



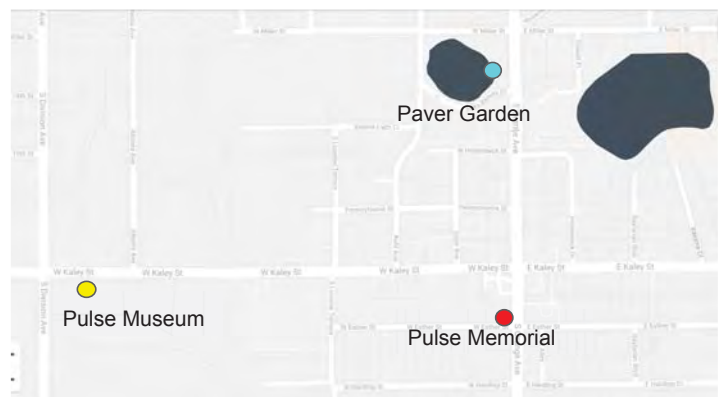
DILLER SCOFIDIO + RENFRO | RENE GONZALEZ ARCHITECTS  
 TERESITA FERNÁNDEZ | OLIVER BEER | RAYMOND JUNGLES

## Site Plan/ Background



### Context:

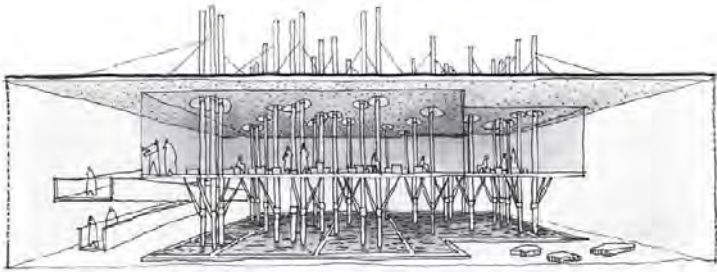
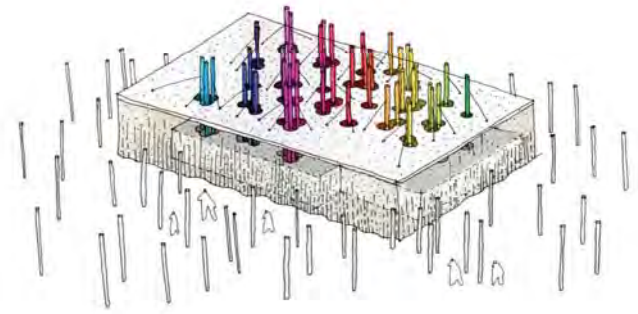
- Orlando, Florida
- Previously Pizza Restaurant then a Live Music Bar
- Near Lake Beauty Park, Lake Lurna & I-4
- Restaurants, shopping, public transit
- Overall project is composed of 3 parts; Memorial, Survivors Walk, & Museum
- Reflecting and celebrate the ideas of love and life communicated through **Love, Hope, Unity, Acceptance, Courage, Security and Strength**



# Pulse Memorial Garden/Sanctuary Concept

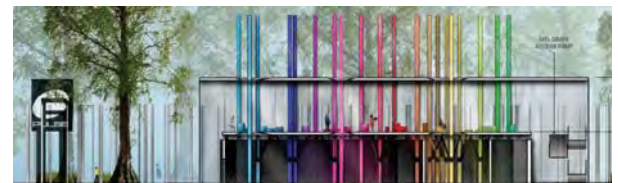
## Conceptual approach:

- Design features of concepts focused on honoring victims, survivors and the first responders
- Create a garden and sanctuary that is solemn and celebratory
- 49 rainbow-colored ceramic tile columns (49 Lives taken)
  - Support roof and floor of nightclub addition
  - Focuses on open concept as well as playing with natural light



## Memorial Enclosure

- Preserve and stabilize some of the existing structural walls
  - Roof eliminated
  - Addition of Metal Mesh walls
- Expanded Metal Zinc enclosure surrounding and protecting structure



VITREOUS GLAZED CERAMIC



CAST GLASS SEATS



CERAMIC GLASS SEATING



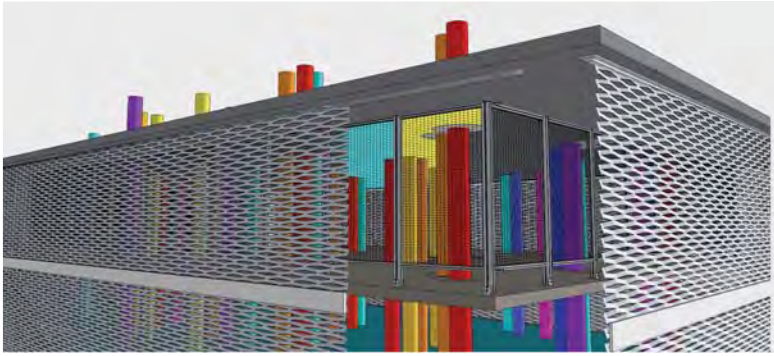
EXISTING INTERIOR



EXPANDED ZINC PANEL



ZINC MESH



## Memorial Enclosure

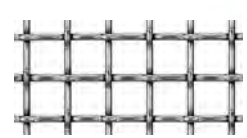
- Expanded Zinc Metal panels
- 110 panels ( 10' x 5' )
- Allows some natural ventilation as well as protects the sanctuary enclosure from direct elements
- Steel Plate integrated into slab
  - Plate bolted to L-shaped steel plates



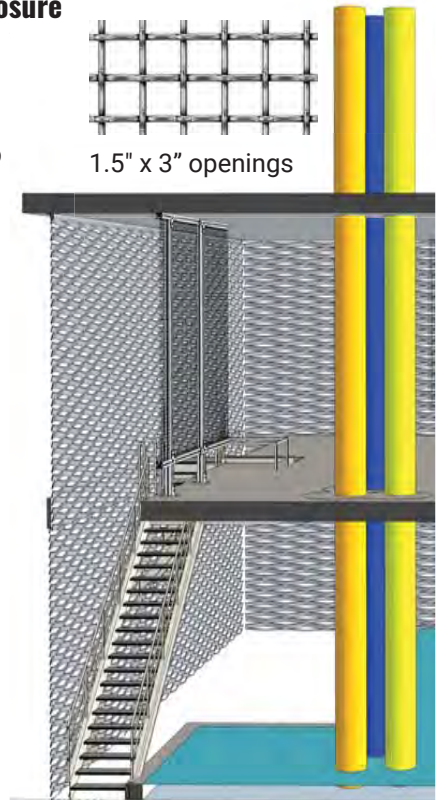
8" x 5" , 1/2" thick

## Interior Sanctuary Enclosure

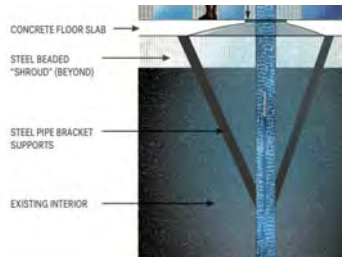
- 64 Zinc Mesh panels ( 5' x 18' )
- Zinc connection bolted directly into concrete floor



1.5" x 3" openings



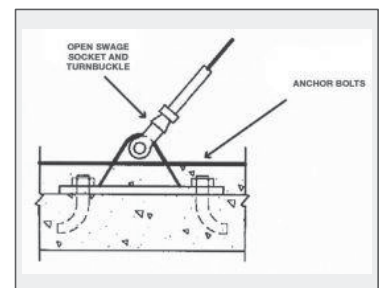
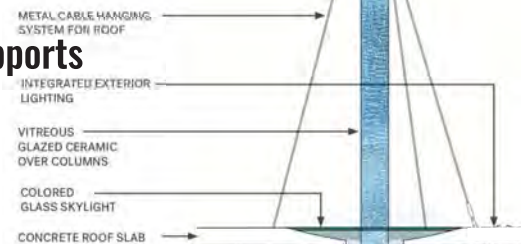
## Structure



- Forty-nine 40' tall steel columns
  - Ceramic wrapped
- Each column has three 6' steel pipe brackets bolted through ceramic sheathed steel columns
  - (4" diameter 9 lbs/ft)
- Bottom compression from steel pipe bracket supports into cast-in-place concrete floor

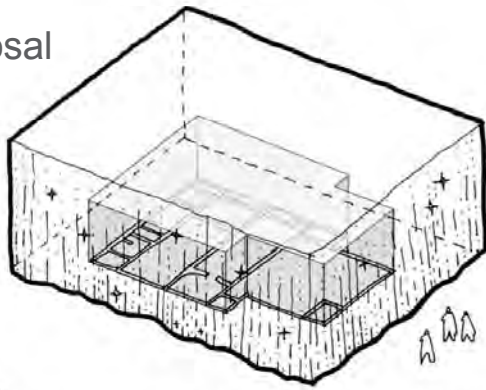
- Two ways post tension Concrete Roof slab ( 8" thick ) and is 4100 sqft
  - Roof supported by hanging metal cable system
  - Metal cables are anchored into hanging roof slab and hooked into column.

## Roof Supports



## Roof Support Connection

# Proposal



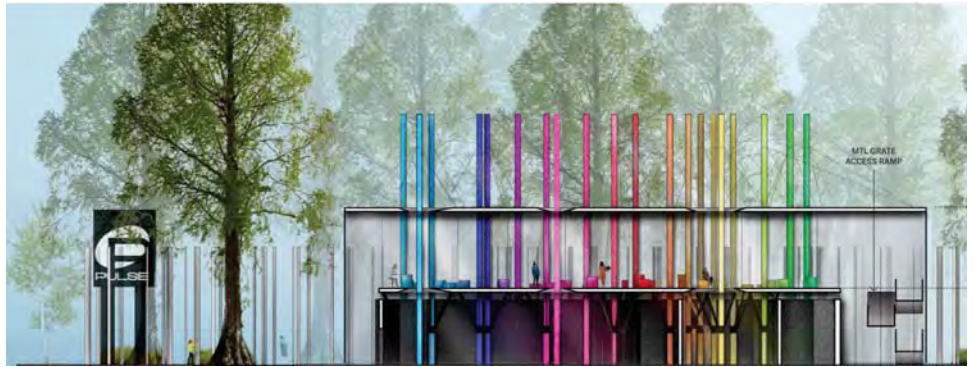
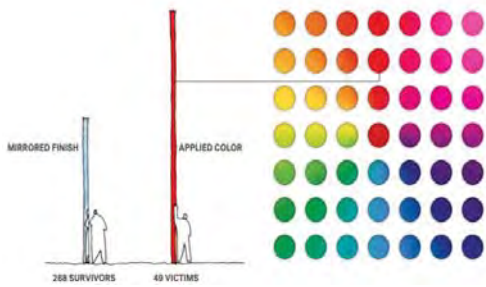
## SHIMMER SHROUD

The Pulse nightclub building is enveloped by a shimmering, beaded shroud that protects the nightclub structure while permitting glimpses of the hollowed ground.

# Memorial Redesign

## Redesign

- Developed materiality, sizing, and connections to accurately fit memorials goals and site conditions
- Kept original layout and concept to keep cohesive connection with Museum
- 



# Survivors Walk



## Proposal

- Create garden spaces
- Oral Oasis with microphones to record testimonials for survivors
- Speakers distributed along path to play continuously
- Combination of native trees/plants with fruit trees and larger local species



ENLARGED PLAN OF W. KALEY WILD GREEN EDGE, N.T.S.



INTEGRATED BENCH WITH WOOD SEATING  
MICROPHONE TO RECORD TESTIMONIALS  
SPARKLING MICA PAVING  
CONCEALED SPEAKER  
STAINLESS STEEL PLAQUE WITH RFID TAG

# Survivors Walk Redesign



- Retained native shrubbery, flowers and trees were allocated throughout walk for minimal maintenance
- Celebratory signs and distributed along path to commemorate victims
- Paths also have unique custom pattern for clarity to destinations
- Kept materiality, seating layout, and cohesiveness to both museum and memorial



# Pulse Museum

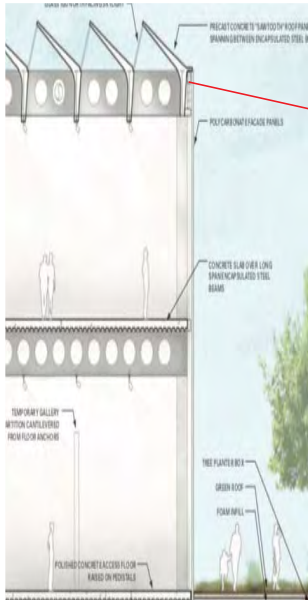


**POTENTIAL FUTURE:** PHASE TWO ADDS A CULTURAL CENTER / MUSEUM ATOP THE GREEN ROOF, FORMING A VIBRANT ENSEMBLE OF BUILDINGS IN A PARK SETTING

- Museum houses parking for memorial visitors and provides community spaces for events
- Bottom 2 floors of Museum are parking garages
- Most of program sits on Garden Plaza on top of the main structure and consists of: Gallery, Cafe & Office spaces



# Enclosure & Structure



## Enclosure Initial Proposal

- Entire enclosure of all 4 buildings be the same
- Type of glazing
- Unnecessary heights

## Structure Initial Proposal

- Concrete and steel construction for all buildings
- Complete concrete parking complex



## Redesign Goals

- Address and correct proposal's construction methods
- Passive materials usage for construction
- Develop stormwater capture and reuse
- Provide efficient cooling and indoor air quality for spaces
- Create on-site energy solutions



## Proposal

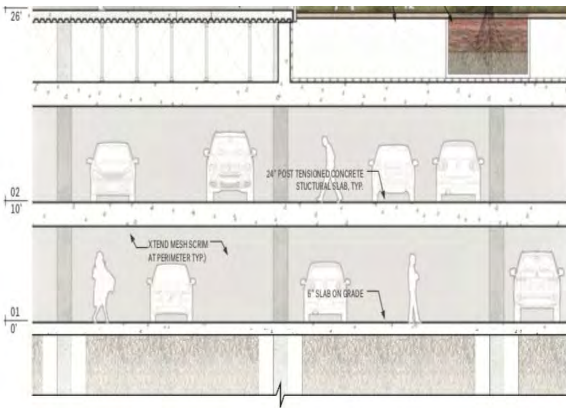


North Elevation

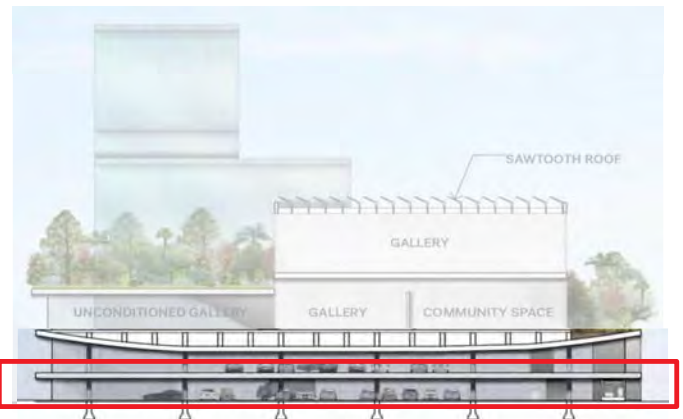
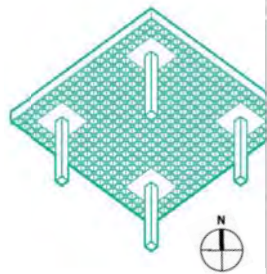
## Redesign



## Museum Parking Garage



- Created a reasonable and functional support structure to support rest of program
- Two-way waffle slabs
- 18" thick, 51450 sqft
- Thirty-six 24" diameter concrete columns spaced 30' apart
- 8' in between floor slabs
- 12" Thick concrete structural core walls

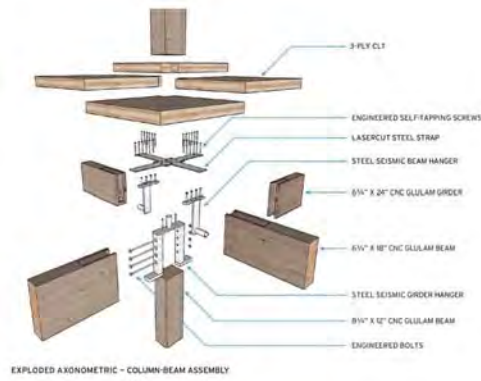
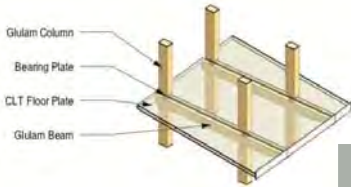


Second Level Concrete Slab Grid & Column Layout

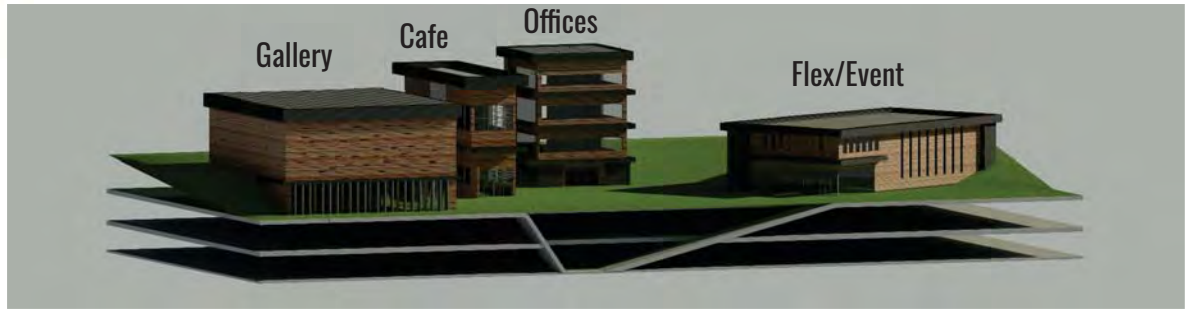
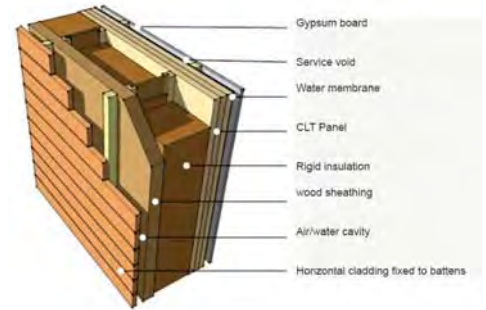
# Event spaces

## Redesign

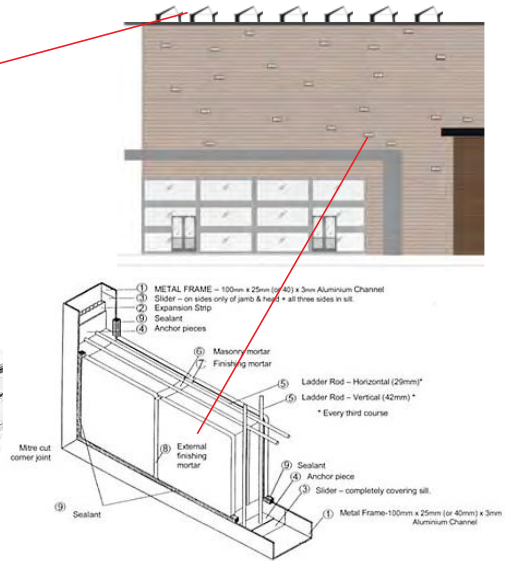
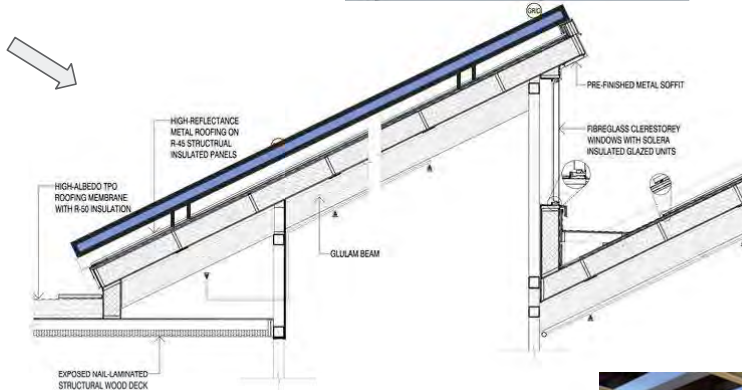
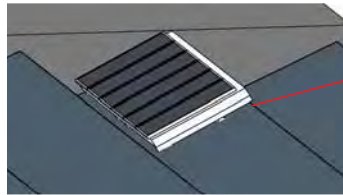
- Double Glazed insulated Channel Glass
- Reduced, yet generous ceiling height
- Zinc Cladding
- Wood siding
- Glass blocks (Gallery)
- Glulam and CLT structure
  - 15' x 20' Bays



## Wall Assembly



# Gallery Skylights

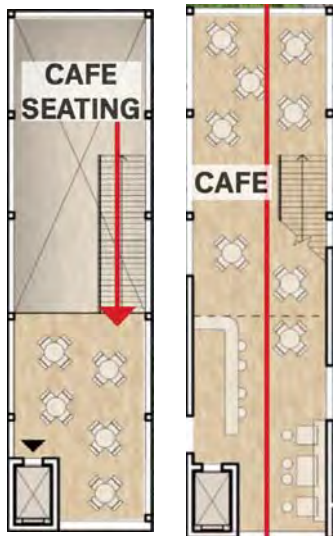


- Gallery structure proposed as steel and concrete
  - Skylights remain precast concrete
- Converted to CLT/Glulam structure
  - Sawtooth changed from Precast concrete to timber
- PV panels on Exterior face of sawtooth skylights with enough space between for coolt



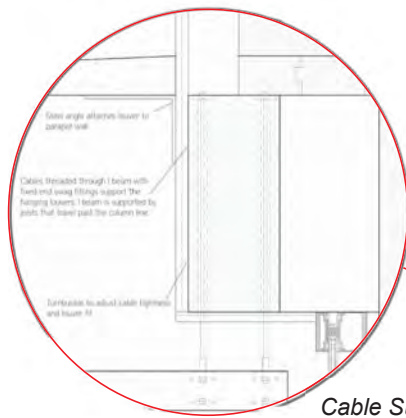


# Cafe



2nd Level

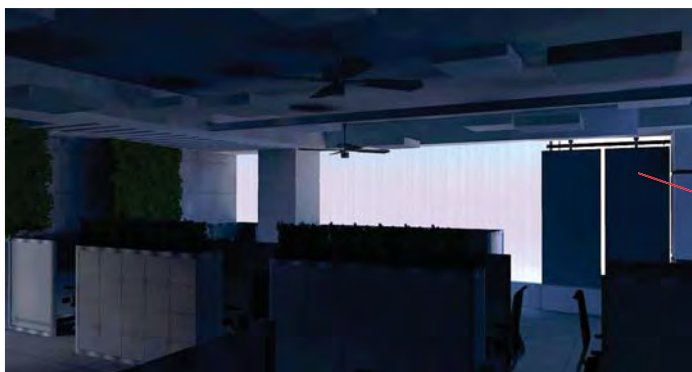
1st Level



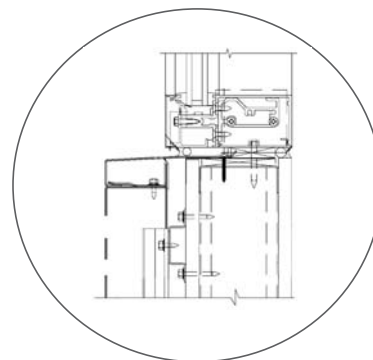
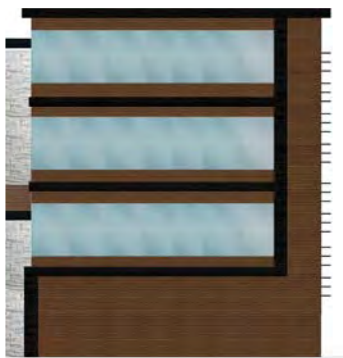
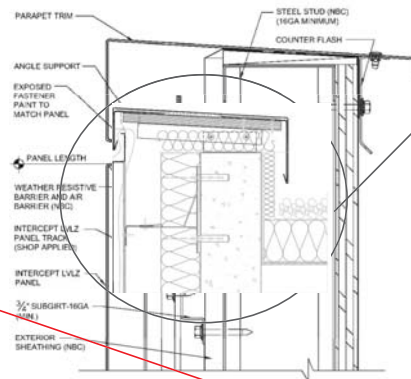
Cable Suspended louvers



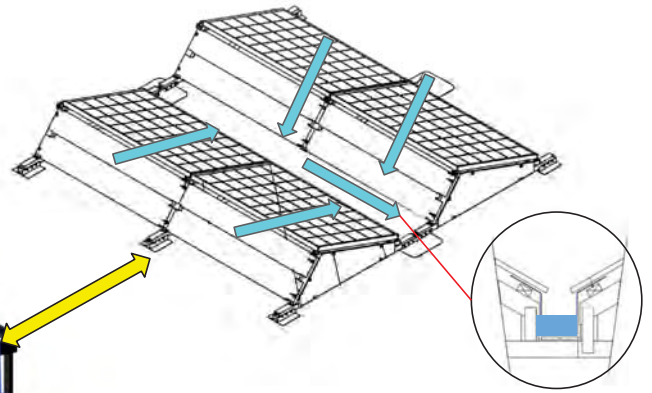
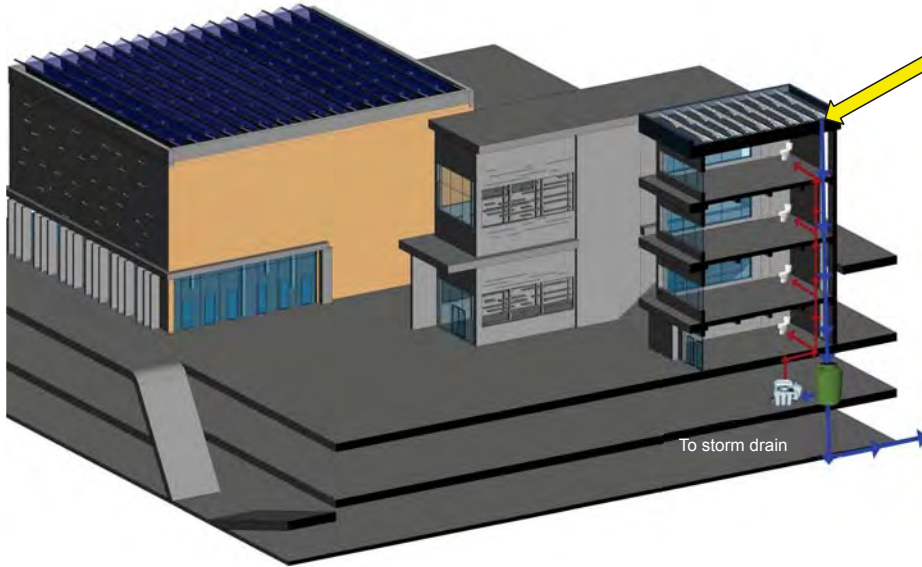
# Offices



Horizontal louvers on South Facade



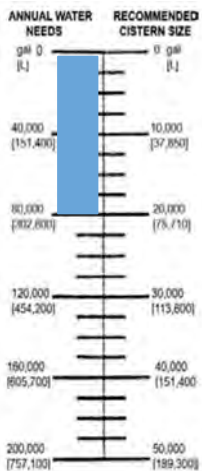
# Greywater Reuse



## PV Stormwater Collection

- Solar PV's attached along rooftops
- Smaller water drainage system installed within between PV's that drain into cisterns and distributed throughout buildings

# Water Conservation



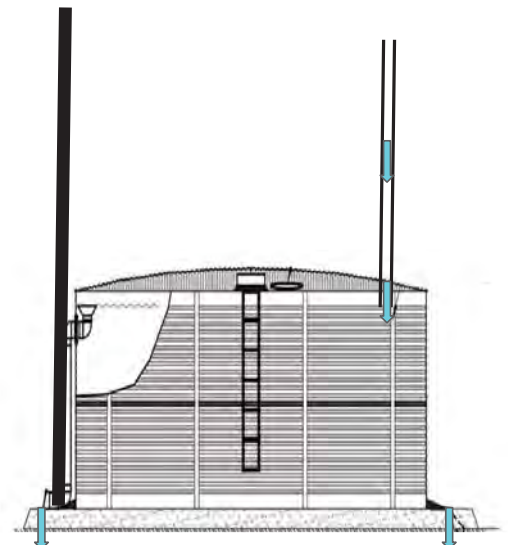
- Buildings annual water needs roughly 90,000-100,000 gallons
- Water is stored within 20,000 gallon cisterns for building usage
- Additional 10,000 gallon cistern for onsite usage
- Excess overflow is used for watering of Garden Plaza vegetation

## Water Redistribution

- To avoid creating swamp of redistributed water on site, excess water filtered through multiple grates throughout site into trench drainage to cisterns

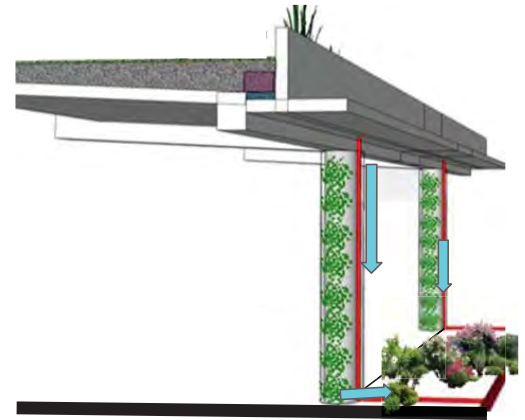
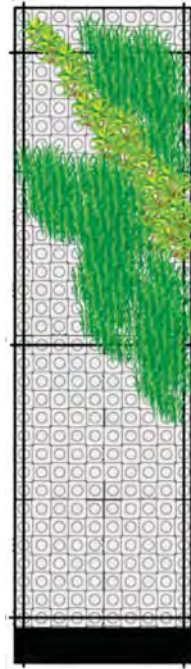
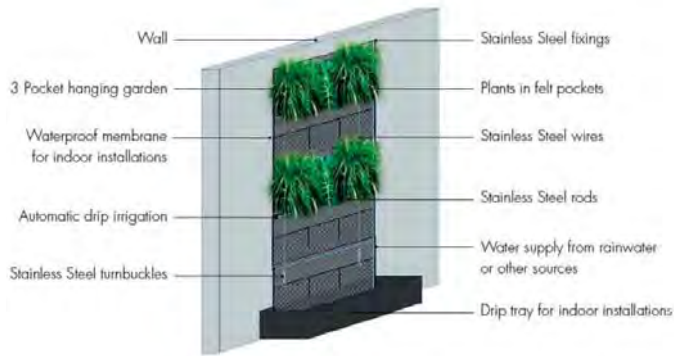
STANDARD TANK SIZES

CAPACITY (GALLONS)	LENGTH	WIDTH	HEIGHT	SHIPPING WEIGHT
250	4'0"	3'7"	3'0"	3,400 LBS.
500	4'6"	4'7"	3'0"	5,400 LBS.
1,000	7'0"	3'7"	4'0"	8,500 LBS.
1,500	10'7"	3'11"	4'0"	11,250 LBS.
2,000	11'10"	4'3"	4'0"	12,500 LBS.
3,000	9'5"	4'11"	7'1"	15,100 LBS.
3,000	9'0"	7'11"	7'1"	15,800 LBS.
4,000	12'2"	7'11"	7'1"	19,000 LBS.
5,000	13'0"	7'11"	7'1"	23,700 LBS.
6,000	18'0"	7'11"	7'1"	27,000 LBS.
8,000	24'0"	7'11"	7'1"	35,400 LBS.
10,000	30'0"	7'11"	7'1"	43,600 LBS.
12,000	36'0"	7'11"	7'1"	48,700 LBS.
15,000	45'0"	7'11"	7'1"	60,400 LBS.
20,000	60'0"	7'11"	7'1"	79,000 LBS.

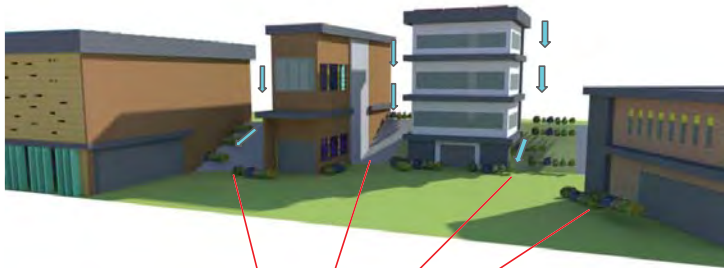


## Water Redistribution

- Interior Green-wall panels installed
- Filtered rainwater also distributed to vegetation
- Drip-tray collects and funnels water back into drainage system
- Regenerative element improves Indoor Quality and contributes to the decrease of ambient temperatures in space
- Acts somewhat as a soundproofing barrier
- Cleans air of pollutants and offsets the carbon footprint of buildings



## Garden Plaza Vegetation



**Trench Drainage**

- “Protective” thick layers of native bushes and plants that create a sense of security and moves you into spaces
- Lighter & Brighter foliage to commemorate community and life
- Interacts with local fauna bringing nature element
- Sites climate requires plants with minimal maintenance and drought resistant



Golden Creeper



Spanish Stopper



Dahoon Holly



Wax Myrtle



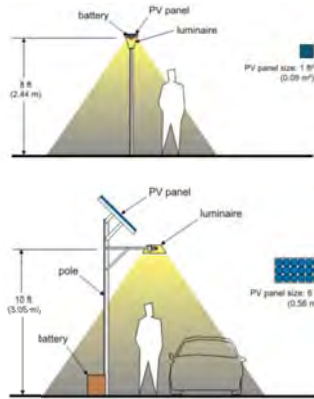
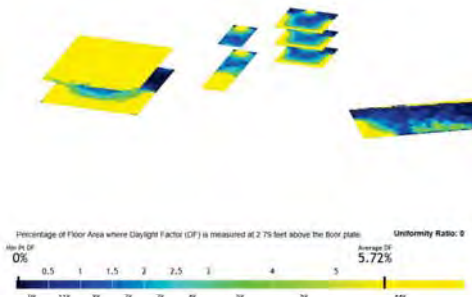
Leatherleaf Fern



Blanket Flower

# Lighting & Paths

- Luminaires distributed throughout site based off needed illuminance not emitted from buildings
- Provide 50% optical efficiency
- Buildings interior provided with LED lighting to spaces that don't receive optimal sunlight
- Cooling dominated building
- Communal Central space enclosed by buildings and garden plaza



- Larger PV luminaire in larger open areas
- Smaller PV luminaires throughout pathways and garden seating areas



Flex Space



# Energy

- Total square footage: 29,200 sq. ft.
- Total energy consumption (Estimate): 664,050 kWh/year

Broad Category	Primary Function	Further Breakdown (where needed)	Source EUI (kBtu/ft²)	Site EUI (kBtu/ft²)
Food Sales & Service	Restaurant/Bar	Fast Food Restaurant	886.4	402.7
		Restaurant	573.7	325.6
		Other - Restaurant/Bar		
Office	Medical Office*		121.7	51.2
	Office*		116.4	52.9
	Museum		112.0	56.2
Entertainment/Public Assembly	Recreation	Performing Arts		
		Bowling Alley		
		Fitness Center/Health Club/Gym		
		Ice/Curling Rink		
		Roller Rink	112.0	56.8
		Swimming Pool		
Social/Meeting Hall	Other - Recreation			
			109.6	56.1

Estimated EUI per building:

Cafe: 2,400 Sq. ft. x 325.6 kBtu/sq. ft. = 781,440 kBtu/sq. ft. (229,001 kWh)

Office: 6,400 sq ft x 52.9 kBtu/ sq ft= 338,560 kBtu/sq ft. (99,222 kWh)

Gallery: 14,400 sq ft x 56.2 kBtu/sq ft = 809,280 kBtu/sq ft (237,180 kWh)

Flex/Event: 6,000 sq ft x 56.1= 336,600 kBtu/sq ft (98,647 kWh)

# PV system results

Office: 1,600 sq ft roof area = 24kw system (36,607 kWh/year)

Cafe :1,600 sq ft roof area = 24kw system (36,607 kWh/year)

Gallery: 14,400 sq ft roof area= 216 kw system (329,463 kWh/year)

Flex: 6,000 sq ft roof area = 90kw system (137,276 kWh/year)

Office and cafe fall short of energy generation compared to consumption.

Using a shared system allows each building to transfer excess energy to each other. This shared system results in 539,953 kWh/year. Approximately 80% of estimated annual consumption

- Approximately excess of 124,097 kWh/year



## Heating/Cooling

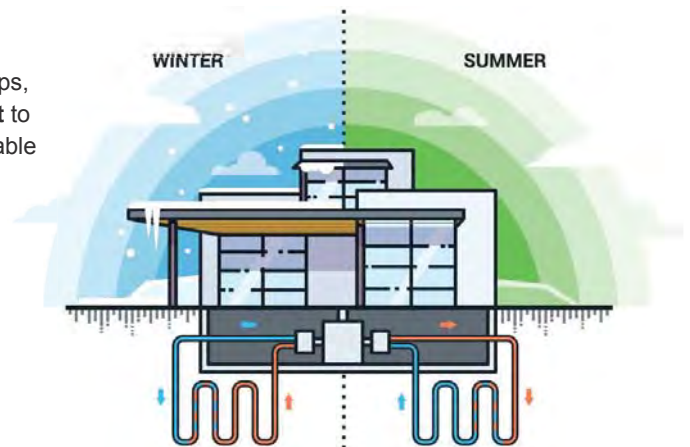
Geothermal  
**Let the Earth  
Heat & Cool Your  
Home Affordably**



## Geothermal Heating/Cooling System

**Geothermal heat pumps (GHPs)**, also known as ground-source **heat pumps**, can **heat**, cool, and even supply hot water to a building by transferring **heat** to or from the ground. This technology has been keeping consumers comfortable for more than 50 years and can cut energy bills by up to 65% compared to traditional **HVAC** units.

The United States (US) Department of Energy states that geothermal heat pumps have the lowest operating costs of all conventional heating/cooling technologies.



# Geothermal Heating/cooling System

- There are two general types of geothermal heat pumps:
- closed-loop
  - open-loop systems.

Open-loop systems tend to have lower upfront costs and higher efficiencies, closed-loop installations are more practical and common for most situations. Generally, open-loop systems are only practical if there is an adequate supply of clean groundwater.

**As the Orlando, Florida is well equipped with plenty of groundwater we designed open loop system which is cost effective.**

The vast majority of the public water systems in Florida use groundwater as their source. There are approximately 12,000 wells associated with groundwater systems used for public water supply in Florida. These wells produce water from five major aquifers or aquifer systems.

The major source of groundwater supply in Florida is the Floridan Aquifer System, which underlies the entire state.

The Surficial Aquifer System and the Intermediate Aquifer System generally produce less water, and, with some exceptions, are used primarily for domestic and smaller public supply wells in Florida.



This map shows where the major aquifers in Florida are found at the land surface. This is where these sources of drinking water are at their most vulnerable.



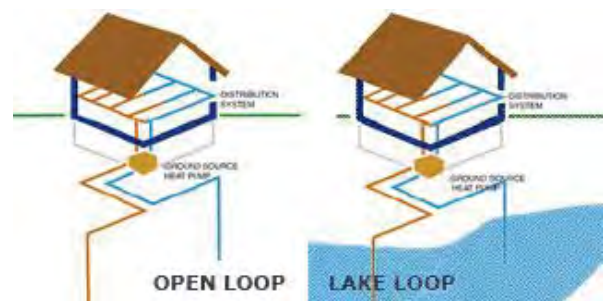
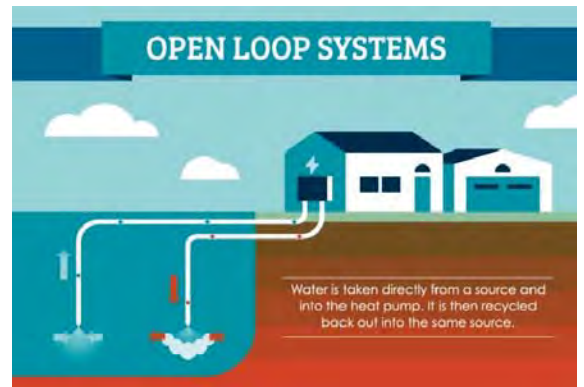
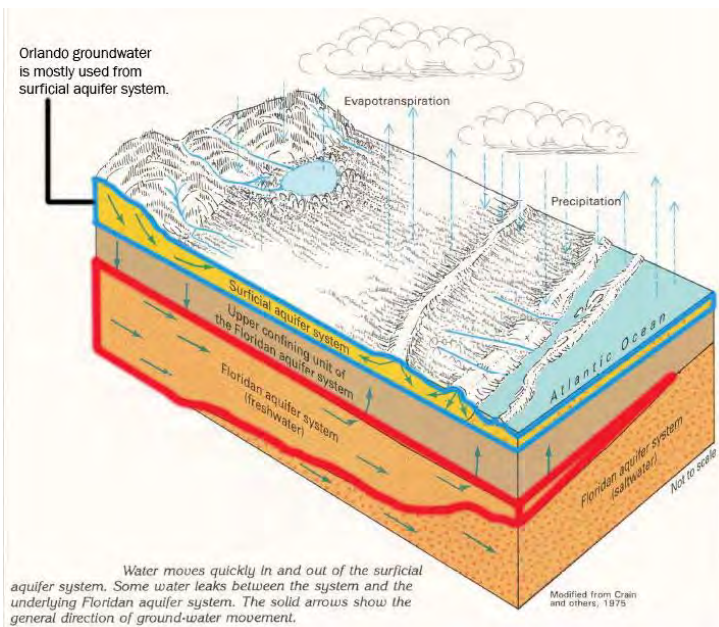
This map shows where the Floridan Aquifer Systems in Florida are found at the land surface. This is where these sources of drinking water are at their most vulnerable.

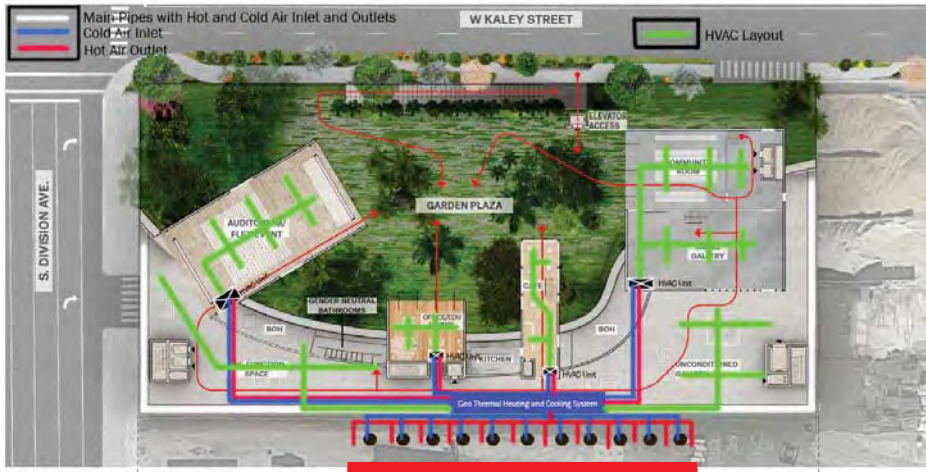


This map shows where the Surficial Aquifer Systems in Florida are found at the land surface. This is where these sources of drinking water are at their most vulnerable.

# Open Loop Geothermal Heating/cooling System

An **open loop system** is connected directly to a ground water source such as a well or pond and directly pumps the water into a building to the **heat pump unit** where it is used for **heating and cooling**

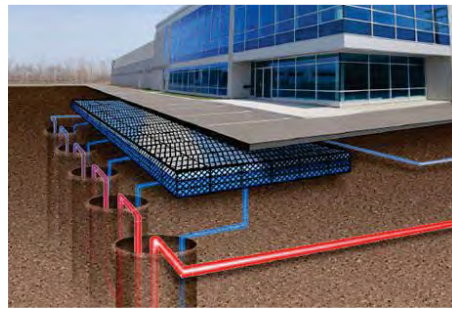




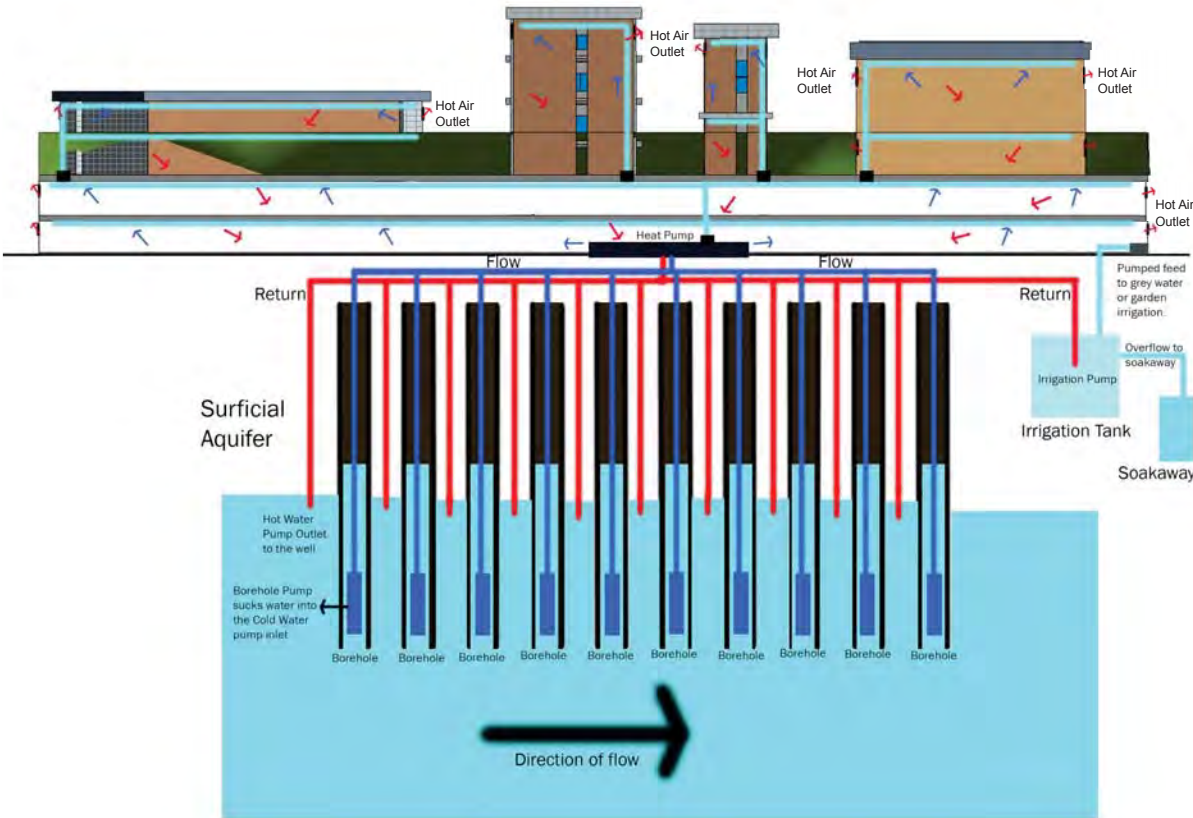
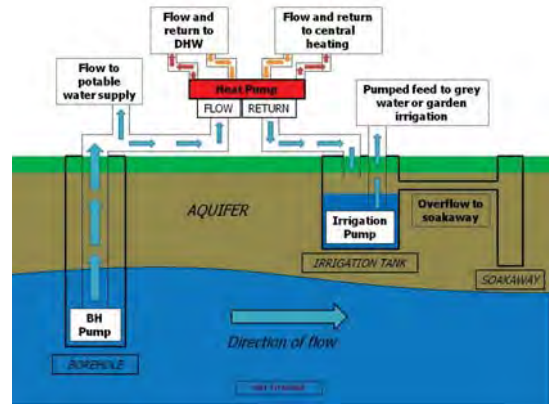
MUSEUM LEVEL 3 PLAN - PHASE 2, N.T.S.

### Open Loop Geothermal Heating/Cooling System

This picture showing the Geothermal pits drilled vertically into the ground.



- As per the Orlando's groundwater survey the surficial aquifer ranges from around 300 to 400 ft underground accommodates with groundwater.
- Geothermal Pits to be drilled vertically deep into the ground to around 300 to 400 ft.
- In open loop system the pumps are directly connected to the groundwater source.
- Hot and Cold water pumps are then connected to Heat Pump.
- Heat Pump then connected to the traditional HVAC unit which controls the flow and return of Hot and Cold Air in the building according to our requirement.



1. The climatic condition in Orlando, Florida is Humid. we decided to have geothermal system we chose to have only cool air inlet during summer.
2. We designed to connect traditional HVAC to the heat pump which pumps cold air to the building.
3. Each individual block in the design is equipped with single traditional HVAC unit.
4. There are two pipes with cold and hot water.
5. The cold water directly from the well pumps into the HP (Heat Pump) which makes the air cool and let hot air return.
6. These hot water pump is connected to irrigation tank, then filtered and those water are pumped to feed grey water or garden irrigation.

# Summary

## *Renewable Energy*

- PV panel roofing
- Geothermal Cooling
- Water Efficient Landscape - Green Roof
- Energy storage system

## *Passive Strategies*

- Natural Lighting/Ventilation
- HVAC humidity control system
- Reduced Heat Island Effect

## *Energy Saving Strategies*

- LED interior lighting
- Hands free faucets
- Low-flow sinks
- Low-Flow Flush valves
- PV systems generate approximately **80%** of annual energy consumption

## *Water Reuse and Distribution*

Reduced potable water consumption for landscape by over **40%**

Water Use reduction by **25%**

