†KRISTIN MARUSZEWSKI
†LIGHTING/ELECTRICAL CONCENTRATION
†THESIS 2007/2008

ST. FRANCIS FRIARY

Project Description

Size: 59,962 SF
Levels: 2
Construction: Summer 2008
Delivery Method: Design – Bid - Build

Project Team

Owner: Father Dominic
Architect: Franck, Lohsen, McCrery
Structural Engineer: Spiegel, Zamecnik & Shah, Inc
MEP Engineer: META Engineering

Structural

5” Concrete slab on metal decking poured on site.
Concrete load bearing walls with steel reinforcement.
Roofing is composed of Steel and Wood Trusses exposed in the Chapel and Refectory.

Mechanical

8-Air Handling Units on lower level supply 4380 CFM O.A. Under the slab system. The supply ductwork runs below the floor, allowing for flexibility in design, i.e. the exposed truss system in the Chapel and Refectory.

Electrical

Primary Service. Cullman Electric Power is stepped down by a single transformer to distribute power throughout the building at 208/120V.
Emergency Service. A 125 KW Standby Generator serves the receptacles, lighting, and mechanical equipment for the Chapel, Kitchen, and Corridors.

Lighting

Exterior Lighting. Metal Halide floodlights wash the façade while Incandescent spotlights accent landscape features.
Interior Lighting. Layers of Incandescent/Fluorescent light provide ambient and decorative lighting in the main spaces.

Special Features

Landscape Architecture. Statues of the Stations of the Cross positioned along an arced walkway surrounding the Chapel provide the Friars with a quiet escape from everyone but God.

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EXECUTIVE SUMMARY

LIGHTING DEPTH

The lighting depth explores a redesign of the current lighting systems for four of the main spaces in the friary. Though the current design is a good solution to the spaces, the redesign will approach the challenge of lighting these spaces from a different angle. The redesign will cover the following spaces: the library, the foyer to the chapel, the chapel itself, and the courtyard that surrounds the chapel on three sides.

ELECTRICAL DEPTH

The electrical depth determines the impact of the proposed lighting redesign as well as the mechanical redesign on the electrical load. This is used to determine whether the current electrical equipment is adequate or whether it will need to be resized. A short circuit analysis was completed for a single path from the main distribution equipment to a local panelboard to ensure that the AIC ratings on each piece of equipment are adequate. The study also includes looking at cost savings associated with changes in feeder material.

MECHANICAL BREADTH

The current mechanical system utilizes a four pipe system with a centralized chiller and boiler serving the air handling and fan coil units. A geothermal system is investigated in the mechanical breadth in place of this existing system. The implementation of a geothermal heat pump system could allow for the elimination of the chiller and boiler and the addition of heat pumps which results in a lessened electrical load. The mechanical breadth looks at this advantage and determines what the extent of the benefits are of the geothermal system in terms of lowered electrical load and emissions. The goal of this section is to prove that a more environmentally conscious system may be advantageous to the owner.

CONSTRUCTION MANAGEMENT BREADTH

The construction management breadth continues the study of the geothermal heat pump system. This portion develops a study of the potential benefits of a horizontal piping configuration to support the geothermal heat pumps verses a vertical configuration. Identifying vertical boring as the most appropriate solution, the construction management breadth then determines what implications this will have on the site. The last item developed in the construction management study was the time difference required to construct a geothermal system as opposed to the current system.

PROJECT BACKGROUND

St. Francis Friary is a friary located in Hanceville, Alabama. By definition a friary is a building that houses a room reserved for prayer as well as domestic quarters and a workplace for friars. This friary in particular was designed to house 20-30 Franciscan Friars. There are a variety of spaces in this building including those necessary to meet all the typical living accommodations as well as offices, a chapel, study, gathering space, courtyard, and library. The building is a box shaped configuration with a courtyard cut out of the middle. The grand chapel juts out of the east side of the building and is surrounded by a second courtyard on three side. The friary is located in a very remote location allowing the friars to be secluded from the remainder of the world. The chapel is a holy place set apart for the Friars to have one focus, worshipping their God. The project design for this building is complete. The site has been cleared, however, construction has not begun and is not anticipated to do so until the summer of 2008 due to funding shortfalls.

BUILDING STATISTICS

PROJECT BACKGROUND INFORMATION

Project Name:	St. Francis Friary
Location:	2100 County Road
	Hanceville, Alabama
Building Occupant:	Archdiocese
Occupancy Type:	Mixed Use: A-3 Assembly, R-2 Residential
Size:	59,962 square feet, 2 stories above grade

PROJECT DESIGN TEAM

Architect:	Franck, Lohsen, McCrery Architects
Structural Engineer:	Spiegel, Zamecnik, & Shah, Inc.
MEP Engineer:	Meta Engineers

PROJECT DESIGN INFORMATION

ARCHITECTURE:

The Friary was designed to house 20-30 friars. While including all the necessary accommodations for living, the friary still gives the impression of seclusion and holiness. The building consists of a variety of spaces laid out on two floors. The first floor contains offices, a kitchen and refectory, mailroom, and an exercise room as well as three of the spaces studied in the lighting depth. These spaces include the library, foyer to the chapel, and the chapel itself. The second floor contains the bedrooms referred to as “cells”, a gathering space, music room, laundry room and study area. These two floors were designed to surround an inner courtyard. This inner courtyard is divided into four quadrants allowing for more privacy as well as displaying the statue of St. Pascal in the center. Leading off of the inner courtyard is the foyer that leads to the chapel. The chapel, a multi-story space, is the main focus of the friary and thus the architectural design reflects the importance. High quality materials of fieldstone, mahogany, and travertine were used throughout the space. The chapel has exits to the exterior on both the North and South walls. These exits open onto a clay paver sidewalk that travels through a courtyard to the perimeter of the site. At the perimeter of the site stand twelve statues of the stations of the cross.

MAJOR BUILDING CODES:

ACI 318 “Building code requirements for reinforced concrete”

2003 International Building Code(IBC)

2003 International Energy Conservation Code (IECC)

2002 National Electric Code (NEC)

2002 National Fire Protection Association Standard (NFPA)

BUILDING STATISTICS

MAJOR BUILDING CODES(CONT'D.):

TMS 402/ACI 530/ASCE 5 "Building Requirements for Masonry Structure

BUILDING ENVELOPE:

The floors are concrete slab poured on site with metal decking, steal beams and girders. Walls are 10" thick CMU masonry with 32" OC #6 vertical reinforcement. The façade is stone for the interior spaces of higher importance, the main foyer, the chapel, and the refectory. The remainder of the building façade is stucco. A light gage cold-formed steel truss system is used for the room with tongue and groove plywood sheathing below the

ELECTRICAL:

The primary service is delivered by Cullman Electrical Cooperative and stepped down to 208Y/120V and distributed throughout the entire friary. This 208Y/120, 3PH, 4W system feeds the panelboards which serve the lighting, receptacles, heating and cooling equipment, kitchen equipment, elevator, and general electrical loads. An automatic transfer switch located in the main electrical room in the basement switches to emergency power in the event of a failure of the main distribution equipment. The 125 KW generator is powered by natural gas and a 12V battery start-up motor. The emergency power serves the receptacles, lighting, and mechanical equipment for the chapel, kitchen and corridors.

LIGHTING:

The interior lighting in the friary is comprised of incandescent and fluorescent lamps. This provides a warm and welcoming appearance to the spaces. The bronze colored fixtures give the atmosphere a rustic and antique feel. The exterior lighting uses metal halide to provide a crisp and cool light to wash the stone façade while incandescent spotlights accent the statues of the stations of the cross.

CONSTRUCTION:

The delivery method of the construction of the friary is design-bid-build. The site was cleared for construction by October of 2006. The project was put on hold due to funding and is anticipated to continue the summer of 2008.

MECHANICAL:

The mechanical system was designed to cause the least interference with the other design options. A central chiller is located on the southeast corner of the site and serves chilled water to the AHUs and FCUs throughout the building. A natural gas powered boiler also serves the AHUs and FCUs. The system is a 4-pipe system which allows for more flexibility in heating and cooling throughout the building.

BUILDING STATISTICS

STRUCTURAL:

The building façade is a mixture of stone and stucco. The stone is presented in the main, grand spaces while the stucco fills in for the less important areas. This creates a way to express the importance of the interior spaces by the composition of the exterior. The flooring is 5" slab on metal decking, the load bearing walls are concrete with steel reinforcement. Steel and wood trusses exposed in the chapel and refectory make up the roof system.

FIRE PROTECTION:

The fire protection system in the St. Francis Friary consists of flow and tamper switches, fire alarm pull stations at all the exits, integrated strobes and speakers, fireman's telephones by elevators in stairways and in the electric room, cut smoke detectors, exit signs, and emergency lighting in the corridors.

TRANSPORTATION:

One elevator is provided in the southeast corner of the building. The elevator is fed by the main switchboard distribution panel protected by a 350A trip. It travels between the basement, first and second floors.

TELECOMMUNICATIONS:

The telecom is pulled through the basement main mechanical room. The 4" PVC telecom conduit pull wire is stubbed at the property line for the local telecommunications company to provide. It is pulled through the mechanical room then under the slab to the first floor.