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architecture
landscape architecture
interior design
construction management

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Holy Spirit Catholic Church

Bowling Green, Kentucky

Spirit II Schematic Design

BCDM Project Number 0364-07

19 December 2008

SCHEMATIC DESIGN SUBMITTAL
HOLY SPIRIT CATHOLIC CHURCH – BOWLING GREEN, KENTUCKY
SPIRIT TWO
19 DECEMBER 2008

Schematic Design Narratives

Architectural Design Narrative	ADN-1; ADN-5
Structural Design Narrative	SDN-1; SDN-2
Mechanical Design Narrative	MDN-1; MDN-12
Electrical Design Narrative	EDN-1; EDN-7

ARCHITECTURAL DESIGN NARRATIVE

Spirit II, the second phase of the relocation of the existing parish to its new home at 4754 Smallhouse Road, consists of the main church worship space and support spaces. The current plan is 24,572 sf, on a single ground floor level, and is located directly east of the Spirit I social hall and entry lobby per the previously published "Parkside Master Plan".

EXTERIOR ELEMENTS

Exterior seeding of disturbed areas (and sodding of areas from the new exterior walls to the first adjacent sidewalk) is to be included in the Spirit II scope. Exterior landscaping, shrubs and trees is to be performed by the Owner and is Not In Contract (N.I.C.).

All exterior paving and building areas not previously included in Spirit I, generally including all sidewalk, plaza and "piazza" paving east of Spirit I, as well as finish paving at all roadway and parking areas for both Spirit I and Spirit II, shall be included in the Spirit II scope. "Terra Paver" fire department access from the north parking lot of Spirit I to the northeast parking lot of Spirit II is to be included in the Spirit II scope. Exterior site furnishings (benches, waste receptacles, etc...), fire pit, light bollards, flagstone paving, and colored concrete at the south plaza are included.

Building Areas will include the all areas east of the current Spirit I lobby, including the covered driveway canopy and bell tower base located east of the new narthex and family room, per the attached floor plan (see appendix),

Exterior wall finishes and components in general will be the same as was included in Spirit I as follows: exterior face brick at grade level walls; architectural precast concrete sills, lintels, parapet copings and jamb/lintels at main entry doors; steel shingles at steep sloped roof areas to mimic natural slate with gutters and downspouts tied into a below grade perimeter storm water system; single-ply membrane roofing at low slope areas; upper (clerestory) walls at the narthex and nave as well as the covered driveway canopy shall have exterior architectural metal siding;

Decorative doors at the south Narthex entry will be hollow metal frames with custom solid wood doors (to receive bronze relief panels in the future) with concealed floor closers; all other exterior door and window openings shall be thermally broken aluminum frames and medium stile and rail doors to match Spirit I. The cupola above the main altar area of the Sanctuary shall be comprised of clear glazed skylight roof panels and metal siding at vertical wall surfaces. The cross extending from the cupola shall be fabricated from tube steel and extend to 75 feet above the main finish floor elevation.

INTERIOR ELEMENTS

Interior Public Worship Spaces

Include the south entry vestibule, narthex, baptistery, nave, sanctuary, choir, reservation chapel, daily chapel, and reconciliation rooms.

While floor and wall finishes at each space may vary, elements consistent throughout the Public Worship Areas are as follows: Solid wood stile and rail paneled wood doors in wood door frames with molded wood casing/trim the door head and jambs.

Finishes at each of the Public Worship Spaces as follows:

Entry Vestibule: Patterned porcelain tile floor; painted gypsum wall board walls with 4" thick limestone veneer (4" thick @ \$9/sf material cost) wainscot up to 4' above the floor level; painted, smooth finish gypsum wallboard ceilings.

Narthex: Patterned porcelain tile floor; painted gypsum wall board walls with 4" thick limestone veneer wainscot up to 4' above the floor level; stained wood roof deck ceilings with exposed glu-laminated wood beams.

Baptistery: Patterned porcelain tile floor; see Nave (below) for wall and ceiling types. Baptistery font itself will be octagonal in plan with metal gated steps descending into the floor for immersion baptisms (see photo below). The four raised corners of the font will be constructed of granite veneer with water reservoirs for easy access to those entering and leaving the Nave.



Nave: Patterned porcelain tile floor at walkways and aisles with carpet beneath the pew areas (floor slopes at seating areas, down 12" over a 27'-4" run); gypsum wall board walls with limestone veneer up to 14' above the floor level, except that the south wall (at the baptistry) shall be stone veneer the full height of the wall; stained wood roof deck ceilings with exposed glu-laminated wood beams and trusses. Clerestory walls and soffit with be painted GWB. Two motorized projection screens are expected to be installed at the north end of the Nave.

Sanctuary: Patterned porcelain tile floor; gypsum wall board walls with limestone veneer full height at the north wall; stained wood roof deck ceilings with exposed glu-laminated wood beams (contiguous with the main Nave ceilings). A free-standing Crucifix will be located directly behind the altar, approximately 6' south of the north wall,

Choir: Patterned porcelain tile floor; gypsum wall board walls with limestone veneer up to 14' above the floor level at the north wall; stained wood roof deck ceilings with exposed glu-laminated wood beams (contiguous with the main Nave ceilings).

Reservation Chapel: Porcelain tile floor; gypsum wall board walls; painted, smooth finish gypsum wallboard ceilings.

Daily Chapel: Nave: Carpet floor; gypsum wall board walls with limestone veneer up to 4' above the floor level; stained wood roof deck ceilings with exposed glu-laminated wood beams and trusses.

Reconciliation Rooms: Carpet floor; gypsum wall board walls with fabric wall panels for acoustics; acoustic tile ceilings (for sound absorption).

Interior Accessory/Support Spaces

Includes all areas not specifically listed in "Public Worship Spaces" above. In general, finishes at these areas will be comparable to the Spirit I administrative offices as follows: carpeted floors (porcelain tile at restrooms and vestibules), painted drywall walls, acoustic tile ceilings, plastic laminate covered manufactured casework, and minimal wood millwork. Interior doors will be stile and rail paneled wood doors in wood door frames with molded wood casing/trim at the door head and jambs.

The fireplace at the Family Room shall be Majestic UVSRC42A or equal (product cut sheet attached). Approximately 70 square feet of stone veneer is expected to surround the fireplace (7' wide, 10' tall)

Feature Elements located throughout the building are as follows:

Window Glazing Types and Stained Glass/Art Glass Elements:

Window framing throughout the project is expected to be thermally broken aluminum framing with clear insulating glass, similar to Spirit I. At locations to receive stained/art glass, provision should be made for an additional glass pane and stop to be installed at a later date.

The following spaces are expected to have clear insulating glass only, with no provision for future art glass: Cana Room, Family Room, Narthex, Vestry, Choir Practice Room, and North Vestibule. Window shades comparable to Spirit I should be provided at the following rooms: Cana Room, Family Room, Narthex, Vestry, and Choir Practice Room,

The following spaces are expected to have clear insulating glass with provision for future art glass: Ground level windows at the Nave, Daily Chapel, and Reconciliation Room. Clerestory windows at the Nave shall also have clear insulating glass with provision for future art glass.

The 54' wide wall between the Narthex and Baptistry shall be glazed from the floor level up to 12' above the floor level. Individual glass panes shall be located as follows: clear glass from 3' to 6' high (for observation into the nave from the narthex); stained glass from the floor to 3' high, and also from 6' to 12' high.

Above the baptistry, a colored and art-glass canopy will extend the full 54' width of the narthex wall (see drawing A2-4 attached hereto) to a 13' wide by 9' tall arched top stained glass rose window.

The North Sanctuary wall will have some colored glass windows incorporated into the "flames" of the Holy Spirit motif to be sculpted into the wall.

Interior Glazing between the Sanctuary and Reservation Chapel shall be 13'4" wide by 14' tall glazing (a combination of colored and clear glass) in four metal framed panels, the center two of which will be bi-parting sliding doors.

The partition wall between the Reservation Chapel and the daily Chapel shall be metal stud and gypsum wall board with inset windows of relocated stained glass (six sacramental windows) from the current church.

Sculpted Relief Walls and Statuary Elements:

Scriptural verses (noted on C6-1, attached hereto) will be etched into precast concrete door lintels or painted on soffits at locations throughout the church. Final selection of specific verses will occur later in the design process.

At the main south entrance to the Narthex, the precast panel above the main doors shall have a relief pattern (to be determined) sculpted or formed into it.

At the south end of the Narthex, above the vestibule, the central wall panel shall be clad in wood paneling and serve as a back-drop to a sculptural element to be determined (Risen Christ figure, or similar).

The north wall of the Sanctuary is expected to have a 4" deep sculpted relief pattern of the "flames" of the Holy Spirit (see drawing A2-4 attached hereto) constructed of stone veneer.

Statuary representing the Holy Family is expected to occupy the east transept arm. The west transept arm will have a similar use. Existing statues of Mary and Joseph to be relocated from the existing church may be located in the Cana Room or somewhere in Spirit I.

The Stations of the Cross from the existing church are expected to be relocated to the southwest and southeast walls of the nave.

Additional “Non-Traditional” Items

Additional line item costs should be provided in the Schematic Design Estimate to account for the following elements:

Exterior Furnishings

Movable Furnishings, including demountable risers at the Choir Area.

Pews, Chapel, and Choir Seating

Sanctuary Furnishings and Liturgical Equipment (Altar, Ambo, Celebrant's Chair, Deacon's Chair, and side table)

Baptismal Font

Artwork, Sculpture, and Statuary

Stained Glass (new)

Stained Glass (relocated)

Markerboard (at Cana Room)

Interior Signage

Residential Appliances (at Working Sacristy)

Sound System

Security Alarm System

Telephone System

Cable Television Service connection to the internal distribution system

LEED Documentation/Implementation Costs (CM and construction costs)

LEED Professional Fees (Design Team and Commissioning Agent)

STRUCTURAL DESIGN NARRATIVE

Holy Spirit Catholic Church – Spirit II

The Spirit II scope includes the main sanctuary, narthex, choir practice, day chapel, family room and connector corridor to Spirit I with a combination structural scheme consisting of glue laminated timber, steel braced frames and steel moment frames throughout the building.

SANCTUARY:

The main sanctuary consists of a high volume pitched gable roof with clerestory windows running the length of the structure. This high volume roof will be supported by a pair of 120 feet long x 14 feet tall steel trusses. Preliminary analysis indicates that the truss top chords will be fabricated from W10x39 members and the bottom chords will be fabricated from W8x28 members. There will be five equal panels with web members framed with W8x24's in diamond pattern. Support for these trusses will come from W12 or W14 columns that weigh between 70 – 100 lbs/ft. Spanning between the clerestory trusses will be a series of modified hammer head arch trusses spaced at approximately 24 feet on center. These trusses will be fabricated out of either glue laminated timber or structural steel wrapped in wood, depending on the final profile. The roof deck will consist of 2x tongue and groove timber deck laid randomly supported by glue laminated purlins that will span between the hammer head arches at approximately 6 feet on center.

The roof structure outside of each clerestory truss will consist of approximately 6-3/4" x 24" glue laminated timber beams at 24 feet on center supporting 5-1/8" x 12" glue laminated timber purlins spaced around 6 feet on center. This area will have a 2x tongue and groove timber roof deck laid randomly.

The lateral support will be provided at the perimeter of the sanctuary by a structural steel post and beam braced frame fabricated from HSS columns and braces and W section beams. Should it be necessary due to additional or relocated wall penetrations (i.e., revised door and window locations) the perimeter frame could change to a structural steel moment frame. This would cause an increase in member sizes and weights.

The infill perimeter walls will be constructed of 18 gage structural metal studs.

The columns will be supported by reinforced concrete spread footings ranging from 3'-0" x 3'-0" x 1'-0" up to possibly 10'-0" x 10'-0" x 1'-9" for the main truss foundations. The perimeter will consist of a 2'-0" x 1'-0" reinforced concrete continuous footing with a concrete stem wall up to grade elevation. If wall thicknesses approach the footing width, the stem wall will be eliminated and the continuous footing will change to a trench footing.

NARTHEX:

The narthex will be a smaller version of the sanctuary framing system.

FAMILY ROOM:

The family room is a flat roof structure which will consist of a perimeter structural steel braced post and beam frame with open steel joists at 5'-0" on center roof framing supporting 1-1/2" 18 gage metal roof deck.

The infill perimeter walls will be constructed of 18 gage structural metal studs. Column footings will be reinforced concrete spread footings that are approximately 3 to 5 feet square and wall footings will match those in the sanctuary.

CHOIR AND DAY CHAPEL:

The choir and day chapel is a pitched roof structure that will have a perimeter structural steel braced post and beam frame with glue laminated timber ridge beams and glue laminated timber purlins supporting 2x tongue and groove timber roof deck laid randomly.

The infill perimeter walls will be constructed of 18 gage structural metal studs.

Column footings will be reinforced concrete spread footings that are approximately 3 to 5 feet square and wall footings will match those in the sanctuary.

DRIVE CANOPY AND BELL TOWER BASE:

The drive canopy will be a structural steel post and beam structure that will get its lateral support from the main structure at one end and the bell tower base at the extremity. The bell tower base is completely open with no braces. The columns and temporary roof perimeter beams will be steel moment frame post and beam. These members will be rather large in proportion to the immediate structure due to its design to support both the lateral and gravity loads of a future tall bell tower.

The roof over the drive canopy as well as the temporary roof of the bell tower will consist of open steel joists roof framing at 5'-0" on center with 1-1/2" 18 gage metal roof deck.

The columns will be supported by reinforced concrete spread footings ranging in size from 4 feet square to approximately 7 feet square at the bell tower base. Depth of footing will vary depending on height of bell tower design. The taller the bell tower the more concrete mass needed to resist the overturning due to wind.

MECHANICAL SCHEMATIC DESIGN INTENT NARRATIVE

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OVERVIEW

In keeping with the design intent from the Holy Spirit I project, the design criteria for the Holy Spirit II project will use the same type mechanical system types. The heating and cooling plant for Holy Spirit II were installed in the Holy Spirit I project therefore only the air systems and water piping systems will need to be designed for this project. The church Sanctuary area will be served by air handler (one per side). These air handlers will have full economizers with energy recovery wheels. They will have the capability of cooling, heating and dehumidifying. The other zones will be served by 4-pipe fan coils. The outside air will be supplied by small energy recovery units. These energy recovery units will exhaust restrooms, toilets, and janitor's closets at the rate of 75 cfm per water closet or urinal fixtures.

DESIGN CRITERIA

The design of the mechanical systems for the Holy Spirit Catholic Church facility will conform to the following codes and standards:

- Kentucky Building Code
- Kentucky Plumbing Code
- International Mechanical Code
- International Fuel Gas Code
- National Electrical Code
- NFPA-13 (Fire Sprinklers)
- NFPA-90A (Heating and Air Conditioning Ductwork)
- International Energy Conservation Code
- American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
- National Fire Protection Association Pamphlets (NFPA)
- American National Standards Institute (ANSI)
- American Society of Mechanical Engineers (ASME)
- Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

HVAC LOAD

PRELIMINARY LOAD CALCULATIONS

Preliminary HVAC load calculations were made using engineering calculations.

The calculations were based on the following assumptions:

Roof construction: u value = 0.026

Wall construction: u value = 0.07

Glass construction: u value = 0.42, solar heat gain coefficient = 0.46

Lighting: 1.5 watts / square feet

Infiltration: 0.1 air changes / hour (summer & winter)

Ventilation: 20 cfm / person of outside air

Outdoor Air Design Conditions: 94°F db, 78°F wb (summer), -2°F db (winter)

Indoor Air Design Conditions: 75°F ±3°F, 50% Relative Humidity (summer), 70°F ±3°F, 35% Relative Humidity (winter)

SITE UTILITIES

SANITARY SEWER

The underground sanitary sewer piping shall be Schedule 40, Type I, Grade I, polyvinyl chloride produced and labeled as ASTM D 1784-755 LF. The building sewer size will be 4" and will exit the building on the South side to the existing manhole. Grade cleanouts will be installed every 100 LF

STORM SEWER

The underground storm sewer piping shall be Schedule 40, Type I, Grade I, polyvinyl chloride produced and labeled as ASTM D 1784-755 LF. A double-grade cleanout will be provided within the first 5 LF outside the building.

HEATING VENTILATING AND AIR CONDITIONING

The building will be served by single zone 4-pipe fan coils units and air handling units connected to the existing buildings power plant. All areas other than the Sanctuary will be supplied by fan coil units. The fan coils will serve about 9 zones with the combined capacity of approximately 32 tons of cooling and 491 MBH of heating. The Sanctuary will be supplied by two air handling units with about a combined capacity of approximately 55 tons of cooling and 662 MBH of heating. See Appendix A: Preliminary HVAC Zoning and Loads for preliminary zoning and estimated numbers of diffusers and grille

The building will be heated and cooled by means of water to water geothermal heat pumps that heat or cool water. This water is supplied from the existing water to water heat pumps located in the existing building. The water is then distributed to fan coil units (4 pipe) and air handling units by means of a steel piping system and centrifugal circulation pumps. In cooling mode, the rejection heat from the water to water heat pumps will be used to dehumidify, reheat, or will be rejected to the geothermal ground loop. In heating mode, the rejection cooling from the water to water heat pumps will be used to cool or will be rejected to the geothermal ground loop.

Inside loop water piping will be ASTM A583, schedule 40 black iron or hard drawn type L copper. Piping will be insulated with glass fiber piping insulation with all service jackets.

VENTILATION

Typical ventilation throughout the facility will be 20 cfm per person.

The air handlers will have an energy recovery section to provide ventilation air as required for the Sanctuary in accordance with ASHRAE 62 recommendations. All other areas, ventilation air will be ducted to each fan coil using small energy recovery units.

The small energy recovery units will exhaust restrooms, toilets, and janitor's closets at the rate of 75 cfm per water closet or urinal fixtures.

AIR DISTRIBUTION

Distribution ducts will be galvanized steel construction, insulated, sealed, and installed per the latest SMACNA standards. Rectangular supply and return air duct mains will be insulated with 1 1/2" acoustical duct liner. Round run-outs to diffusers will be wrapped with 1-1/2" mineral fiber blanket insulation. Spiral ductwork without insulation will be provided when exposed in finished spaces.

In areas with ceilings, supply air will be delivered to the space through flat plate ceiling diffusers. All return air will also be ducted to prevent negative pressures in the building. The return and exhaust air systems will use perforated return air grilles.

Final connections to diffusers and grilles may be made with flexible duct only when concealed from finished spaces. Length of flexible duct shall not exceed 36" and path shall not exceed 45°.

ACOUSTICS

Duct mains serving the building will maintain maximum 1,200 FPM velocity. Duct branches will maintain maximum 800 FPM velocity.

Rectangular duct mains will utilize 1 1/2" acoustical duct liner.

As much as possible, mechanical equipment will be physically isolated from noise sensitive areas.

TEMPERATURE CONTROL

The facility will be controlled by adding on to the existing Direct Digital Control (DDC) system, which will be the primary control mechanism for all heating, cooling, and ventilation. All schedule and setpoint modifications will be readily accomplished through an on-site terminal. Each zone will have individual control and be addressable from the central operator station to assist in trouble-shooting.

Control of fans, dampers and coils at the fan coil unit will be provided by the DDC control system. All fan coil units will be controlled based on the time schedules entered into the DDC system and modified as required for special activities and holidays.

All zones will have thermostats with override adjustment and temperature readouts.

BAPTISTRY

The baptistry will be supplied and controlled by the equipment located in the closet in the Vestry room. The following equipment is needed for the baptistry:

1. Pump (pool type)
2. Heater (hot tub type)
3. Filter
4. Controller
5. Ozonator
6. Chlorinator

PLUMBING

DOMESTIC WATER SYSTEM

The building water service will be connected to the existing 2" water pipe located in the Foyer of the existing building to handle the demand of the building. A domestic water distribution piping system will be provided to serve plumbing fixtures and specialties throughout the facility. Water piping will be type 'L' copper with fiberglass piping insulation. Vapor barriers will be maintained on all cold water piping.

DOMESTIC HOT WATER

A hot water distribution piping system will be provided to serve plumbing fixtures and specialties throughout the facility. Water piping will be type 'L' copper with fiberglass piping insulation.

Domestic hot water (120°) will be heated by an instantaneous electric hot water heater located by the sinks or lavatories.

SANITARY WASTE AND VENT SYSTEMS

Sanitary waste and vent system piping will be Schedule 40, Type I, Grade I, polyvinyl chloride produced and labeled as ASTM D 1784-755 LF with gasketed joints under ground and solvent cement joints and fittings above ground.

PLUMBING FIXTURES

Plumbing fixtures will be commercial grade and designed to meet the Americans with Disabilities Act (ADA) where required. All vitreous china fixtures will be white in color. All fixtures will have ¼ turn water stops.

Some plumbing fixtures will be mounted at various heights to accommodate all ages and abilities.

Water closets with chases and urinals will be wall hung. Water closets without chases will be floor mounted. All water closets and urinals will have automatic battery powered flush valves.

Lavatories shown counter mounted will have under counter mounted lavatories at ADA height and exposed piping will be protected with insulation. All other lavatories will be wall mounted at ADA height and exposed piping will be protected with insulation. All lavatory faucets will have automatic battery powered sensors.

Areas showing single bowl sinks, the sink will consist of stainless steel 18 gauge and have a double handle gooseneck faucets.

We will relocate the sacrarium sink from the existing building to the new working sacristy.

A laundry sink will be provided next to the washer and dry location.

Wall hydrants will be located on each side of the building exterior. Additional cold water hydrants may be located at select locations around the site.

STORM SEWER SYSTEM

Roof drains, overflow drains and downspouts will be provided in accordance with applicable plumbing codes. Roof drains and downspouts will be piped under ground, but overflow drains will be day lighted. Roof and overflow drains will have cast iron bodies with cast iron domes.

Storm waste piping will be Schedule 40, Type I, Grade I, polyvinyl chloride produced and labeled as ASTM D 1784-755 LF with gasketed joints under ground and solvent cement joints and fittings above ground.

NATURAL GAS

A 2-psig gas system will be routed from the existing building above ceilings to the South outside wall, then down and outside to the gas-fired fire pit located to the South of the building. A pounds-to-ounce gas pressure regulator will be located at the outside wall. Natural gas piping will be ASTM A53, schedule 40 black iron.

FIRE PROTECTION

The entire building will be protected by a wet pipe fire sprinkler system in accordance with NFPA 13. Narthex, Family, Cana Room, Vestry, Choir Practice, Daily Chapel and Sanctuary areas will be designed as light hazard. Mechanical rooms, Electrical rooms and Storage spaces will be designed as ordinary hazard.

A 4" fire water line will enter the building connected from the existing building with a zone valve to protect the facility. A zone flow switch will indicate flow to the fire alarm system.

Fire sprinkler size will be verified when city water pressure data is available. Sprinkler piping will be thin wall steel and CPVC pipe located above ceilings and thin wall steel in exposed areas without ceilings.

A wet sprinkler system will be provided for all heated areas. Each connection to the riser will be provided with a flow switch and an OS&Y monitored valve.

A stand pipe will be provided with fire department valves. A stand pipe will be located in the wall between Men 102 and Foyer 101 by the future entry to the church.

Sprinkler heads will be provided for all areas. Sprinkler heads are required to be centered in one direction if mounted in lay-in ceilings. See the following for sprinkler head types and locations:

- 1) Suspended Ceilings – painted enamel recessed pendant
- 2) Hard Ceilings - painted enamel recessed pendant
- 3) Exposed Areas – upright brass pendant
- 4) Sidewall areas - chrome plated semi-recessed pendant
- 5) Dry type exposed area – upright brass pendant
- 6) Dry type ceiling area – painted semi-recessed pendant

APPENDIX A (PRELIMINARY HVAC ZONING AND LOADS)

BCDM

Project Name: Holy Spirit 2 Job # 0364-07
 Date: 12-10-08 By:

Building Preliminary HVAC Zoning and Loads

Room No. / Name	Toilet Exhaust 1=Yes	Level	Gross SF	Cooling SF/Ton	Total Tons	Cooling Airflow CFM	Supply		Return		Exhaust Air Grilles	Cooling AHU Unit	VAV Temperature Control Zone	Heating BTU/SF	Total Heating MBH	Nat. Gas Heating CFH
							Air Diffusers	Air Grilles	Air Grilles	Air Grilles						
001 Closet		0	76	400	0.2	84	0	0	1	0	AHU-X	TB-X	50	3.80	4.75	
002 Narthex 01		0	1196	300	4.0	1772	9	0	2	0			50	59.80	74.75	
003 Entry Hall		0	775	400	1.9	861	4	0	1	0			50	38.75	48.44	
		0	0	0	0.0	0	0	0	0	0			50	0.00	0.00	
Totals			2047		6.1	2717	14	0	4	0				102.35	127.94	

Building Preliminary HVAC Zoning and Loads

Room No. / Name	Toilet Exhaust 1=Yes	Level	Gross SF	Cooling SF/Ton	Total Tons	Cooling Airflow CFM	Supply		Return		Exhaust Air Grilles	Cooling AHU Unit	VAV Temperature Control Zone	Heating BTU/SF	Total Heating MBH	Nat. Gas Heating CFH
							Air Diffusers	Air Grilles	Air Grilles	Air Grilles						
004 Narthex 02		0	1196	300	4.0	1772	9	0	2	0			50	59.80	74.75	
005 Entry Vestibule		0	275	400	0.7	306	2	0	1	0			50	13.75	17.19	
006 Closet		0	76	400	0.2	84	0	0	1	0			50	3.80	4.75	
007 Entry Hall		0	129	400	0.3	143	1	0	1	0			50	6.45	8.06	
008 Vestibule		0	59	400	0.1	66	0	0	1	0			50	2.95	3.69	
		0	0	0	0.0	0	0	0	0	0			50	0.00	0.00	
Totals			1735		5.3	2371	12	0	6	0				86.75	108.44	

Building Preliminary HVAC Zoning and Loads

Room No. / Name	Toilet Exhaust 1=Yes	Level	Gross SF	Cooling SF/Ton	Total Tons	Cooling Airflow CFM	Supply		Return		Exhaust Air Grilles	Cooling AHU Unit	VAV Temperature Control Zone	Heating BTU/SF	Total Heating MBH	Nat. Gas Heating CFH
							Air Diffusers	Air Grilles	Air Grilles	Air Grilles						
009 Family		0	810	200	4.1	1800	9	0	2	0			50	40.50	50.63	
012 Closet		0	20	400	0.1	22	0	0	1	0			50	1.00	1.25	
		0	0	0	0.0	0	0	0	0	0			50	0.00	0.00	
Totals			830		4.1	1822	9	0	3	0				41.50	51.88	

Building Preliminary HVAC Zoning and Loads

Room No. / Name	Toilet Exhaust 1=Yes	Level	Cooling		Total Tons	Cooling Airflow		Supply		Return Air Grilles	Exhaust Air Grilles	Cooling AHU Unit	VAV Temperature Control Zone	Heating BTU/SF	Total Heating MBH	Nat. Gas Heating CFH
			Gross SF	SF/Ton		CFM	CFM	Air Diffusers	Air Grilles							
013 WC	1	0	43	400	0.1	48	0	0	0	0	1			50	2.15	2.69
014 Vestry		0	402	200	2.0	893	4	1	0	0	0			50	20.10	25.13
015 Recon		0	89	400	0.2	99	0	1	0	0	0			50	4.45	5.56
016 Closet		0	9	400	0.0	10	0	1	0	0	0			50	0.45	0.56
		0	0	0	0.0	0	0	0	0	0	0			50	0.00	0.00
Totals			543		2.4	1050	5	3	1						27.15	33.94

Building Preliminary HVAC Zoning and Loads

Room No. / Name	Toilet Exhaust 1=Yes	Level	Cooling		Total Tons	Cooling Airflow		Supply		Return Air Grilles	Exhaust Air Grilles	Cooling AHU Unit	VAV Temperature Control Zone	Heating BTU/SF	Total Heating MBH	Nat. Gas Heating CFH
			Gross SF	SF/Ton		CFM	CFM	Air Diffusers	Air Grilles							
017 Sound Control		0	88	300	0.3	130	1	1	0	0	0			50	4.40	5.50
018 Cana Room		0	392	400	1.0	436	2	1	0	0	0			50	19.60	24.50
019 WC	1	0	65	400	0.2	72	0	0	1	0	0			50	3.25	4.06
		0	0	0	0.0	0	0	0	0	0	0			50	0.00	0.00
Totals			545		1.4	638	3	2	1						27.25	34.06

Building Preliminary HVAC Zoning and Loads

Room No. / Name	Toilet Exhaust 1=Yes	Level	Cooling		Total Tons	Cooling Airflow		Supply		Return Air Grilles	Exhaust Air Grilles	Cooling AHU Unit	VAV Temperature Control Zone	Heating BTU/SF	Total Heating MBH	Nat. Gas Heating CFH
			Gross SF	SF/Ton		CFM	CFM	Air Diffusers	Air Grilles							
020 Sanctuary 01		0	3214	200	16.1	7142	36	7	0	0	0			50	160.70	200.88
022 Sanctuary 02		0	3494	300	11.6	5176	26	5	0	0	0			50	174.70	218.38
		0	0	0	0.0	0	0	0	0	0	0			50	0.00	0.00
Totals			6708		27.7	12319	62	12	0						335.40	419.25

Building Preliminary HVAC Zoning and Loads

Room No. / Name	Toilet Exhaust 1=Yes	Level	Cooling		Total Tons	Cooling Airflow		Supply		Return Air Grilles	Exhaust Air Grilles	Cooling AHU Unit	VAV Temperature Control Zone	Heating BTU/SF	Total Heating MBH	Nat. Gas Heating CFH
			Gross SF	SF/Ton		CFM	CFM	Air Diffusers	Air Grilles							
024 Sanctuary 03		0	3321	300	11.1	4920	25	5	0	0	0			50	166.05	207.56
025 Sanctuary 04		0	3225	200	16.1	7167	36	7	0	0	0			50	161.25	201.56
		0	0	0	0.0	0	0	0	0	0	0			50	0.00	0.00
Totals			6546		27.2	12087	60	12	0						327.30	409.13

Building Preliminary HVAC Zoning and Loads

Room No. / Name	Toilet Exhaust 1=Yes	Level	Cooling		Total Tons	Cooling Airflow		Supply		Return		Exhaust Air Grilles	Cooling AHU Unit	VAV Temperature Control Zone	Heating BTU/SF	Total Heating MBH	Nat. Gas Heating CFH
			Gross SF	SF/Ton		Air Diffusers	Air Grilles	Air Diffusers	Air Grilles	CFM	CFM						
027 Mech/Elec		0	980	0	0.0	0	0	0	0	0	0	0			50	49.00	61.25
		0	0	0	0.0	0	0	0	0	0	0	0			50	0.00	0.00
Totals			980	0	0.0	0	0	0	0	0	0	0			49.00	49.00	61.25

Building Preliminary HVAC Zoning and Loads

Room No. / Name	Toilet Exhaust 1=Yes	Level	Cooling		Total Tons	Cooling Airflow		Supply		Return		Exhaust Air Grilles	Cooling AHU Unit	VAV Temperature Control Zone	Heating BTU/SF	Total Heating MBH	Nat. Gas Heating CFH
			Gross SF	SF/Ton		Air Diffusers	Air Grilles	Air Diffusers	Air Grilles	CFM	CFM						
028 Music Storage		0	121	400	0.3	134	1	1	1	1	0	0			50	6.05	7.56
029 Choir Practice		0	852	200	4.3	1893	9	2	2	0	0	0			50	42.60	53.25
		0	0	0	0.0	0	0	0	0	0	0	0			50	0.00	0.00
Totals			973	2028	4.6	2028	10	3	3	0	0	0			48.65	60.81	60.81

Building Preliminary HVAC Zoning and Loads

Room No. / Name	Toilet Exhaust 1=Yes	Level	Cooling		Total Tons	Cooling Airflow		Supply		Return		Exhaust Air Grilles	Cooling AHU Unit	VAV Temperature Control Zone	Heating BTU/SF	Total Heating MBH	Nat. Gas Heating CFH
			Gross SF	SF/Ton		Air Diffusers	Air Grilles	Air Diffusers	Air Grilles	CFM	CFM						
030 Litur. Storage		0	565	400	1.4	628	3	1	1	1	0	0			50	28.25	35.31
031 Vestibule		0	150	300	0.5	222	1	1	1	1	0	0			50	7.50	9.38
032 WC	1	0	50	400	0.1	56	0	0	0	0	1	1			50	2.50	3.13
033 WC	1	0	50	400	0.1	56	0	0	0	0	1	1			50	2.50	3.13
		0	0	0	0.0	0	0	0	0	0	0	0			50	0.00	0.00
Totals			815	961	2.2	961	5	2	2	2	2	2			40.75	50.94	50.94

Building Preliminary HVAC Zoning and Loads

Room No. / Name	Toilet Exhaust 1=Yes	Level	Cooling		Total Tons	Cooling Airflow		Supply		Return		Exhaust Air Grilles	Cooling AHU Unit	VAV Temperature Control Zone	Heating BTU/SF	Total Heating MBH	Nat. Gas Heating CFH
			Gross SF	SF/Ton		Air Diffusers	Air Grilles	Air Diffusers	Air Grilles	CFM	CFM						
034 Recon		0	81	300	0.3	120	1	1	1	1	0	0			50	4.05	5.06
035 Daily Chapel		0	1270	200	6.4	2822	14	3	3	0	0	0			50	63.50	79.38
		0	0	0	0.0	0	0	0	0	0	0	0			50	0.00	0.00
Totals			1351	2942	6.6	2942	15	4	4	0	0	0			67.55	84.44	84.44

ELECTRICAL DESIGN NARRATIVE

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DESIGN CRITERIA

The design of the electrical systems for Holy Spirit Catholic Church will conform to the currently adopted editions of the following codes and standards:

- National Electric Code (NEC), 2005
- Life Safety NFPA-101
- State and Local Codes
- Building Code, 2006 IBC
- Energy Conservation Code, 2006 IECC

ELECTRICAL SERVICE

The electric service for spirit two will originate from the switchboard located in the mechanical/electrical room in spirit one. The switchboard was sized to accommodate the additional load of spirit two and conduits have been stubbed out to allow for installation of the new feeders. Electrical service will be 480/277 volt, three phase, four wire. Service capacity for spirit two will be 800 amps copper conductors with full neutral. Conduit will be routed from the stub outs to the power panelboard that will be located in the electrical room of spirit two. The power panel will distribute power throughout spirit 2.

The power panel in spirit two will have a molded case main circuit breaker. Bussing will be copper, braced for 42,000AIC. Branch overcurrent devices will be molded case circuit breakers. All components will be fully rated for the available AIC.

Estimated Maximum Demand				
Description		Connected	D.F.	EMD
Lighting	calculated at 1.3 watts/sq.ft	31.8 kW	1.00	31.8 kW
Power	calculated at 4 watts/sq.ft	98.0 kW	0.70	68.6 kW
HVAC	calculated at 4 watts/sq.ft	98.0 kW	0.80	78.4 kW
Site	25 kW	25 kW	1.00	25.0 kW
Total		252.8 kW		203.8 kW
Building Square Footage = 24,500				

GROUNDING

Grounding for the facility will be per NEC 250 and will be an extension of the grounding system developed in spirit one. The main ground bus at the power panelboard will be connected to the water service, concrete encased electrode, building steel and the ground bus of the switchboard located in spirit one.

In addition to the items above, a green insulated copper equipment grounding conductor will be installed in all feeder and branch circuits.

POWER DISTRIBUTION

480/277 volt distribution panels fed from the power panel will be used for power distribution to the chapel. Lighting panels and large mechanical loads will be fed from the power panel. Step down transformers will be used to supply panels for loads such as receptacles and small mechanical equipment.

Panel Construction and Mechanical Connections

Panels will be commercial type with full size bolt-on circuit breakers. Components will be series rated to provide the required AIC. Bussing will be copper. Each panel will have a hinged door with a master keyed flush tumbler latch. Half size breakers and load centers are not permitted. Approximately 20% spare breaker capacity will be scheduled for panelboards supplied under this project as well as the power panel.

HVAC connections, for equipment installed outdoors, will consist of NEMA 3R fused disconnects at the mechanical equipment. Three phase, mechanical equipment, ½ hp and larger will be furnished with combination starter/fused disconnects as required.

Connections will be provided to all owner-furnished equipment and furniture.

CONDUIT RACEWAYS

Electrical Metallic Tubing (EMT) will be the primary raceway type used within the facility where concealed in walls or ceilings. PVC schedule 40 will be used for underground installations and in poured concrete walls and floors. Rigid Galvanized Steel (RGS) will be used for exposed exterior work or where conduits are subject to damage. Liquid tight flexible metallic conduit (LFMC) will be used for final connections to vibrating equipment. Minimum conduit size will be 3/4".

CONDUCTORS

Conductors throughout the facility will be copper with 90°C minimum THHN/THWN insulation. All conductors will be color coded as follows:

480/277 volt systems

Brown – A
Orange – B
Yellow – C
Grey w/stripe – N
Green – ground

208/120 volt systems

Black – A
Red – B
Blue – C
White – N
Green – ground

WIRING DEVICES

Receptacles will be specification grade, 20-amp minimum. GFCI (Ground Fault Circuit Interrupting) type receptacles will be utilized at exterior installations and in selected locations where adjacent to water exposure and as required by the National Electrical Code. Stainless steel coverplates will be provided in all public areas.

Snap switches will be specification grade quiet type. Single pole, three way and four way switches will be provided to suit connections. Momentary contact switches will be provided for lighting contactor controls and lighting control systems. Keyed switches will be provided in public areas where appropriate. Stainless steel coverplates will be provided in all public areas.

LIGHTING

The general illumination of the chapel area will be achieved by the use of decorative architectural bowl fixtures with a fluorescent source. Additional spot and accent lighting will be used to highlight features of the chapel.

Fluorescent can downlighting and parabolic troffers will used to illuminate corridors passageways and general purpose rooms.

General lighting for mechanical rooms, storage rooms, and other low finish areas will consist of fluorescent strip lights with wire guards.

Lighting control for the facility will be through the lighting control system, a dimmer panel and switches.

Lighting control for general use areas will be from occupancy sensors with local override switches.

Corridors and other public spaces will be controlled by the lighting control panel.

Pole mounted area lighting will be provided at exterior parking areas. Decorative accent lighting will be provided for exterior facades and building features. Bollards will be used at the entrance walks to the building. Site lighting will utilize metal halide lamps, while bollard and building mounted lighting will utilize fluorescent lamps.



Examples of Pendant mounted bowl lighting

EXIT SIGNS AND EMERGENCY LIGHTS

'LED' type exit signs will be provided to mark the locations of all exits and exit routes as required to meet fire code requirements. All exit signs will be provided with emergency battery backup. Exit lights will be edge lit with LED lamps.

Emergency lighting will be provided at exits, paths of egress and elsewhere as required by regulatory codes. Selected fluorescent fixtures will be connected as night lights throughout the facility. These night light fixtures may also provide emergency and egress lighting via emergency batteries installed integral to the fixtures. Stand alone emergency lighting fixtures may also be used.

FIRE ALARM SYSTEM

The facility will be equipped with an intelligent microprocessor based addressable fire alarm system. The system will be supplied with detector maintenance alert feature, speaker/strobe and horn/strobe devices, and sufficient spare capacity to allow for future expansion. Voice Evacuation will be provided in the chapel with manual or automatic emergency voice instructions for occupants, interconnected with the fire alarm system.

The fire alarm control panel will be located in the electrical room and will be an extension of the fire alarm system installed in spirit one.

Manual pull stations will be provided at each exit from the building and no more than 200' on center throughout the building. Smoke detection will be provided for HVAC system control and other areas as required.

Audio and Audible/visual evacuation signals shall be visible at all points along the path of egress. Signals will also be installed in restrooms and common use areas. Audible evacuation signals will be speakers and Audio evacuation signals will be horns, while visual signals will be synchronized strobes meeting ADA requirements. Signals will be combined audible/visual or audio/visual assemblies unless otherwise indicated.

HVAC systems over 2000 cfm on the supply side and 10000 cfm on the return side will be provided with duct detectors as required by Code. Relays will be provided to shut down each unit in response to an alarm initiated by its associated duct detector.

Fire sprinkler systems will be monitored for flow and valve position.

All fire alarm wiring will be installed in raceways

AUXILIARY SYSTEMS

Telecommunications, data, A/V, cable television, access control, intrusion detection, and CCTV systems to be specified by owner's representative. Architect/engineer will coordinate design of systems with owner's representative and provide rough-in of conduits and boxes for owner installed systems.

