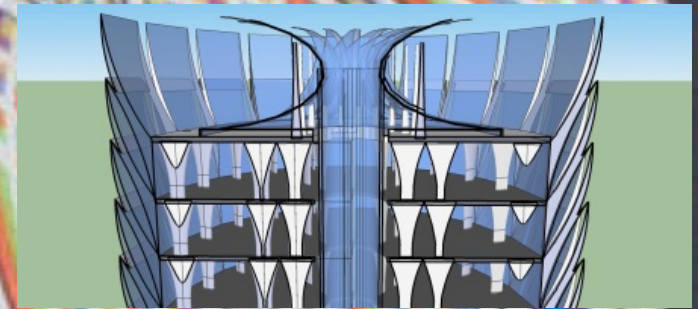
Design Concepts - Tower

- Multi-functional Design
- Office Floors 6-19
- Fashion Hotel Floors 20-34
- Student Hotel Floors 35-49
- Residential Floors 50-65
- Floor height increases
- Elevator system used to vent waste heat.
- Insulating and sealing the elevator shaft is crucial to avoid potential deviant air flow.



Technical and Passive Technologies

- Passive House Technology-
Insulation
- Geothermal
- Rain Capture
- Solar Heat Pump for Electricity
Generation
- Possible CO₂ Removal



CertainTeed Insulation

Insulation, Acoustic and Fire Rating Values

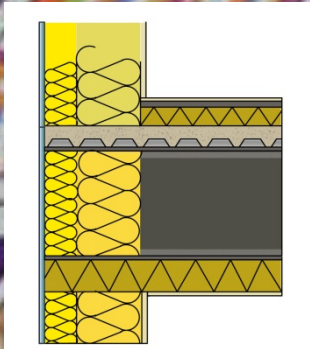
Insulation	Location	R Value (K·m ² /W)	Fire Rating	Acoustics (NRC)	Thickness (mm)
Thermafiber	Exterior and Interior Walls and Ground Floors	4.44	Noncombustible: (ASTM E 136) per NFPA Standard 220	1.20	152.4
CERTAPRO™ fk 25 Batt	Exterior and Interior Walls	6.69	Noncombustible: (ASTM E 136) Surface Burning Characteristics: (ASTM E 84, UL 723, NFPA 255) Max. Flame Spread Index; 25 Max. Smoke Index; 50	1.75	305
FlintBoard ISO-T Plus	Green and Standard Roof	2.66	ASTM E84	N/A	76.20
CertaPro™ Commercial Board	Interior Ceilings and floors	2.47	– ASTM E84, UL 723 – CAN/ULC-S102 Max. Flame Index: 25 Max Smoke Index: 50	1.20	89
CertaPro™ Commercial Board	Interior Ceilings and floors and Green and Standard Roof	4.20	– ASTM E84, UL 723 – CAN/ULC-S102 Max. Flame Index: 25 Max Smoke Index: 50	1.25	153
CERTAPRO™ Partition Batts	Interior Ceilings and floors around I-Beam	1.02	Noncombustible: (ASTM E 136) (ASTM E 84, UL 723, NFPA 255) Max. Flame Spread Index; 25 Max Smoke Index; 50	(ASTM E 90) Typically increases uninsulated wall STC's by 5 to 7 points	38
Ultra*Duct™ Black Duct Board	Interior Ceilings and floors around Ducts	1.53	(UL 723 and ASTM E84) Max. Flame Spread Index: 25 Max Smoke Index: 50 Limited Combustible: (NFPA 259) <3,500 Btu/lb	0.95	51

Other CertainTeed Products Used

CertainTeed Products Used	Location	Fire Rating	Acoustics (NRC)	Thickness (mm)
Membrian Vapor Barrier	All locations in contact with exterior	ASTM E 84 Max. Flame Spread Index: 20 Max. Smoke Index: 55	-	2.74
ProRoc type X Gypsum Board	Interior side of walls	Fire Resistant C 1396 Type X	-	15.9
ProRoc® 1/4" FLEX	Interior Curved Walls and Ceilings	ASTM(C 1396, C36)	-	6.35
Ecophon Foucs DS fiber glass ceiling	Ceilings	(ASTM E 84, CAN/ULC-S102M) Class A	0.80	19
CertainTeed Products Used		Details		
Live Roof - extensive Green Roof	Greer Roof	Dimensions: 1' x 2' x 3-1/4" Soil depth: 6" Weight: 40-50 lb./sq. ft.	-	-

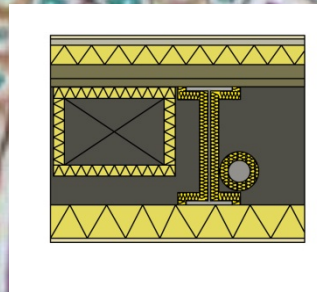
Construction Details

Floor and Ceiling - Exterior



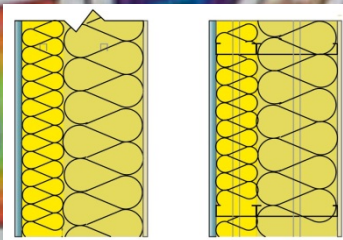
$U = 0.103 \text{ (W/m}^2\text{*K)}$
 $L_{tw} < 40\text{dB}$
 $R_w > 62\text{bB}$
 $L_w = 30\text{dB}$
 $F60 / \text{(REI 60)}$

Floor and Ceiling - Interior



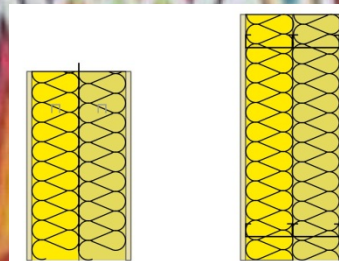
$U = 0.103 \text{ (W/m}^2\text{*K)}$
 $L_{tw} < 40\text{dB}$
 $R_w > 62\text{bB}$
 $L_w = 30\text{dB}$
 $F60 / \text{(REI 60)}$

Exterior walls
section and plan view



$U = 0.089 \text{ W/m}^2\text{*K}$
 $R_w > 45\text{dB}$
 $F60/(\text{REI}60)$

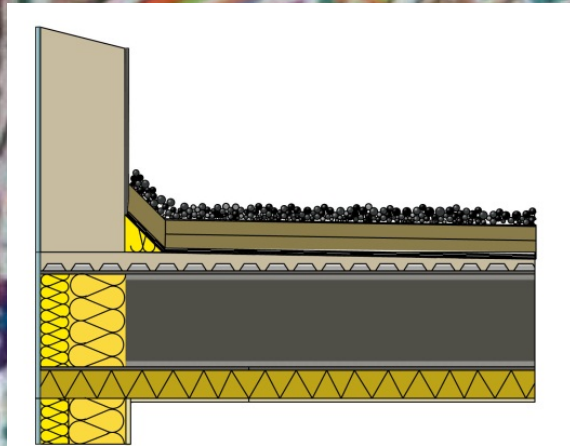
Interior walls
section and plan view



$U = .113 \text{ W/m}^2\text{*K}$
 $R_w > 60\text{dB}$
 $F30/(\text{REI}30)$

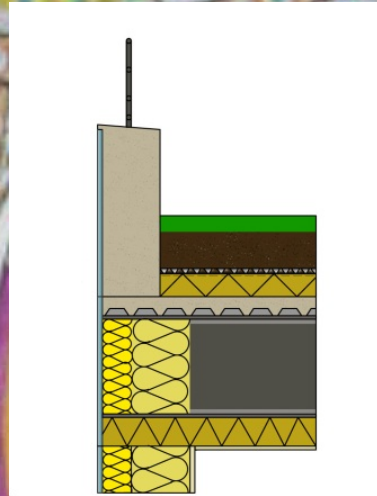
Construction Details

Standard Roof



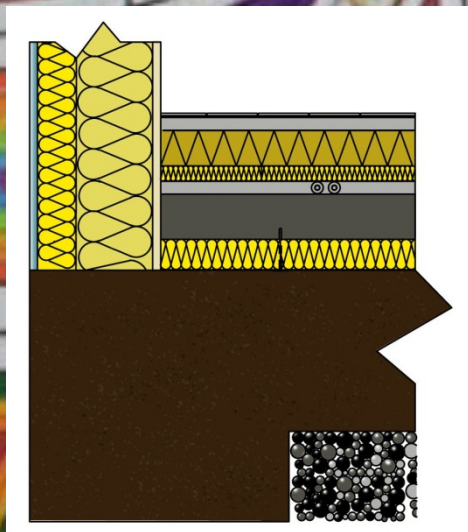
$U = 0.22 \text{ W/m}^2\cdot\text{K}$
 $R_w \geq 64\text{dB}$
 $F_{60}/(REI_{60})$

Green Roof



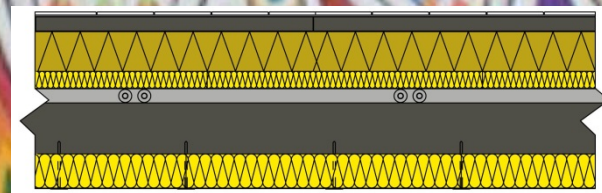
$U = 0.15 \text{ W/m}^2\cdot\text{K}$
 $R_w \geq 64\text{dB}$
 $F_{60}/(REI_{60})$

Ground Floor at Exterior Wall



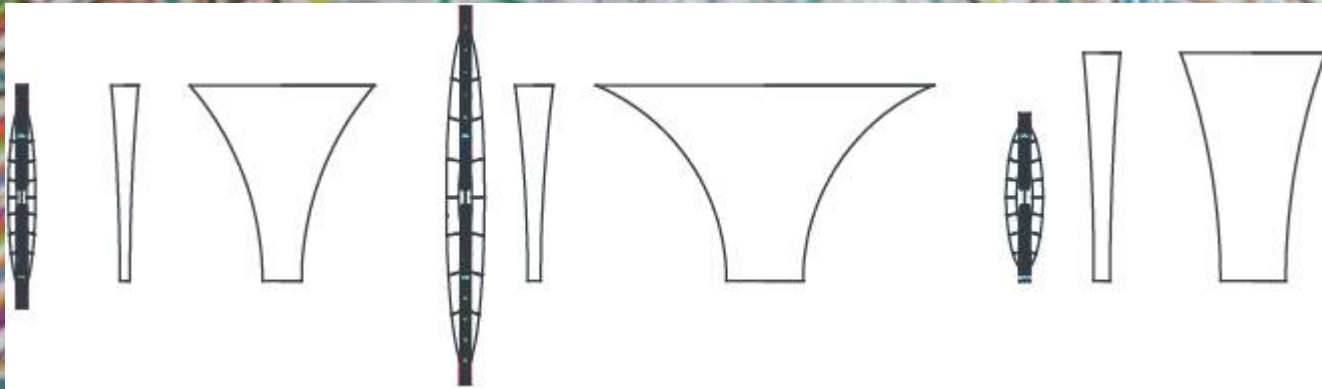
$U = 0.10 \text{ W/m}^2\cdot\text{K}$
 $Ln_{w,t} = 43\text{dB}$
 $R_w \geq 63\text{dB}$
 $\Delta L_w = 35 \text{ dB}$
 $\Delta R_{w} = 7\text{dB}$

Ground Floor Above Open Space

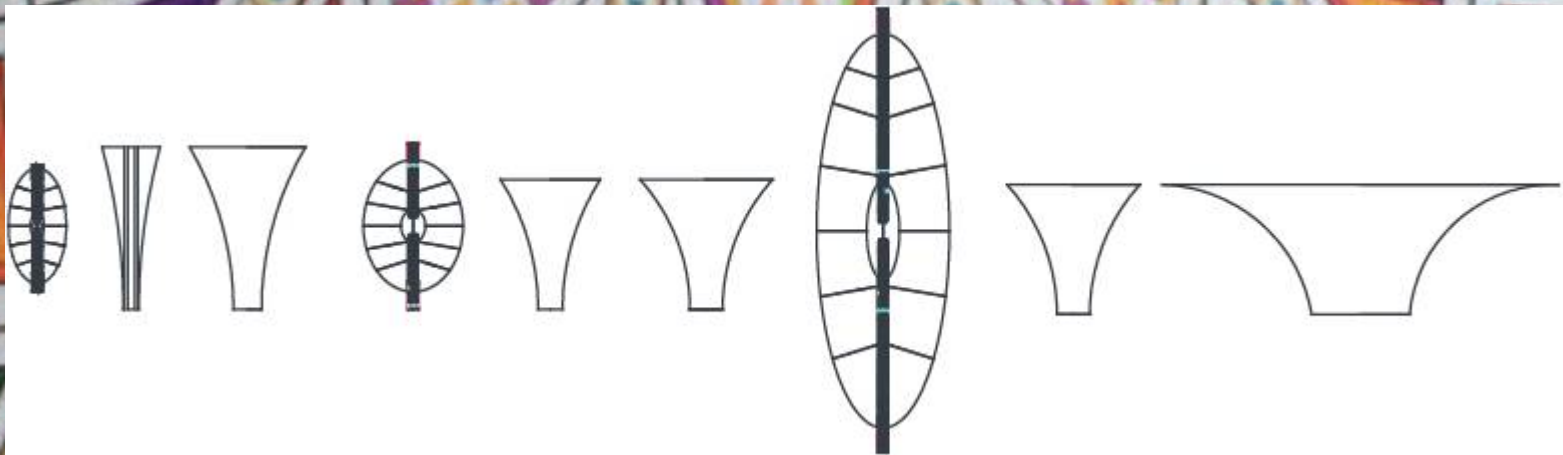


$U = 0.10 \text{ W/m}^2\cdot\text{K}$
 $Ln_{w,t} = 41\text{dB}$
 $R_w \geq 64\text{dB}$
 $\Delta L_w = 35 \text{ dB}$
 $\Delta R_w = 6\text{dB}$

Columns

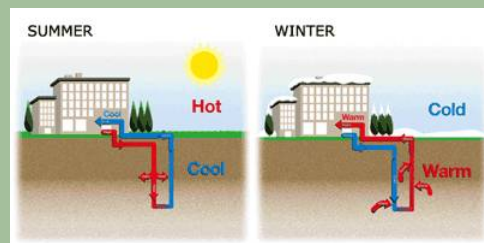


- Piping/Utilities
- Acoustic and thermal breaks
- Aesthetic Design
- Utility Panel, Ease of maintenance



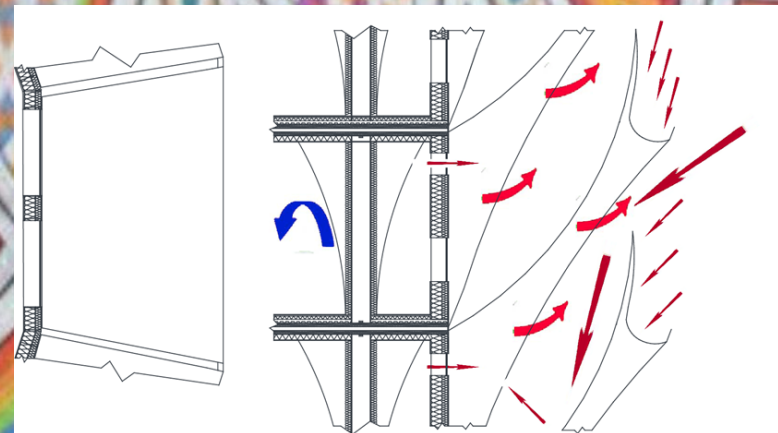
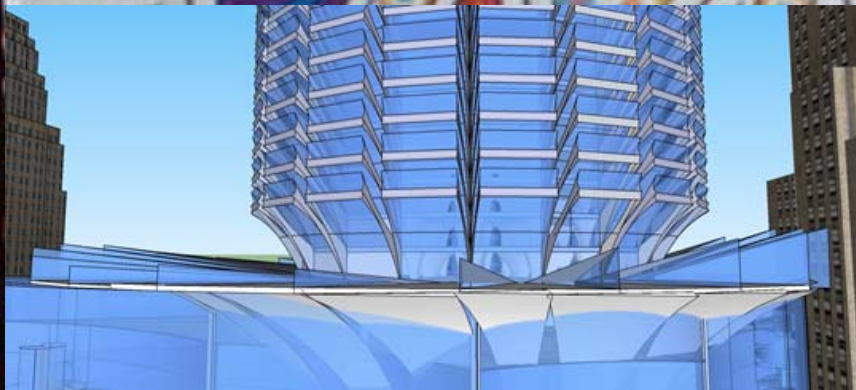
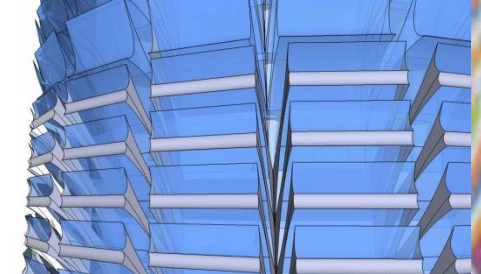
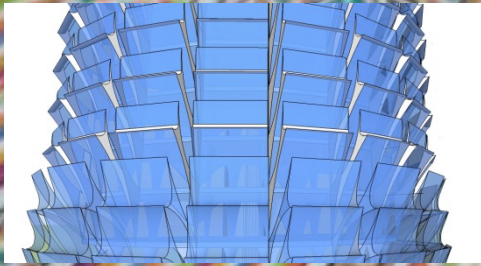
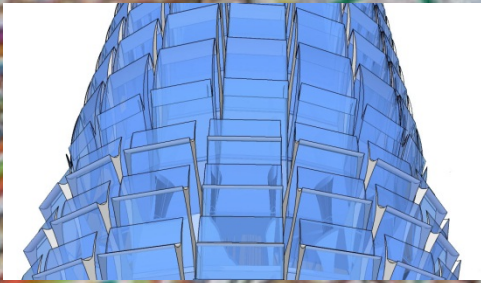
Building Systems

- Ventilation
- Water Collections
- Solar Collectors
- Geothermal System
- Solar Heat Pump



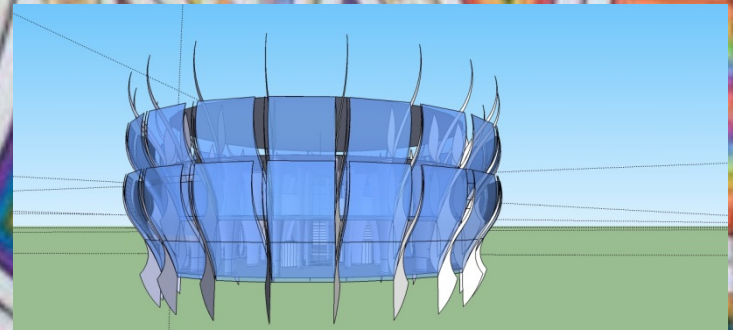
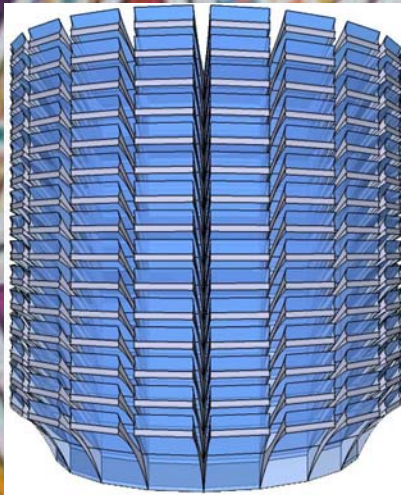
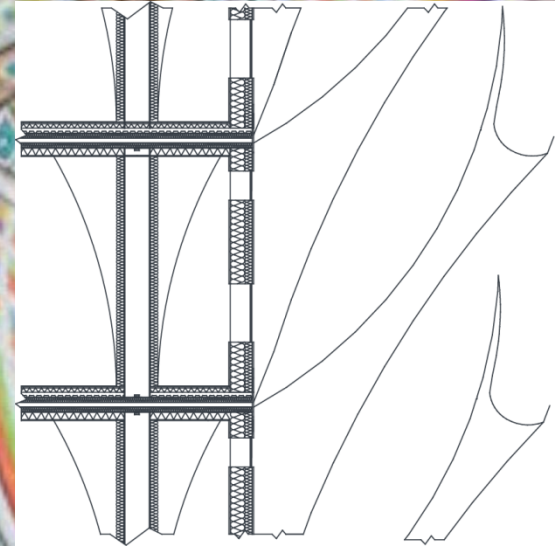
Fins

- Fins on each floor serve a multi-part purpose.
- Intended to catch and collect rain water
- Provide shading
- Used as solar collector that supplies the solar heat pump
- drive the convection current of hot air that travels up the building.



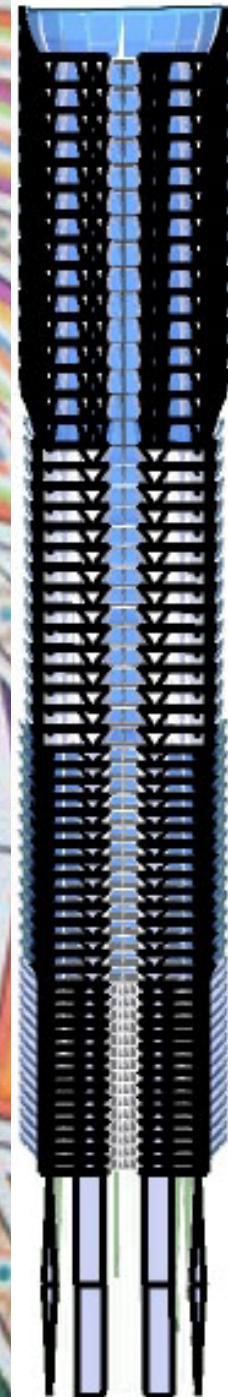
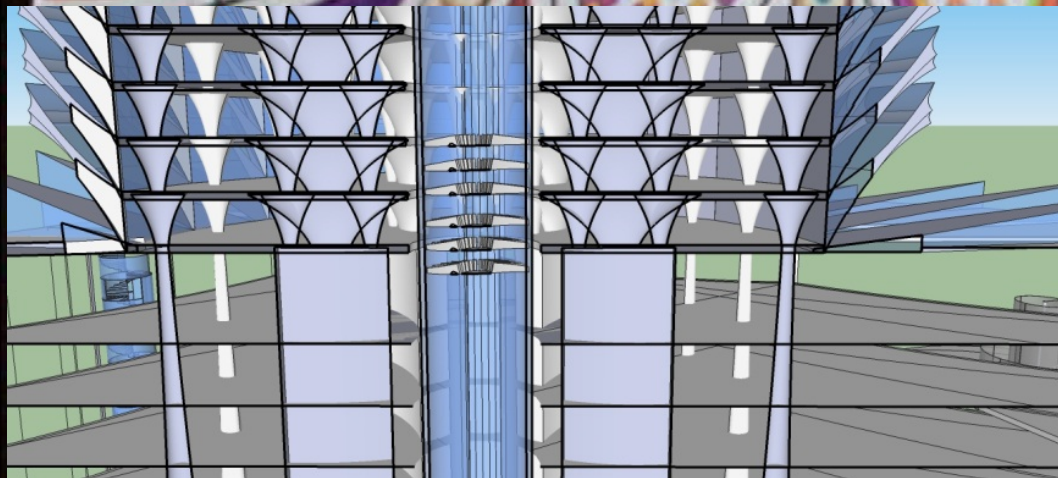
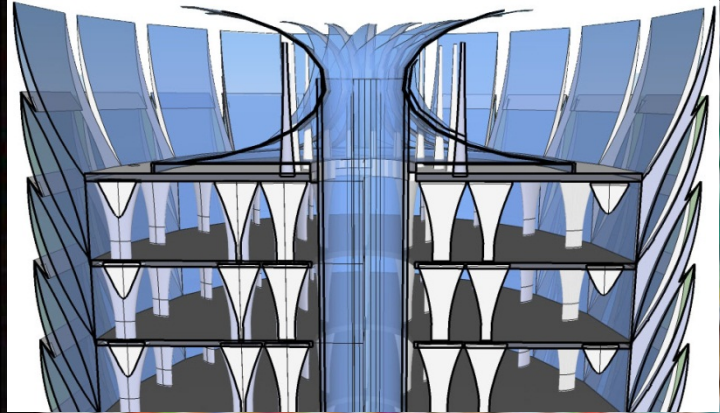
Building Water Savings

- Rain Collector
- Low Flow Shower Heads and Faucets
- Low Flow Toilets
- High efficiency appliances like dishwashers and washing machines



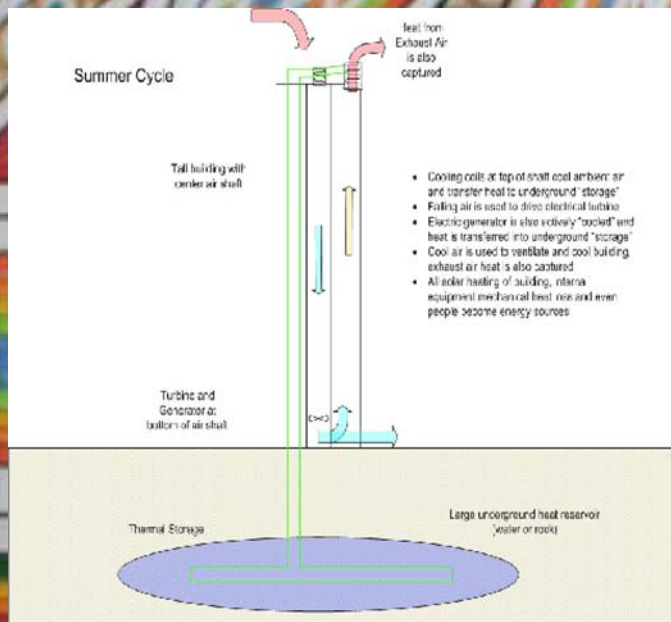
SHPEG

Solar Heat Pump for Electricity
Generation



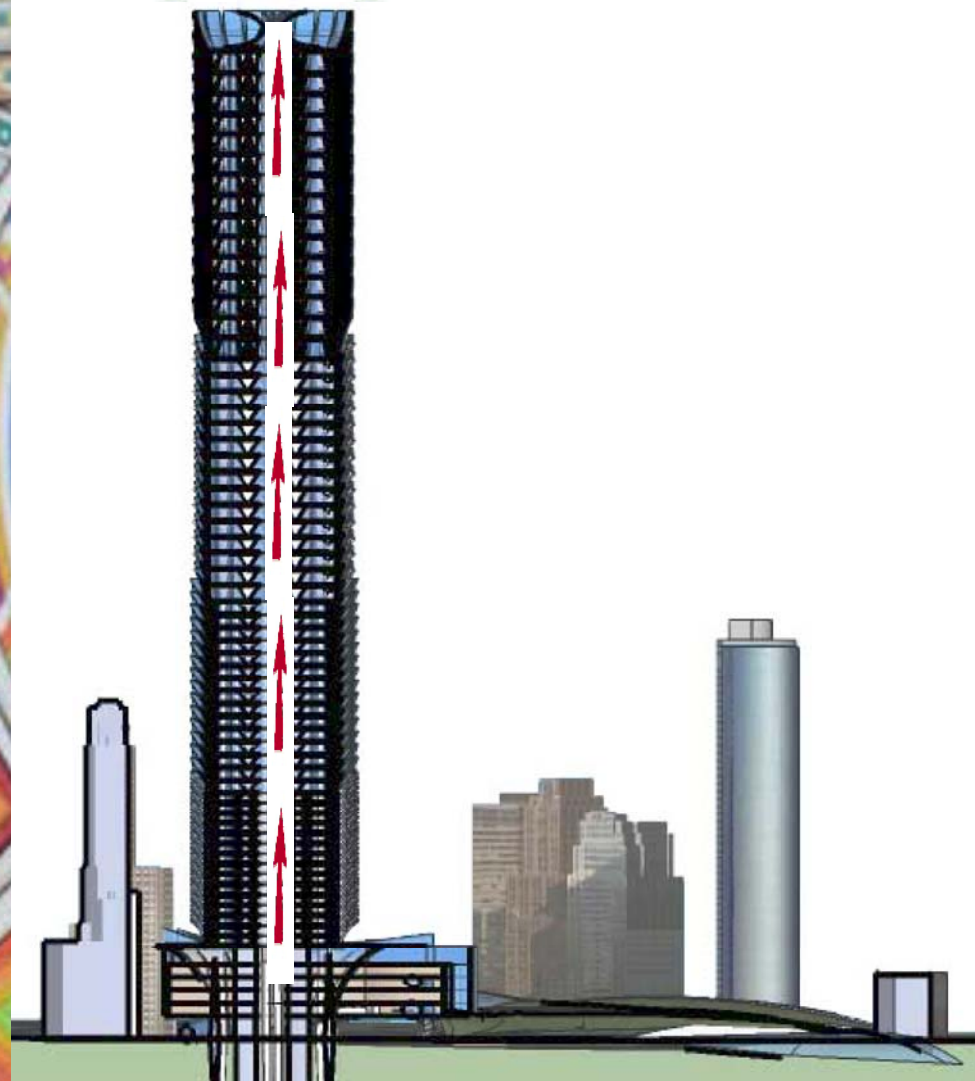
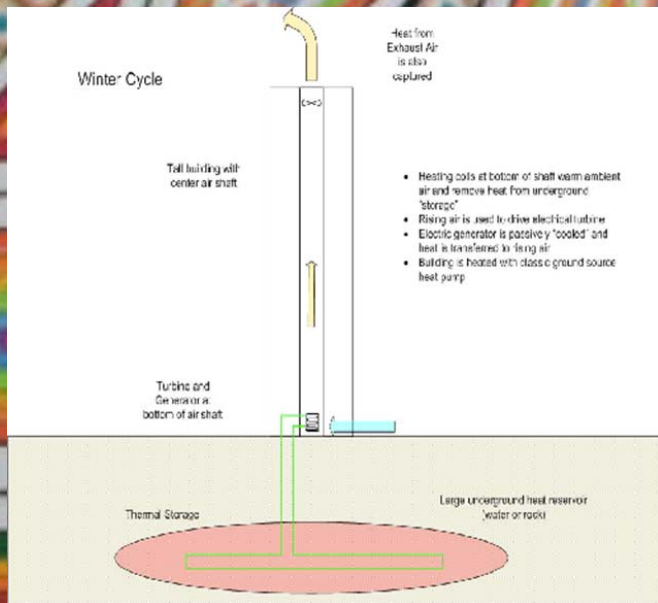
SHPEG Summer Cycle

The central air shaft is the most critical aspect of the system, allowing for the proper air flow from top to bottom in the summer spinning the turbine creating electricity.

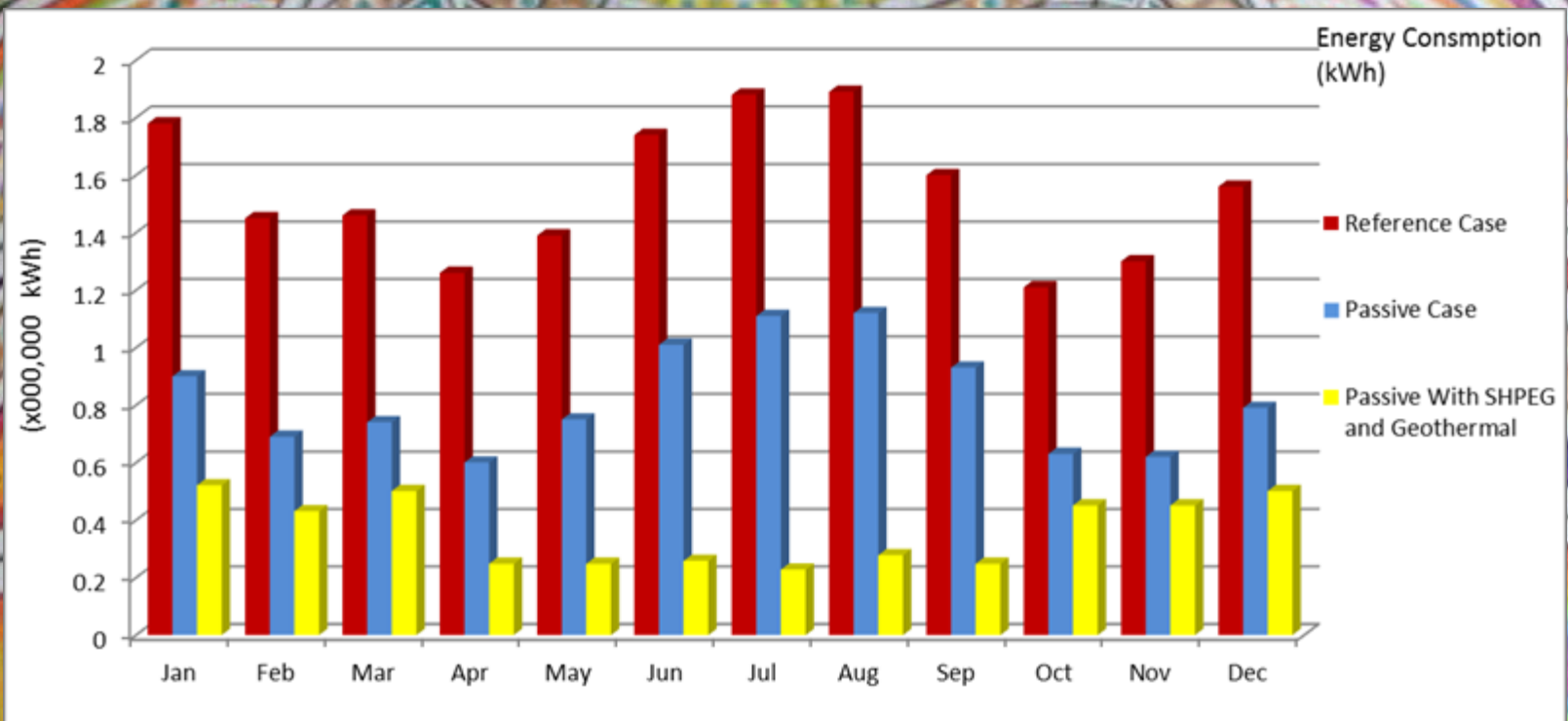


SHPEG Winter

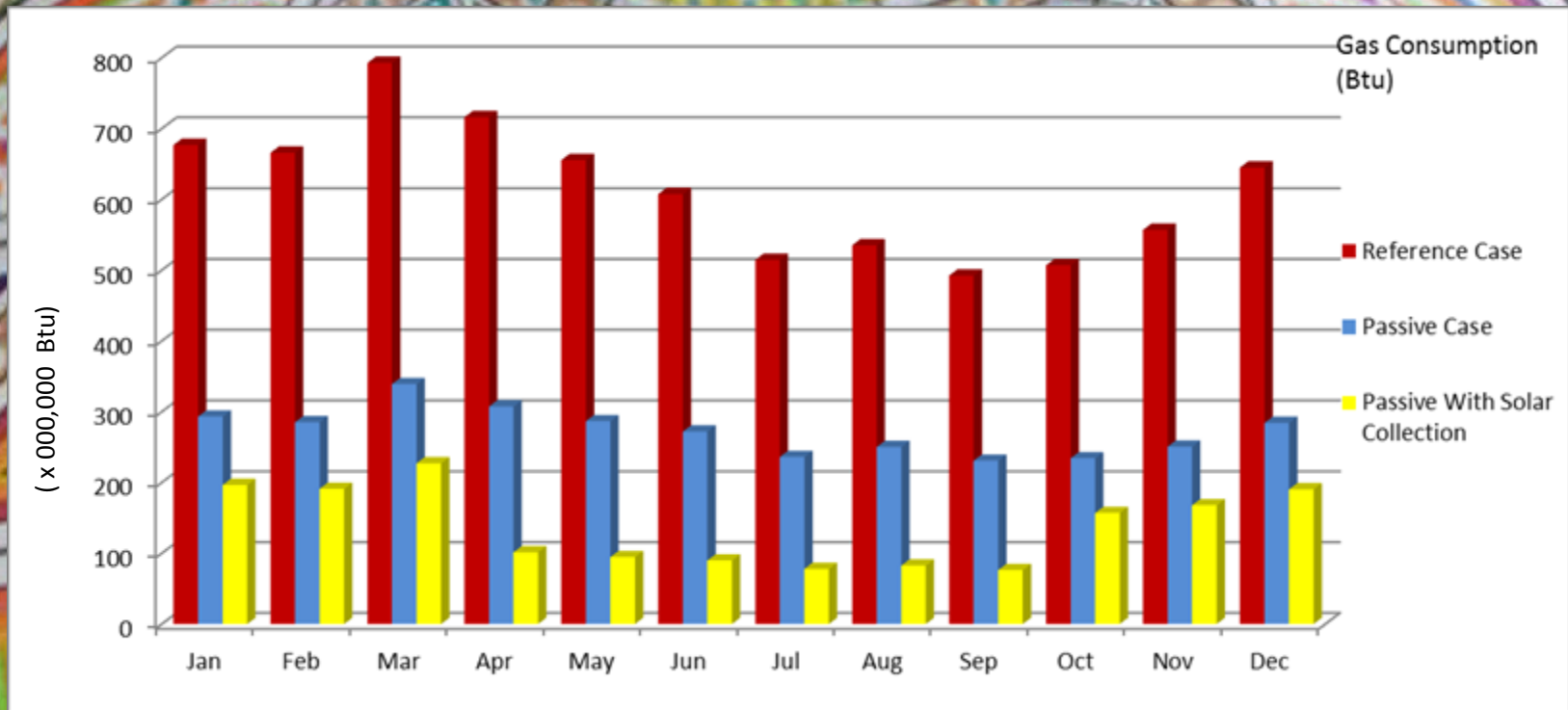
In the winter this system is reversed, releasing the stored energy to spin the turbine in the opposite direction



Energy Usage



Gas Usage for Hot Water Heating



Overall Savings

- Savings Statistics from all systems
- Passive House Savings Compared to Reference Case is nearly 50%
- Geothermal System
 - \$408,000 compared to heat pump system per year
- CO₂ Capture
 - 95,000 lbs of CO₂ Saved per day from the Tunnel per year
- Solar collection
 - Provides nearly all hot water needs of the building per year
- Gray Water Collection
 - 64% of gray water needs met with rain collection per year
- SHPEG
 - 2.45 GWh per Year
 - \$478,681.46 in savings per year
 - Accounts for 25% of the power needed to run the building



Total Savings

- \$ 886,000 in energy savings between SHEG and Geothermal Systems per year
- Totals to nearly 50% in energy savings on top of passive house savings

