MIDWAY, GA MUNICIPAL COMPLEX CONCEPTUAL DESIGN PHASE II

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SAVANNAH STATE UNIVERSITY

CIVIL ENGINEERING TECHNOLOGY

EPA/CUPP/TEX PROJECT

ADVISORS:

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ABOUT MIDWAY, GA

- Midway is located in Liberty County, Georgia on Highway 17 between Savannah and Darien, Ga (Off of Interstate I-95)
- English Puritans founded the Midway Society on August 28, 1754 in a log meeting house on Midway Neck
- City population of 2,121
- The city serves as home for Liberty County Industrial Development Authority's Industrial Park; Midway-Riceboro Library; many day care centers; Liberty Elementary School and Midway Middle School.
- Home of the historic Midway Congregational Church and Cemetery, Midway Colonial Museum, Dorchester Academy and The Museum of African-American History.

MIDWAY HISTORIC MUSEUM

MIDWAY CONGREGATIONAL CHURCH

DORCHESTER ACADEMY MUSEUM

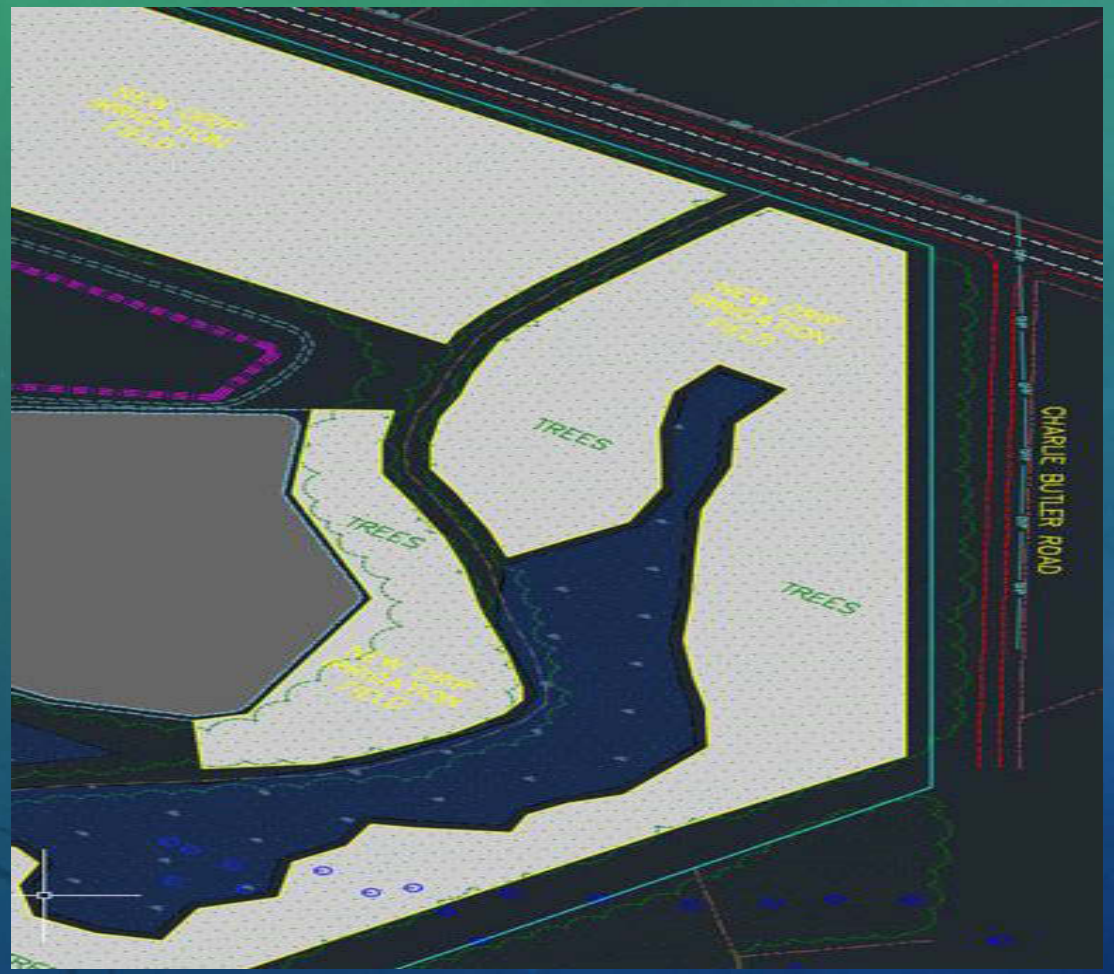
ENGINEERING DESIGN

PHASE II

PREFACE

- Our design is focused on the revision of our predecessor's municipal complex design and the input of a few sustainable design factors.
- After the success of Phase I, a call for a more environmentally-friendly, and resilient-minded design was initiated.
- Through weekly consultations with Ms. Jackie Jackson and Dr. Bryan Knakiewicz. As well as a business meeting with the Mayor of Midway--Dr. Clemontine F. Washington, the City Engineer--Mr. Ronald Kolat and Liberty County Engineer--Mr. Ebrahim Nadji. The revisions to the design and the implementation of sustainable design enhancements were made possible.

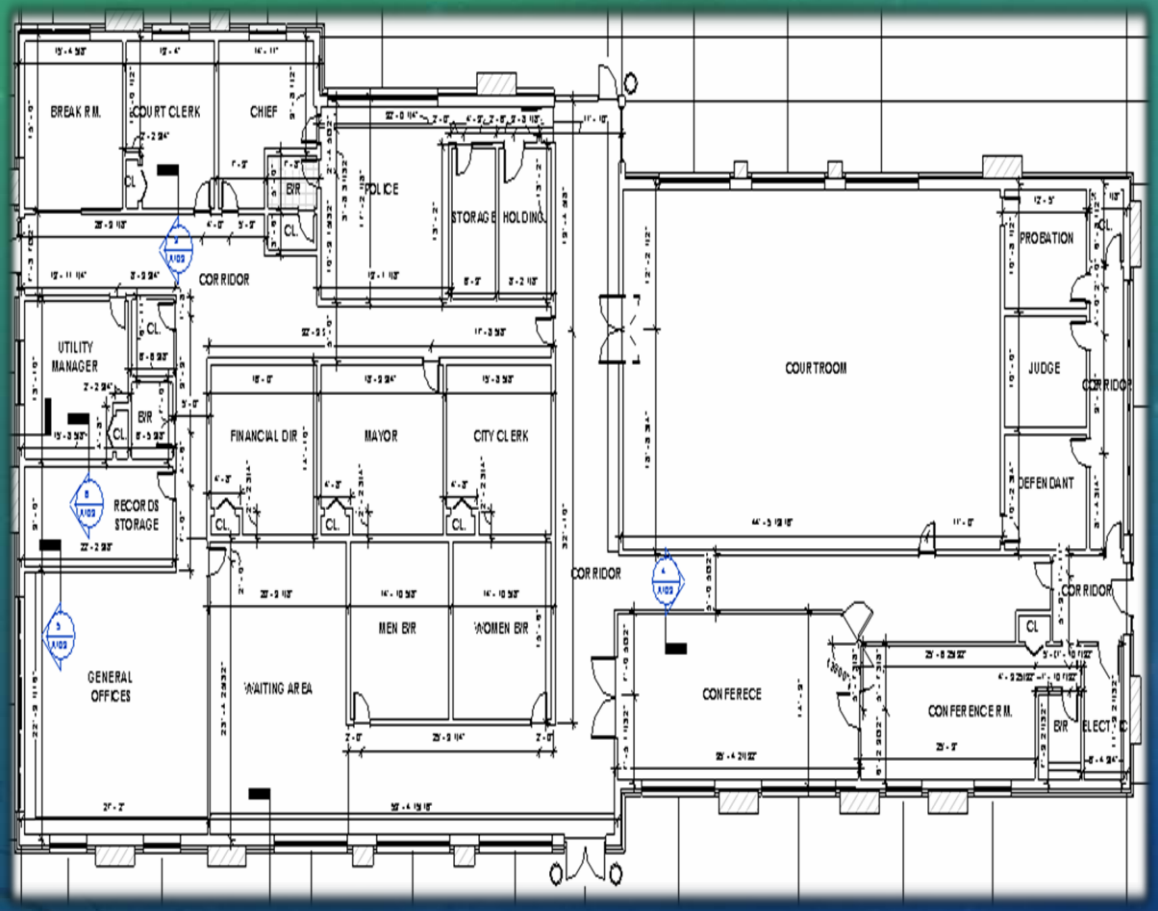
SITE TOPOGRAPHY

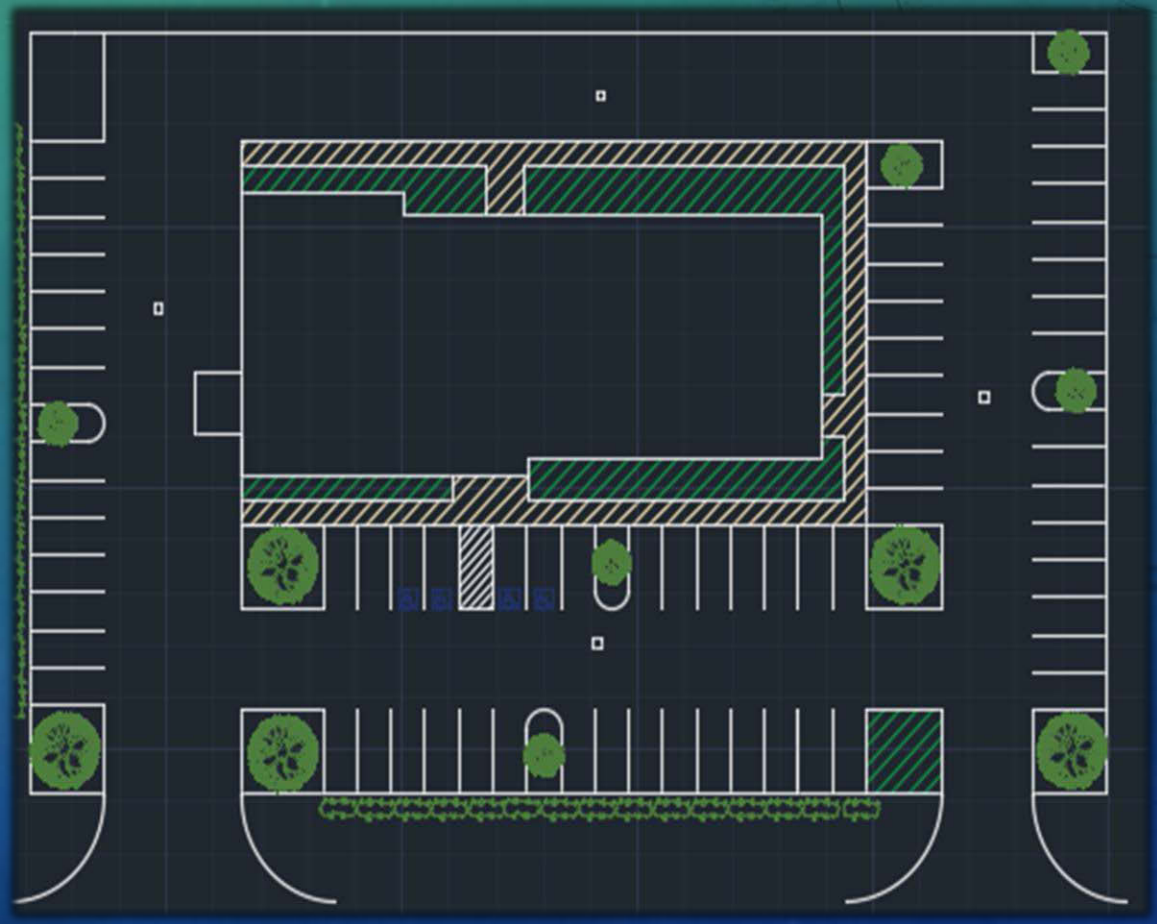


CITY NEEDS

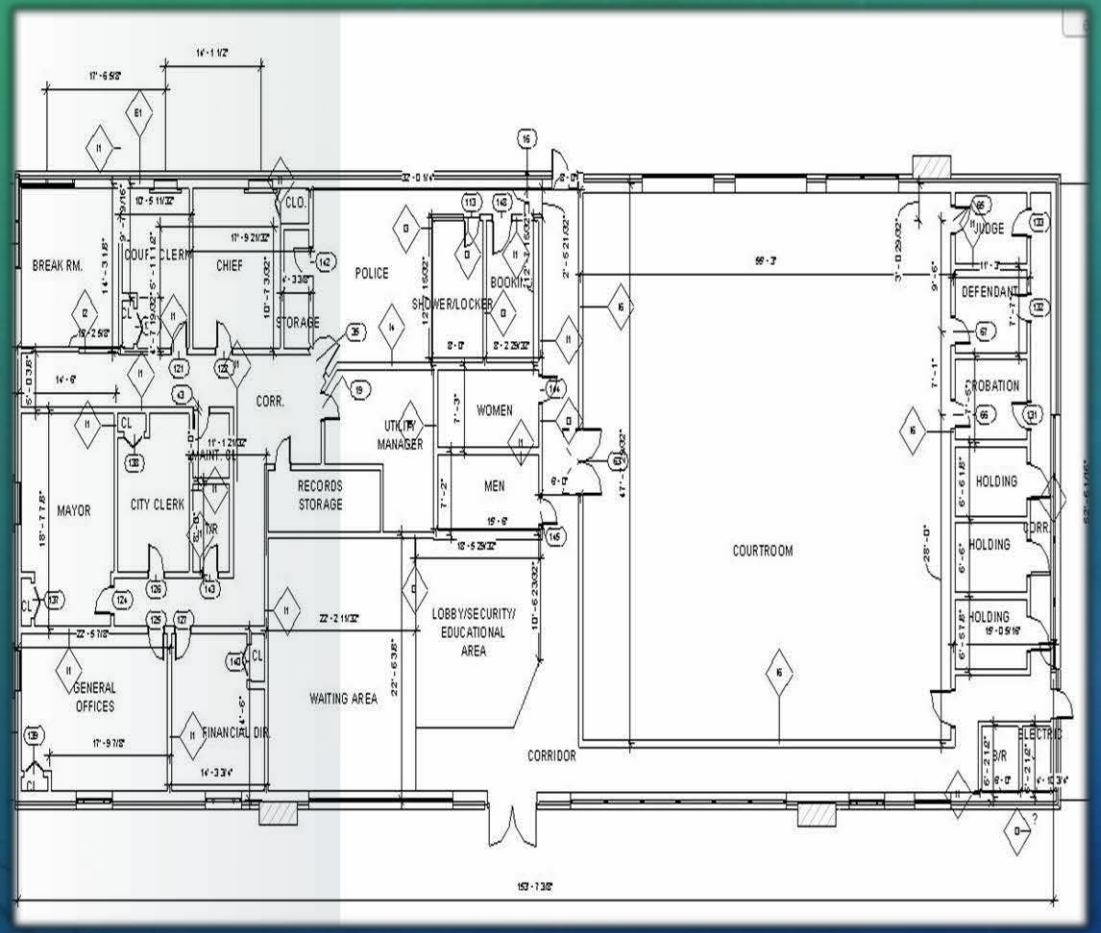
- The City of Midway requested several changes to the original design in phase I of this project, as well as new inputs.
- They requested that we downsize the building to under 10,000 square feet. This meant making offices smaller and cutting a corridor and a conference room from the original design.
- They also requested that we upsize the courtroom, because it will double as a multi-purpose room that can be rented out for city use it would need to fit over 120 people.
- Lastly, they requested that we add holding cells near the court room and add a shower/locker room to the police office.

PHASE I - FINAL DESIGN

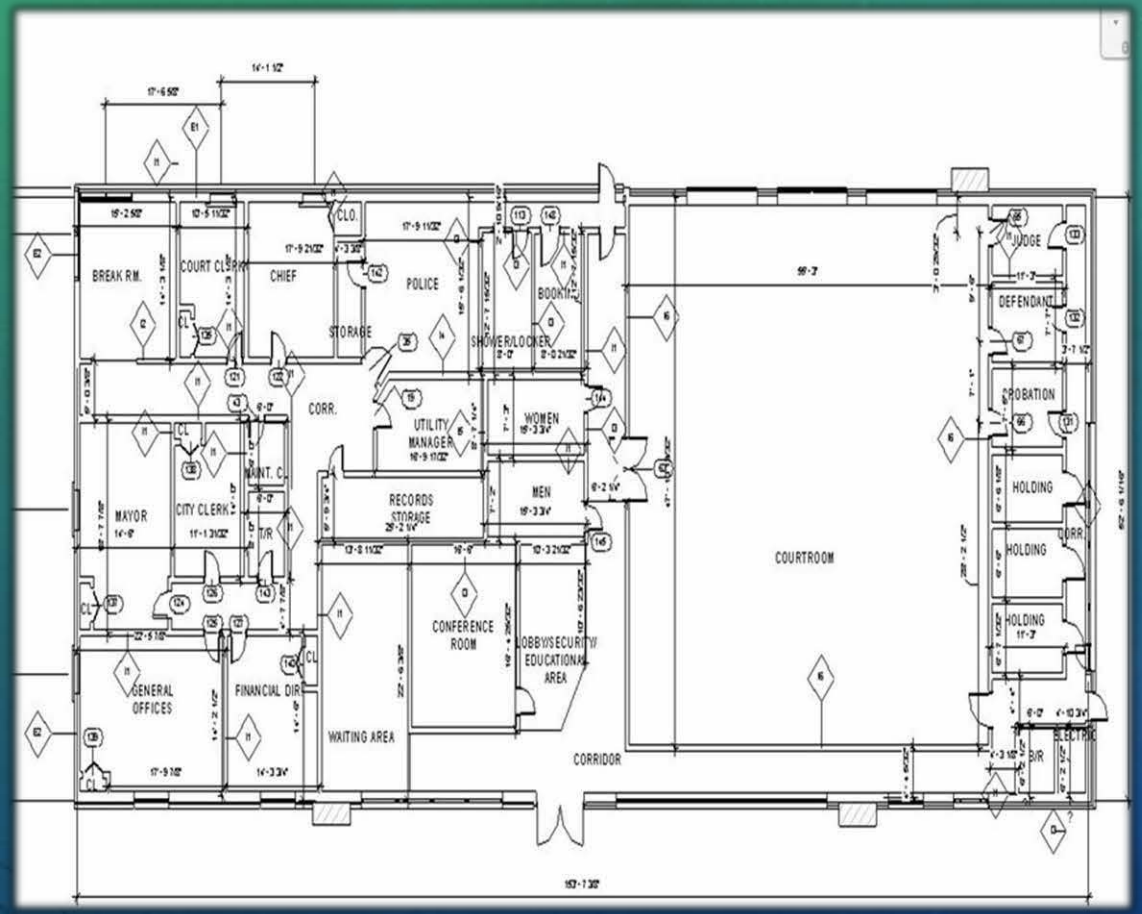




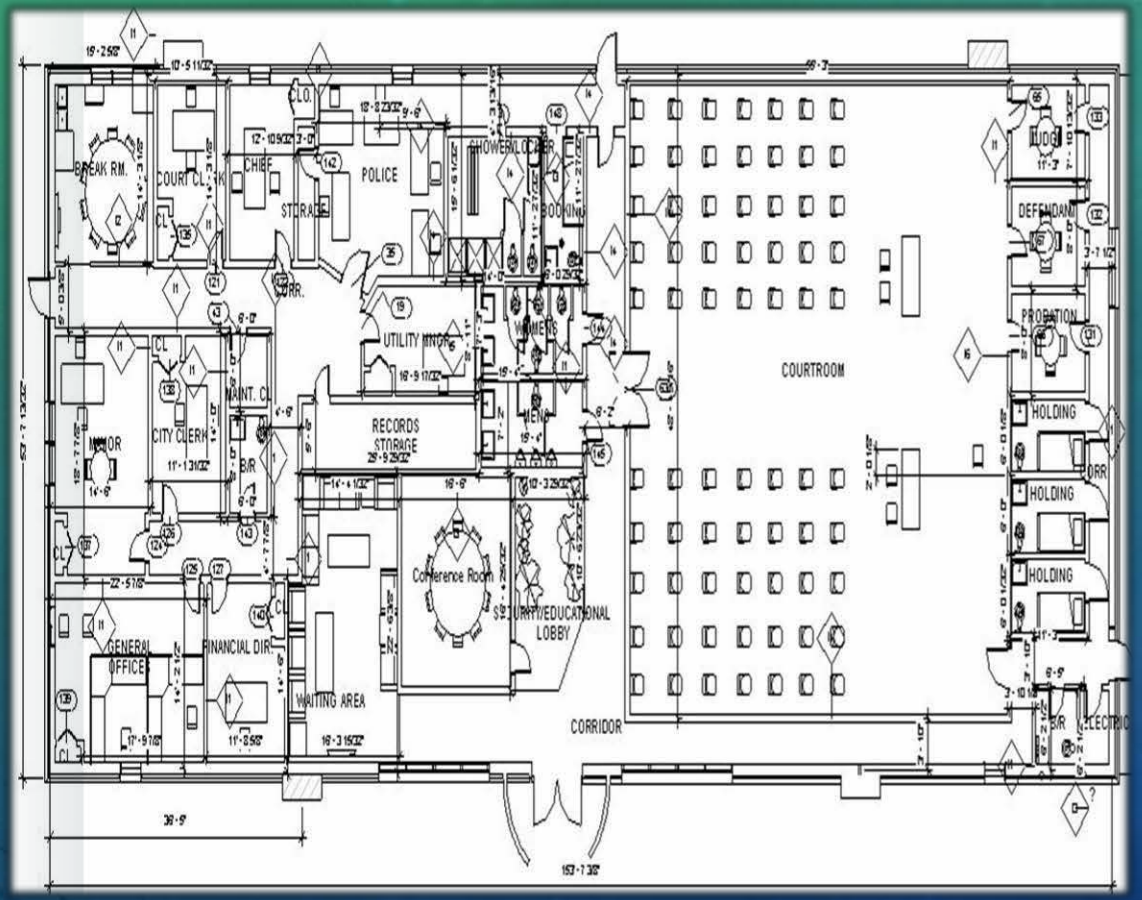
PHASE II - FIRST DESIGN REVISION

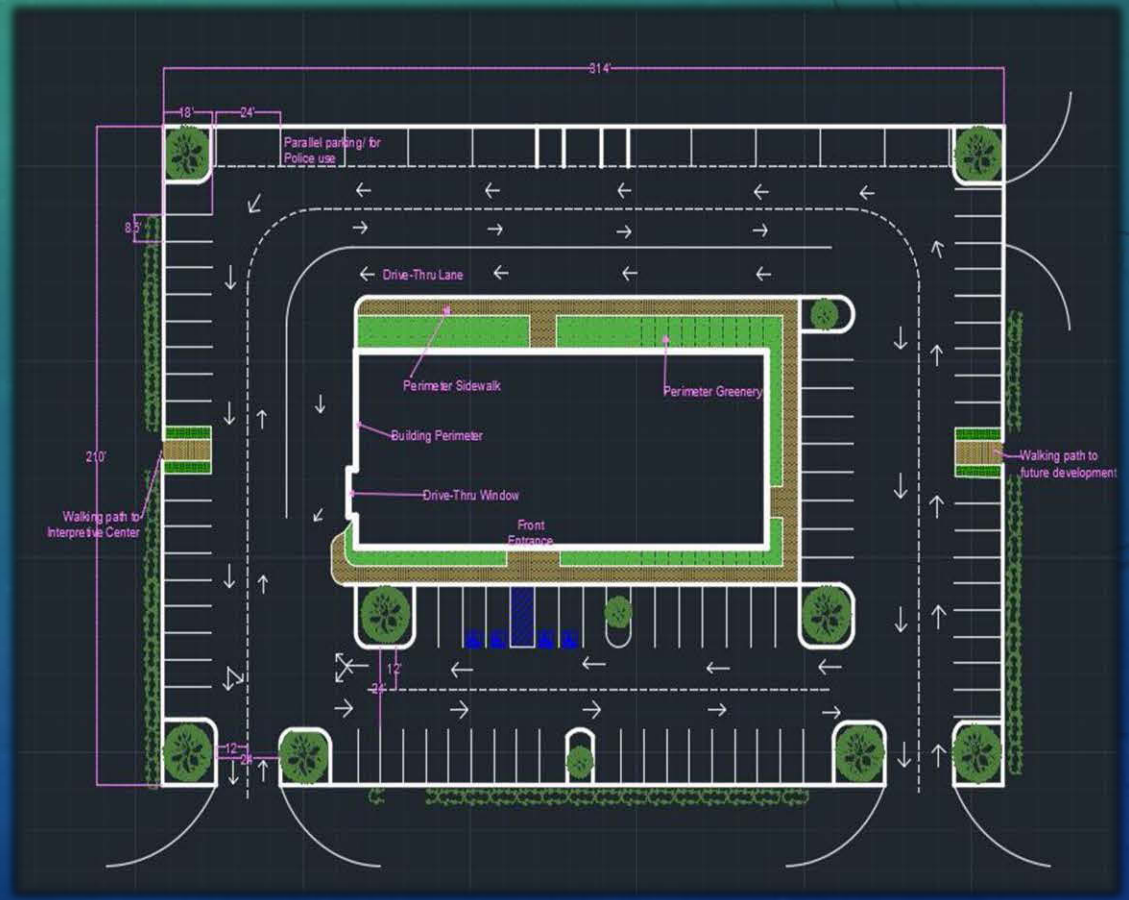


PHASE II - SECOND DESIGN REVISION

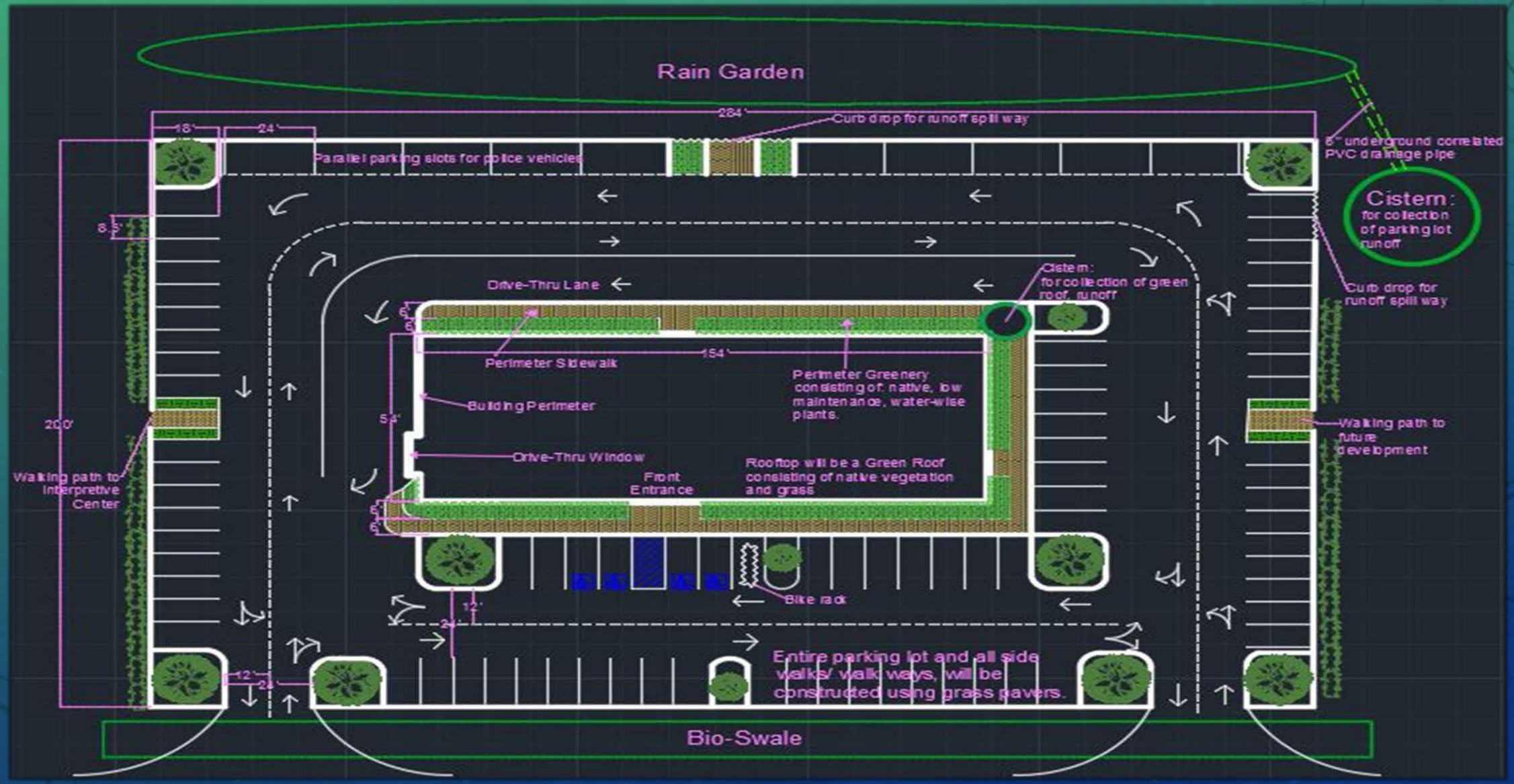


PHASE II - THIRD DESIGN REVISION

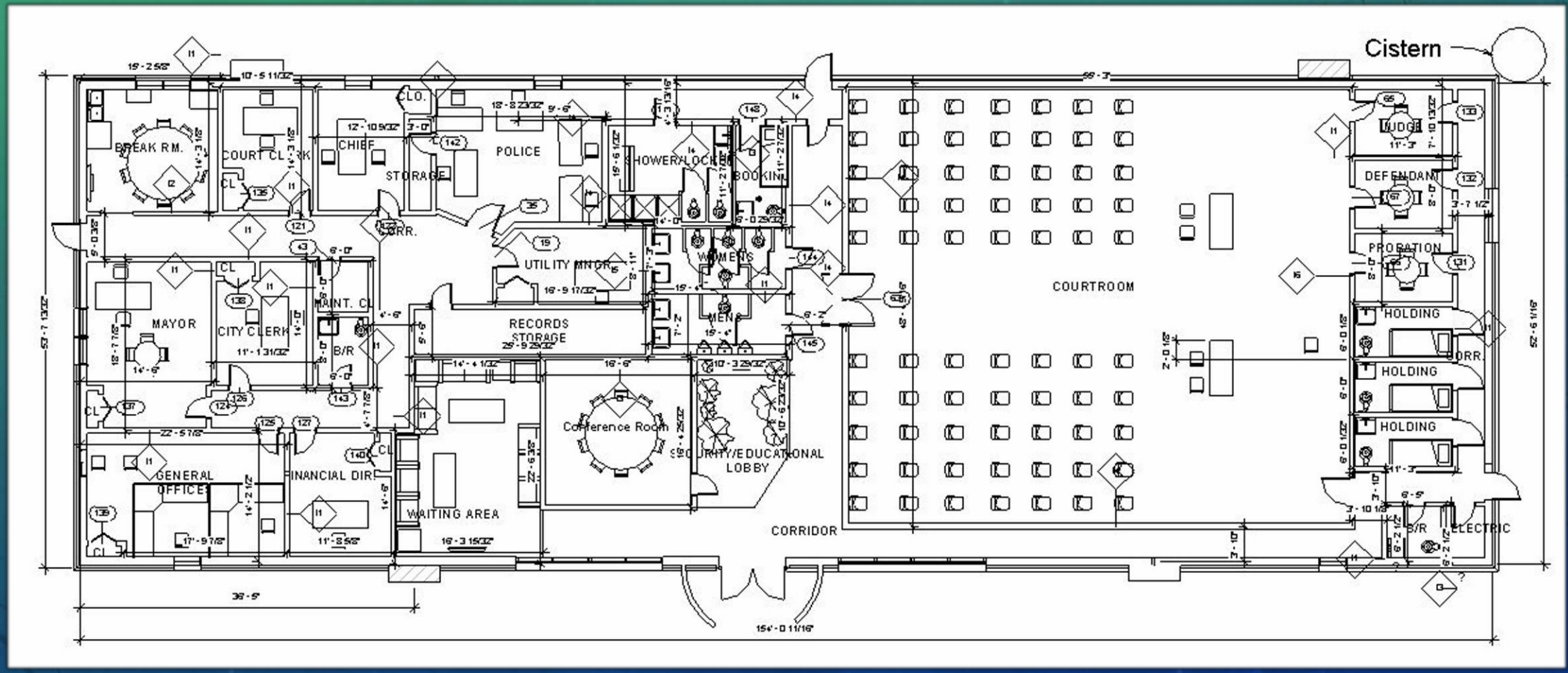




PHASE II - FINAL SITE PLAN DESIGN



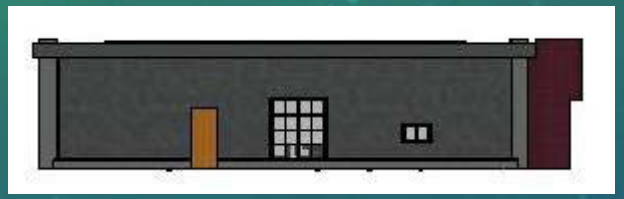
PHASE II – FINAL ARCHITECTURAL DESIGN



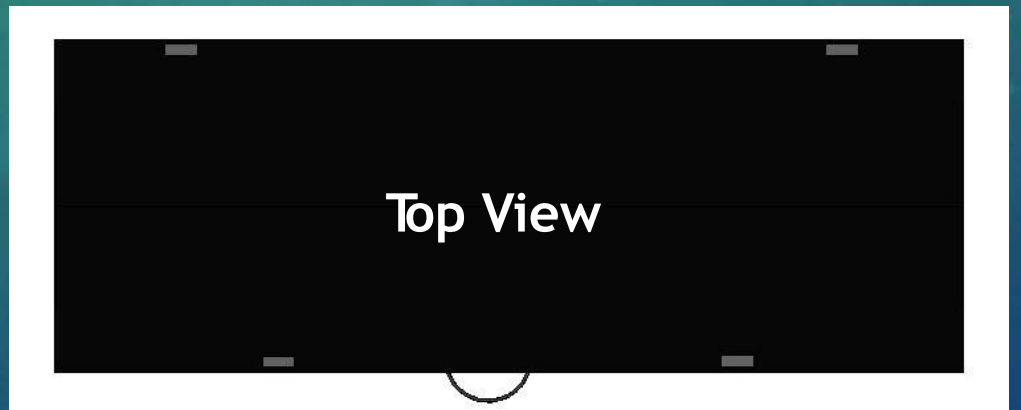
PHASE II – FINAL DESIGN 3D EXTERIOR

Front View

Left Side

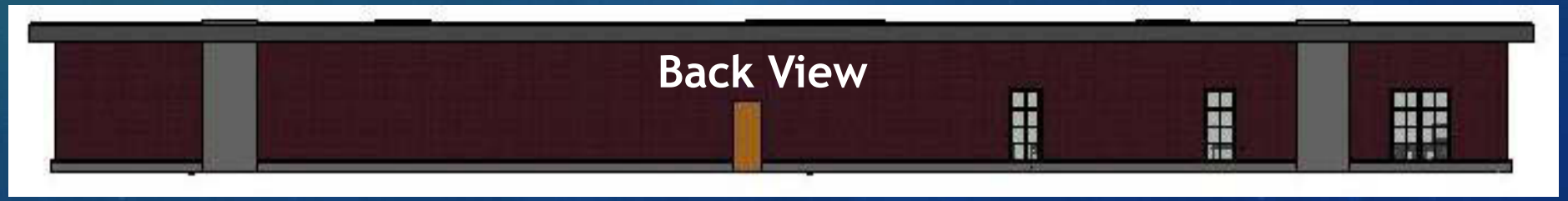


Top View



Right Side

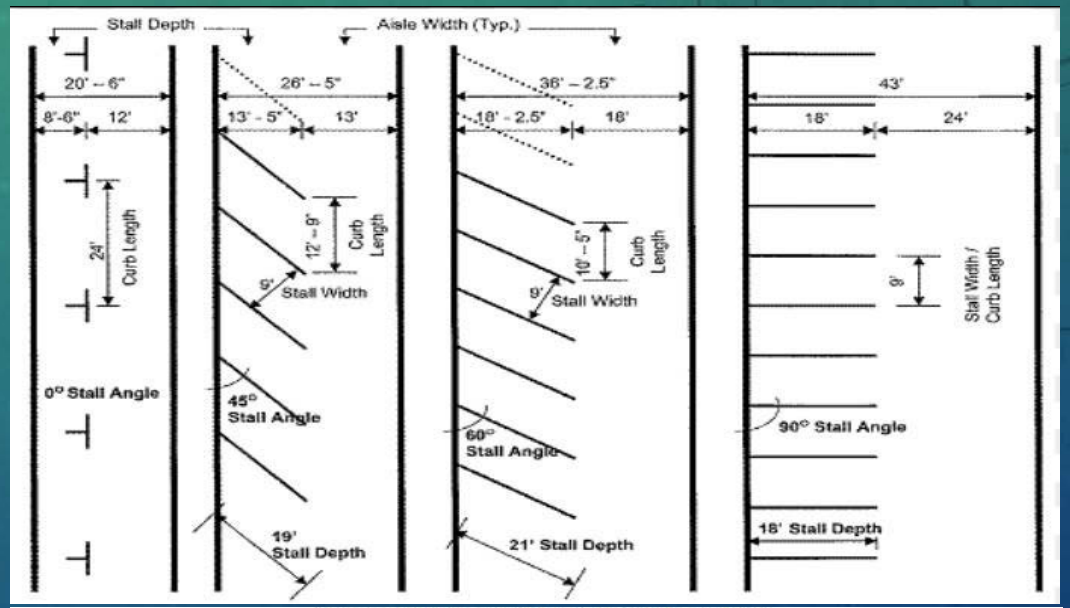
Back View



PHASE II – FINAL DESIGN 3D RENDERING

DIMENSIONS OF PARKING SPACES

- 78 parking spaces at a 90 degree angle (4 reserved handicapped spaces, 1 handicapped van loading space)
- 10 parallel parking stalls in the rear of the building
- The aisle widths are 24 feet for two-way traffic. Each lane being 12 feet wide.
- The 90 degree parking spaces are 18 feet long and 8.5 feet wide.
- The parallel parking stalls are 24 feet long and 8.5 feet wide.
- With the exception of those near obstructions (eco-islands) there is an extra 2 feet added to the width of the 90 degree space, and the length of the parallel parking stalls, to compensate for the overhang of plant life.



ACCEPTIBLE PARKING DESIGNS

Angle	Dimensions				One Way Traffic		Two Way Traffic	
Parking Angle	Stall Width (ft)	Curb Length (ft)	Stall Depth (ft)	Stripe Length (ft)	Aisle Width (ft)	Section Width (ft)	Aisle Width (ft)	Section Width (ft)
A	B	C	D	G	E	F	E	F
30°	8.5	17	16.4	32.7	12	44.7	24	56.7
45°	8.5	12	18.7	26.5	14	51.4	24	61.4
60°	8.5	9.8	19.8	22.9	16	55.6	24	63.6
90°	8.5	8.5	18	18	22	58	24	60

TRAFFIC CONTROL

SUSTAINABILITY DESIGN

PHASE II

IMPORTANCE OF SUSTAINABILITY IN ENGINEERING

- The Institution of Engineers Australia (EA), in the 'Australian Engineering Competency Standards – Stage 1 Competency Standards for Professional Engineers' states that, "Professional engineers are required to take responsibility for engineering projects and programs in the most far reaching sense… including understanding the requirements of clients and of society as a whole; working to optimize social, environmental and economic outcomes over the lifetime of the product or program." (EA 2004)

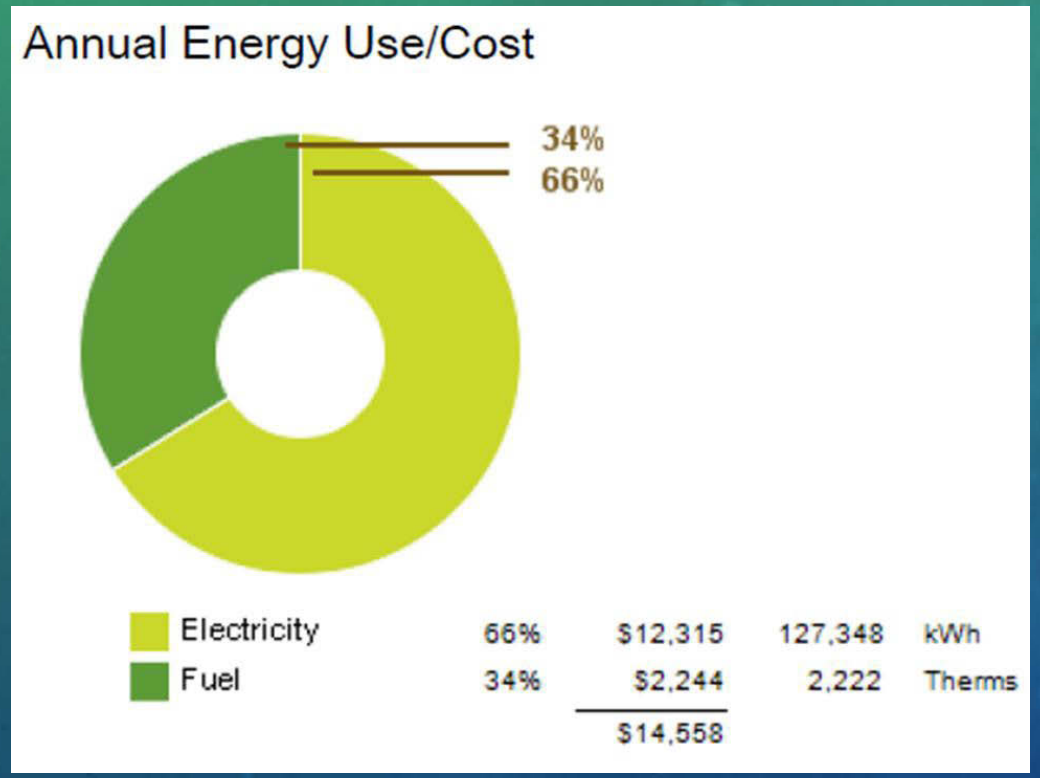
ENERGY CONSUMPTION

Building Performance Factors

Location:	Charlie Butler Rd & Young Miller Ave, Midway, GA 31320
Weather Station:	1046891
Outdoor Temperature:	Max: 100°F/Min: 24°F
Floor Area:	6,913 sf
Exterior Wall Area:	15,770 sf
Average Lighting Power:	0.90 W / ft²
People:	48 people
Exterior Window Ratio:	0.10
Electrical Cost:	$0.10 / kWh
Fuel Cost:	$1.01 / Therm

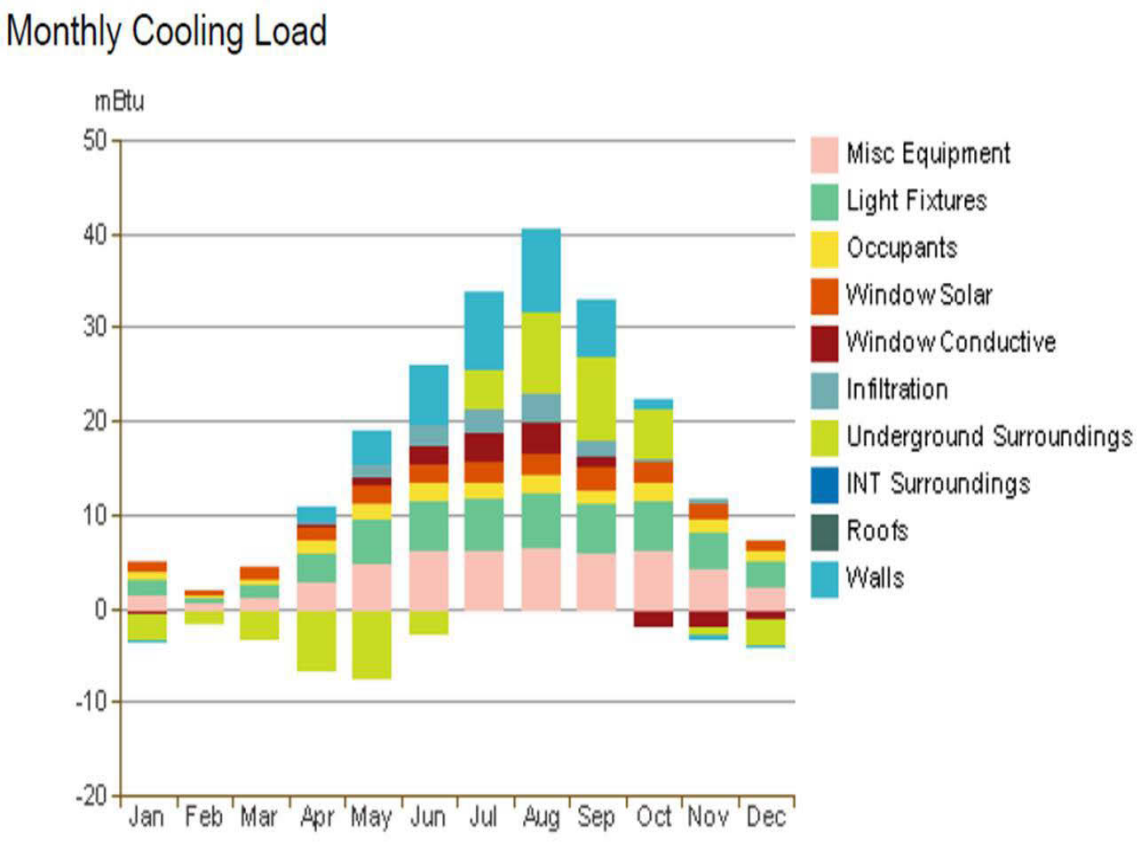
- The building performance factor table shows the major factors that affect the energy consumption of the Midway, GA municipal building. Weather related factors include the location, weather station and outdoor temperature

ANNUAL ENERGY USE/COST

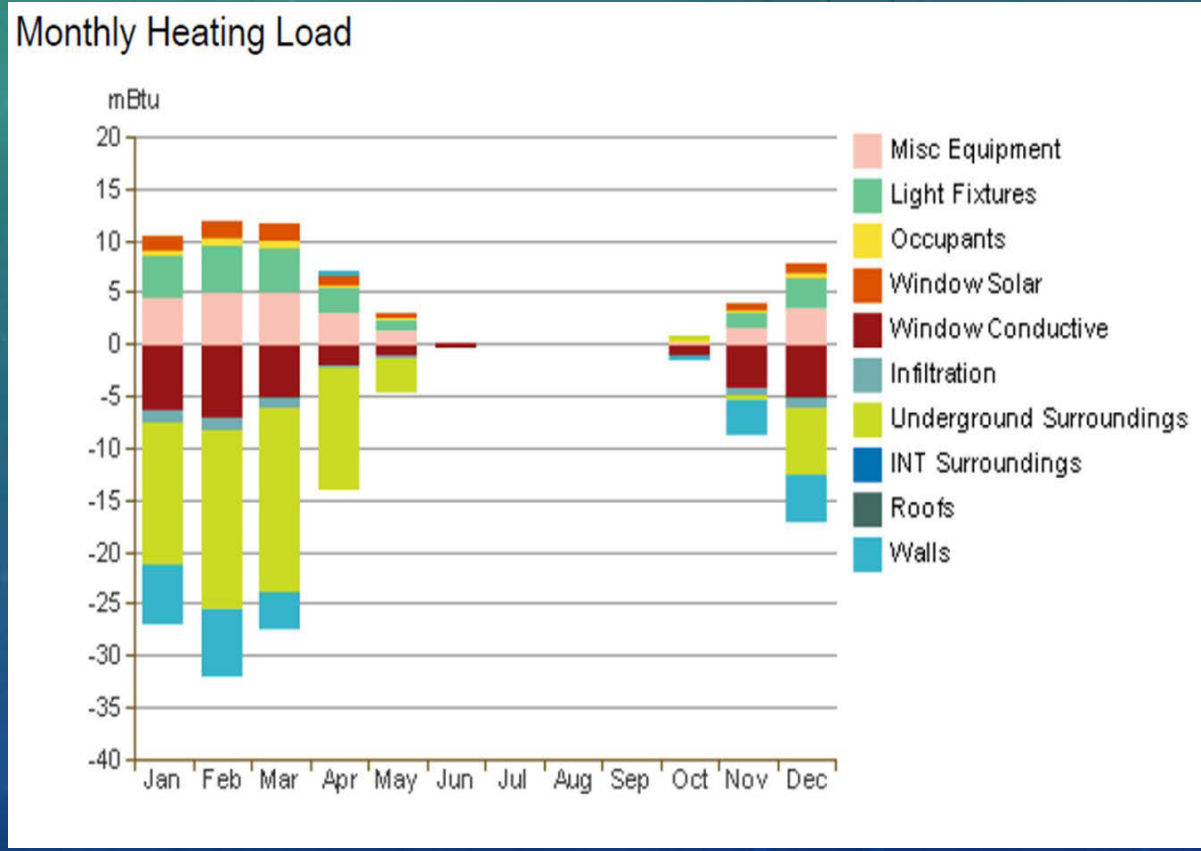


- This chart compares estimated energy use for major fuel versus electricity. Major fuels include heating oil, natural gas, propane, and other resources. The percentage break-down is based on usage, not costs

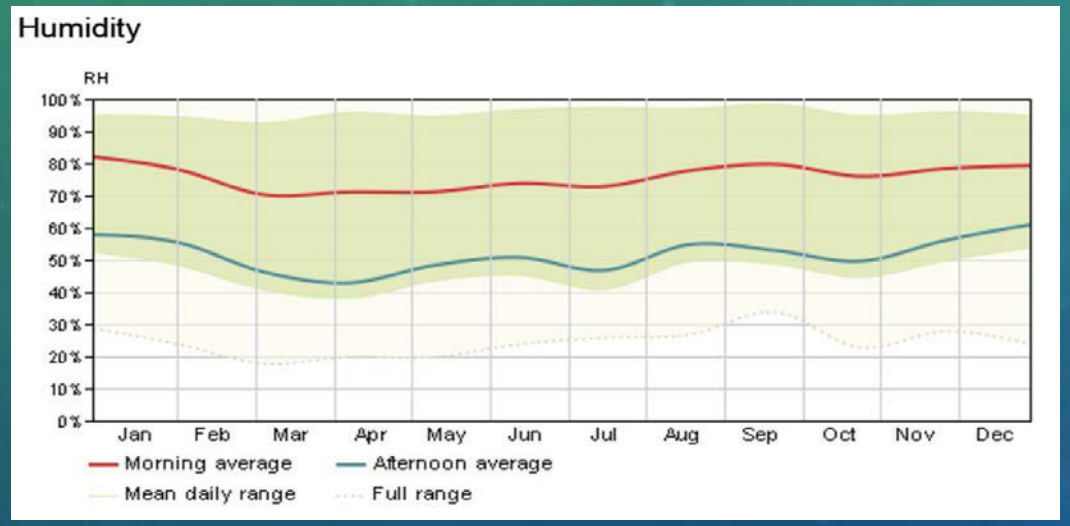
MONTHLY COOLING LOAD



MONTHLY HEATING LOAD



HUMIDITY



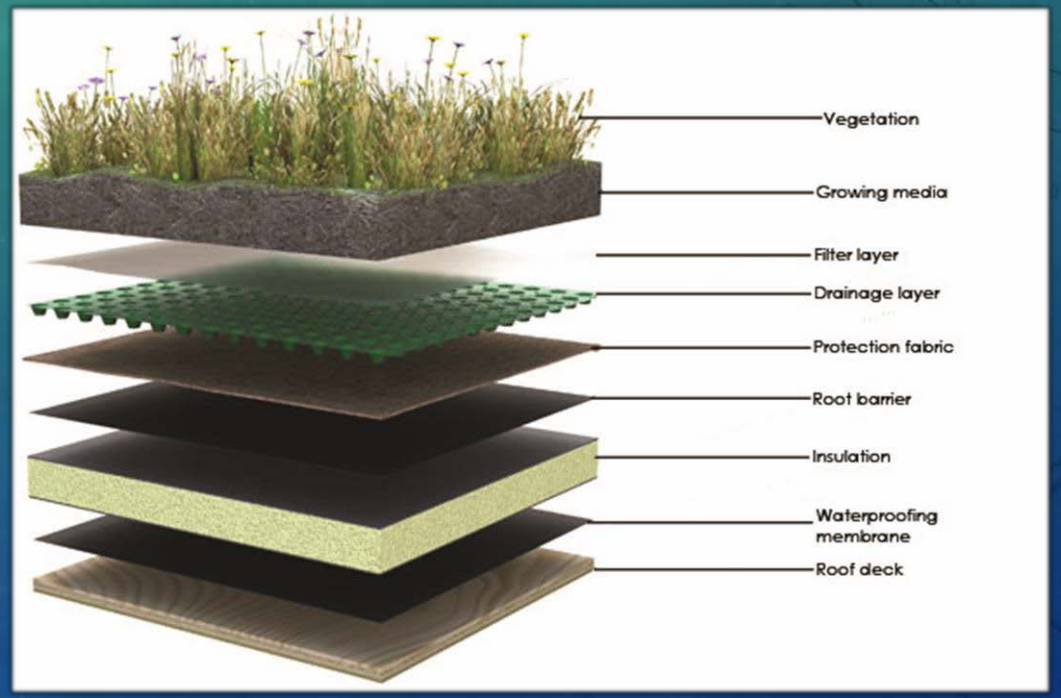
- The Humidity chart shows the annual range of relative humidity. Relative humidity is the amount of water vapor that exists in a gaseous mixture of air and water vapor. Because the humidity can vary greatly throughout the course of one day, and is typically higher in the mornings, the chart shows the morning average and the afternoon average.

IMPLEMENTED SUSTAINABILITY FACTORS

- Green roof top
- Rain garden and an above ground cistern at the rear perimeter of the site
- Bio swale around the front perimeter of the site
- Grass pavers covering the entirety of in the parking lot, as well as the sidewalk
- Recycled cork wood flooring in the interior of the building
- Low light pollution to keep the natural tranquility of the area intact
- Recycled steel material for building construction, and wool bricks for aesthetic appeal of walls
- Motion censored light and water usage, to conserve
- Low emissivity windows
- Educational signage placed around the site, pointing out the impact each environmental feature has on the longevity of the site and how it is good for the environment, for the public's knowledge.

GREEN ROOF

- Green roofs are rooftop surfaces designed for soil and vegetation.
- Green roofs also called living roofs are intended to cool naturally preventing “heat islands”.
- These types of roof tops made of plant life release oxygen into the air reducing toxicity.
- The roof also collects rain water which cools the building, and adds to the longevity of the building.

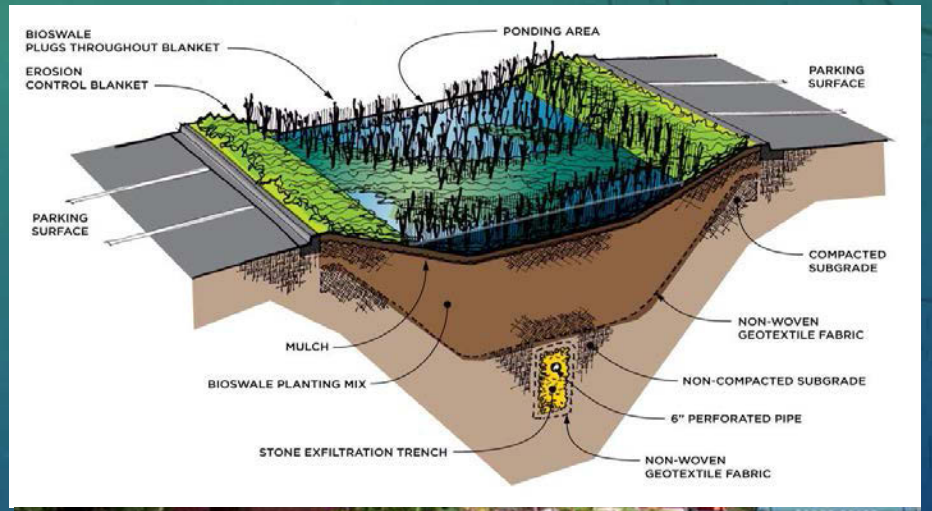


RAIN GARDENS & CISTERNS

- Rain gardens consist of deep rooted plant life growing in a shallow ditch that is positioned down wind of a runoff water source. This is in order to filtrate water through the soil and harvest it into the cistern instead of it reaching the sewer system.
- Rain gardens improve water quality in nearby flowing water and to ensure that rainwater becomes available for plants as groundwater rather than being sent through drains.
- Cisterns also known as ‘rain barrels’ can be used for plumbing inside the building. In this instance it is known as grey water.

BIO-SWALES

- Bio-swales are similar to rain gardens, being that they both serve to collect and filter rain water runoff, as an alternative to storm/sewer drains.
- Bio-swales are linear systems designed to manage a lot of runoff from large impervious areas, such as a parking lot or roadway. Because they need to accommodate greater quantities of storm water, they often require use of engineered soils and are deeper than rain gardens.



GRASS PAVERS

- Grass Pavers give one the ability to walk or drive on a grass surface, while it still maintains the function of a asphalt or concrete pavement and enhancing the environment.
- Sustainable benefits of grass pavers include : pervious load bearing surface, storm water filtration and treatment, cool surface due to the heat energy reflection being reduced.

CORK FLOORING

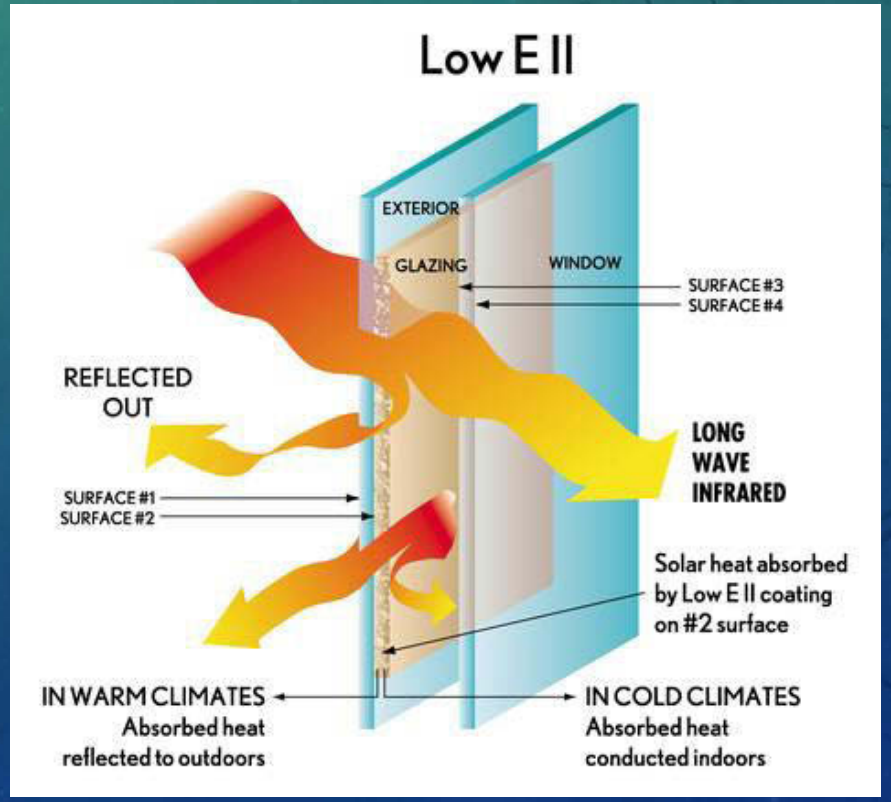
- Cork flooring is a natural, durable, and all around eco-friendly product, made of recycled cork wood.
- Cork wood is renewable, resistant to mold and mildew, hypoallergenic, and easily maintained.
- It also provides thermal insulation, and sound absorption.

WOOL BRICKS

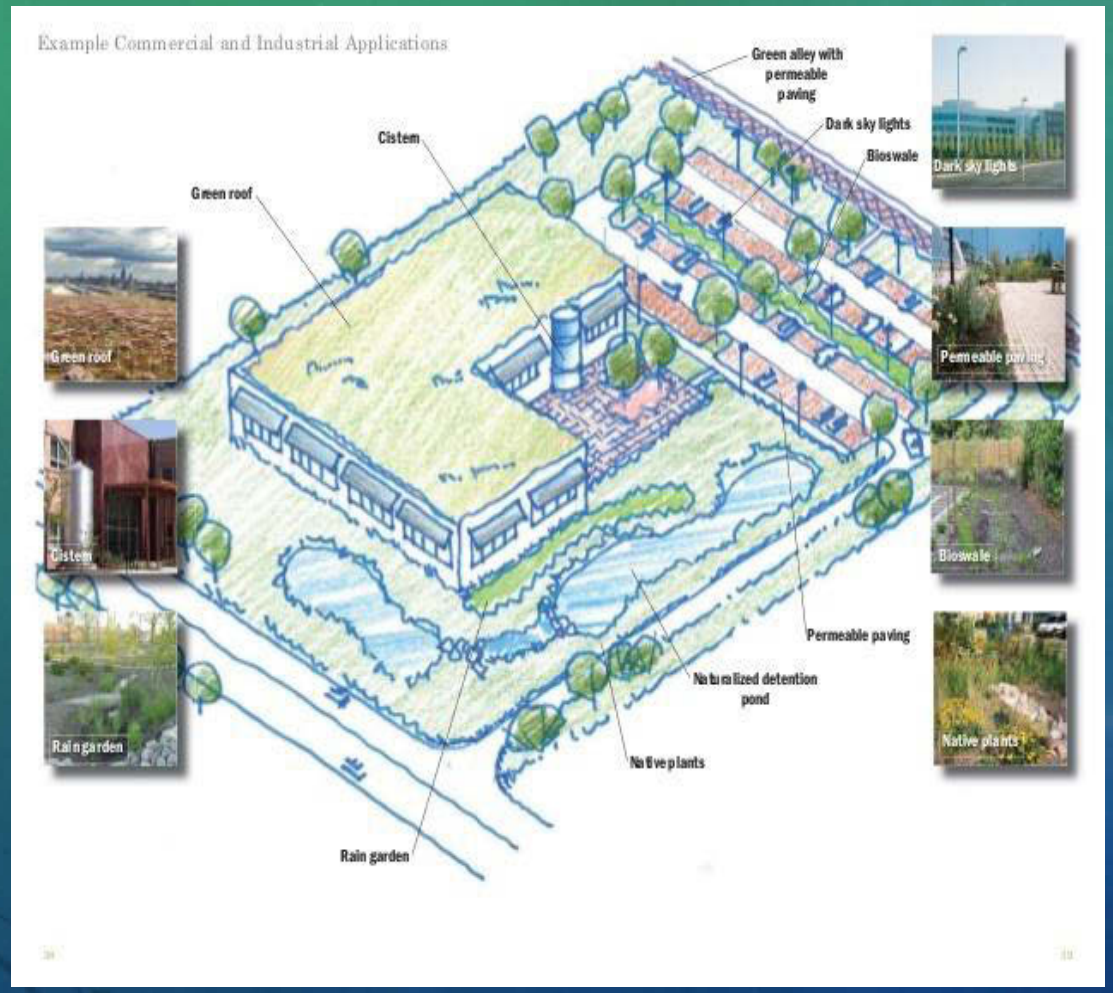
- Wool bricks are a newer “green” material, produced by Spanish and Scottish researchers, by adding wool fibers to the clay material used to make bricks and combining those with an alginate- a natural polymer extracted from seaweed. The result is bricks that are stronger, more sustainable, non-toxic, using abundant local materials, and all around more environmentally-friendly.

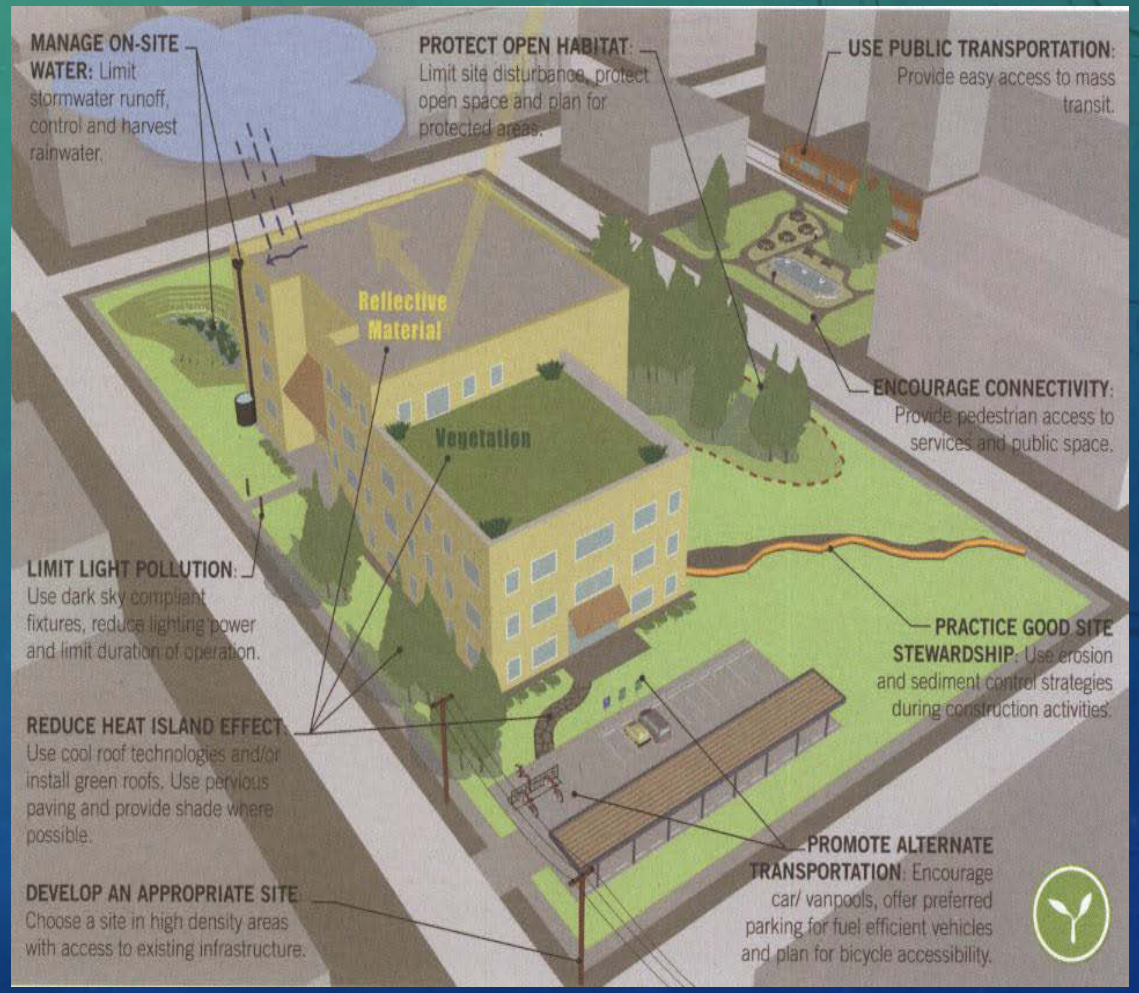
“LOW E” GLASS WINDOWS

- Most energy transfers in and out of the building through its windows, but with the assistance of certain design parameters, they can be used to provide heating, cooling and lighting.
- To enhance the desired performance of our windows, low emissivity windows are used. Which uses a clear coating of metallic oxide to keep heat inside during the winter months and outside in the warmer months.
- This will reduce the heat flow through the windows in half and reduce A/C usage a considerable amount.



SUSTAINABLE SITE DESIGN





CLOSING REMARKS

- As engineers, it is important to take into consideration all wellness factors for humans and nature, economic factors for cost efficiency, and specific factors for client satisfaction.
- With the continuation of this project, we were able to make suitable revisions to satisfy the desired needs of the city of Midway, Ga, while staying within $2.6 M budget.

QUESTIONS

ACKNOWLEDGEMENTS

- Mr. Ebrahim Nadji of the Liberty Consolidated Planning Commission for providing us with revisions needed.
- Mayor Clemontine Washington and the city of midway for providing us with the opportunity to continue the project efforts.
- Ms. Jackie Jackson of the Metropolitan Planning Commission of Chatham County Savannah for weekly consultation and guidance.
- Mr. Ryan Kolat of H&K Engineering for assistance with cost estimating information.
- Alfred Blyden, Marcus Thomas, and Nicholas Paige for the initiation of this project for our continuation.
- Dr. Bryan Knakiewicz of Savannah State University's Civil Engineering Technology Department for constant advice and guidance throughout the course of the project.