HOLY FAMILY CATHOLIC CHURCH
Limited Condition Assessment

316 South Logan Street
Lincoln, Illinois

Final Report
August 21, 2013
WJE No. 2013.3390

Prepared for:
Holy Family Catholic Church
316 South Logan Street
Lincoln, Illinois 62656

Prepared by:
Wiss, Janney, Elstner Associates, Inc.
330 Pfingsten Road
Northbrook, Illinois 60062
847.272.7400 tel | 847.291.9599 fax

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Kurt P. Holloway
Associate II

Kevin A. Kalata
Associate Principal

Jonathan E. Lewis
Associate Principal

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INTRODUCTION

At the request of Holy Family Roman Catholic Church, Wiss, Janney, Elstner Associates, Inc. (WJE) has completed a limited condition assessment of the building envelope and structural systems of the main church building at 316 S. Logan Street in Lincoln, Illinois. This report summarizes our findings from the assessment and provides general recommendations for repair, maintenance, and/or further investigation as needed. Where provided, recommended actions are prioritized and cost estimates are included in an effort to assist Church representatives with both near term and long-term capital planning for the parish.

BACKGROUND

Holy Family Roman Catholic Church in Lincoln, Illinois is a predominately timber and masonry structure that was constructed circa 1903. The building measures approximately 125 feet by 50 feet in plan, with the long dimension oriented in the east-west direction. The gable roof is covered with asphalt shingles. There is an approximately 70 foot bell tower located at the southwest corner of the building. Figures 1 through 4 present overall views of the four elevations of the church.

The Parish recently began an exterior renovation project for the church building. The contractor for this project is Otto Baum Construction, Inc. (OBC) of Fairbury, Illinois. We understand that the current phase of the renovation project includes grinding and pointing the exterior of the bell tower from the base of the bell platform upward as well as isolated grinding and pointing at masonry buttress locations on the east and west elevations. OBC reported that they also intended to shorten and reconstruct where necessary the individual brick piers of the decorative battlement, or castellated parapet, around the roof of the bell tower.

Grinding of the mortar joints on the bell tower reportedly began on June 11, 2013 (grinding out a depth of the old mortar is the first step in the tuck pointing repair process). On Friday, June 14, 2013, while OBC was grinding joints on the north elevation, a portion of the exterior wythe of brick masonry in their work area collapsed. OBC had been performing work from an aerial lift, and OBC reported that most of the debris from the collapsed portion of the wall landed in the work platform, but a small amount fell to the lower roof below. OBC indicated that they did not detect any significant damage to the roofing from the falling debris. OBC reported that their workers were unhurt in the incident, and OBC immediately began temporary stabilization efforts on the north elevation. By that evening, OBC had reportedly removed areas of remaining loose masonry and installed wire mesh and plastic tarps over the damaged area on the north elevation.

WJE was subsequently asked to investigate the cause of the collapse by Catholic Mutual Group (CMG) and issued a report to CMG summarizing the findings of this initial investigation on July 1, 2013. In the aftermath of the collapse, the Church requested that a condition assessment of the main church building be performed. The purpose of this assessment was to determine the general condition of the building envelope (roof and above-grade walls) and structural components of the main church building in an effort to assist with long-term capital planning for the Parish.

CONDITION SURVEY

Mr. Kevin Kalata and Mr. Kurt Holloway of WJE conducted the field portion of the condition assessment on July 18 and 19, 2013. A representative from OBC assisted WJE throughout the field assessment, providing aerial lift access and other general assistance with the investigation. The condition assessment included a general examination of the exterior envelope of the church, including the stone and clay masonry facade, windows, roofing, and drainage systems. The condition assessment also included a limited inspection of interior finishes and representative portions of the structural systems. The structural inspection specifically included examination of the first floor framing from both the basement and crawl space, and inspection of the roof framing from representative accessible areas within the building attic.

In addition to visual survey of the areas described, WJE also performed more detailed inspections of conditions at representative areas of the building; tasks associated with such close-up examinations included hammer sounding of masonry, measurement and documentation of structural conditions, and limited collection of material samples. Three inspection openings were made in the masonry facade to facilitate assessment of conditions within the walls behind the veneer. Following the investigation, a representative of OBC repaired each location with clay masonry units salvaged from the openings.

Exterior Conditions

Our inspection of the exterior of the church revealed conditions that were largely consistent around the building. Though some minor variations in exterior conditions exist from one area of the structure to another, WJE noted similar conditions on all elevations of the building. Accordingly, unless specifically noted, the following observations may be regarded to be generally applicable to the entire exterior of the church building.

Specific conditions observed at the chimney near the east end of the building and at the bell tower are described later in the report.

Clay Masonry

The exterior load bearing walls of the church are primarily composed of unreinforced solid clay masonry units. The units themselves are standard-sized (8½ inches long by 4 inches wide by 2¼ inches tall). The walls are typically three wythes thick and are constructed with common brick back-up, except at the bell tower, where the walls are four wythes thick. The collar joint space (typically ¼ inch to ½ inch) between the backup brick and veneer is generally open except where excess bed joint mortar from the backup mortar fills the void (Figure 5).

The veneer wythe was laid in a running bond pattern without header courses or mechanical anchors tying it to the backup wythes. Instead, notch-cut veneer bricks allow diagonally oriented bricks to bridge between the first backup wythe and the adjoining veneer units, roughly every sixth or seventh course. The difference between this type of wall construction and a conventional header course is highlighted in Figure 6. Figure 7 shows the notch-cut construction observed in the inspection opening made on the bell tower. The mortar joints are generally small, typically $^{3}/_{16}$ inch to ¼ inch wide. A thin overlay or skim coat of mortar (approximately ⅛ inch thick) covers the majority of the facade joints. The age of the skim coat is not clear. Limited grinding of the original mortar joints, which are pigmented to match the brick, appears to have been performed concurrently with the skim coat installation.

Inspection openings through the veneer revealed that the original mortar joints do not support the full width of each unit. Instead, the veneer brick was laid over joints consisting of 1 inch of mortar lining the interior edge of the brick and another 1 inch of mortar along the exterior edge (i.e. a 2 inch void exists between the mortar beds along the center of each brick). An inspection opening on a south elevation gable which illustrates the typical arrangement of the original mortar joints is shown in Figure 8.

General observations of the clay masonry on the main portion of the church are summarized below:

- Widespread debonding and failure of the thin overlay joint coating was noted across large portions of the church, especially at areas where rainwater runoff tends to collect and run down the building. Bond-line separations between the mortar and brick and regions of loose mortar were common. Some of the original masonry joints also showed signs of advanced weathering and erosion, especially at locations repeatedly exposed to moisture. One example of this was below the south end of the west main gable (above the main church entrance). An ineffective flashing detail at this location was permitting a high amount of water ingress into the wall, speeding the weathering process (Figure 9).
- The bricks units themselves were generally in fair to good condition; WJE noted only isolated cracking of masonry units. Cracks were typically located at some of the detailed, or custom cut areas (e.g. the window and louver arches). Cracks in the brick units or along mortar joints were generally local and associated with movements/shifting of the wall at openings or returns.
- WJE identified a number of areas of the facade where the veneer brick was loose (and could be moved by hand or light hammer tapping). Loose brick was most widespread in the portions of the walls comprising the gables and wall areas directly adjacent to roof/wall interfaces.
- Despite the lack of traditional headers or mechanical ties, WJE observed only isolated areas of bowing and displacement in the veneer brick. Notable areas with displaced brick include:
  - A small area on the west main gable near the north eave.
  - A small area on the middle gable on the south elevation (Figure 10).
- Efflorescence[1] and staining of the masonry was evident on the veneer at a few isolated locations around the building, particularly beneath areas prone to moisture runoff.

Stone Masonry

The exterior unreinforced masonry walls of the church are supported on a limestone masonry foundation. Limestone is also incorporated throughout the facade at windowsills and for decorative features on the buttresses, dormers, and bell tower. The limestone was generally found to be in good condition with only isolated locations of minor distress. Specific observations include:

- Limestone units above the foundation level typically remained in very good condition. Units were generally sound and without cracks or spalls. It appears that units extend only minimally into the masonry wall construction, and are not connected to it by mechanical anchorage. No signs of

[1] Efflorescence is staining due to deposits of salts and other soluble materials that are carried to the surface of masonry by water migrating through the masonry.

corrosion, staining, or distress associated with embedded ferrous steel elements were noted. Stone units commonly include appropriate use of drip edges and other detailing to manage moisture exposure.

- Mortar head joints between decorative limestone banding or water table units were severely deteriorated. Eroded, loose, and missing areas of mortar were typical at these locations. This condition may allow an increased volume of water into the wall system.
- At the foundation level, we observed some locations of efflorescence on both the exterior and interior faces of the stone walls. The grade generally pitched away from the foundations, promoting drainage of surface runoff.
- Isolated cracking was observed in the foundation walls, primarily in the mortar joints. This cracking appeared attributable to slight movements/shifting of the wall, especially near openings or returns. WJE also noted some locations where cracks in the stone walls had been previously repaired with mortar and/or sealant.

Windows and Vents

Windows typically consist of wood-framed leaded stained glass. Decorative wood trim lines the windows, which vary in size from small punched openings to large arched openings. The stained glass is protected by a layer of transparent protective glazing which appears to be polycarbonate or plexiglass (Figure 11). Louvers and vents are of similar wood construction. WJE noted the following regarding the condition of these items:

- The stained glass windows are themselves in generally good condition; however, a few cracked or damaged panes of protective glazing were noted at the following locations:
    - The bottom pane and third pane from the bottom of the main window on the west face of the bell tower (Figure 12).
    - Multiple cracks near the bottom of the window on the eastern gable of the south elevation
- The perimeter urethane sealants for all windows were exhibiting varying extents of cohesion and adhesion failures. Cracking and weathering of the sealant was common (Figure 13). Over time, failed sealants will promote deterioration of the wood window frames and further ingress of water into the building masonry walls. The age of the sealant on the church is unknown, but it appears to be well beyond the useful service life which can be about ten years for urethane sealant, depending on degree of exposure to ultraviolet light.
- The protective glazing was typically sealed to the wood trim, and no intentional ventilation of the interstitial space between the protective glazing and the stained glass window was provided. Such ventilation is typically required to reduce condensation potential between the two surfaces and limit the build-up of heat, which can cause warping or buckling of the leaded stained glass frames.

Widespread peeling paint was present on all wood window and louver frames (Figure 14). Failure of the paint typically hastens the weathering and deterioration of the wood framing. However, despite the extensive amount of peeled paint, the wood frames were generally in fair to good condition. We observed general softening of portions of the outer wood surface and limited splitting and brooming at member ends, but no widespread or full-scale deterioration or decay was noted.

Roofing and Drainage

The main roof of the church is configured in a traditional gable fashion, with the nave set in the east/west direction. Two series of smaller gables (or dormers) protrude in the north and south directions from the main gable along the length of the building. Asphalt shingles on the main roof appear to have been recently replaced. Several smaller lower roof areas are also covered with asphalt shingles. All shingled roofs appeared to be in good condition.

A small portion of a lower roof level on the south elevation of the main building near the bell tower is covered with an EPDM membrane (Figure 15). This roof is in fair condition, but WJE observed some nail penetrations through the membrane and other minor penetrations in the membrane (possibly due to impacting debris or foot traffic).

The gutters and downspouts on the church are constructed entirely of copper. Given the appearance of the copper patina, it appears likely that many portions of the drainage system date back to the original construction. WJE noted the following items:

- The copper gutters and downspouts have a fair amount of distortion at several locations around the building. This is possibly due to ice action or impacts on the system over time.
- Some portions of the gutter are no longer properly pitched to the downspouts. Although no water was present within any of the gutters, an accumulation of dirt was present at some locations as shown in Figure 16. This is evidence that ponding likely occurs within the gutters after rain events.
- At isolated locations, we noted that support clips for the gutter system were no longer attached; this likely contributes to the observed slope issues discussed above.

The gutters were free of large debris with the exception of the area along the south elevation directly adjacent to the bell tower. This portion of the gutter was clogged with masonry debris from the ongoing repair work (Figure 15).

Copper copings were present on gable wall areas on the north, south, and east elevations. All copings had been previously coated and sealed with fabric reinforcing mesh. The mesh was intended to provide added protection against moisture infiltration. In general, this repair was performing adequately. However some isolated penetrations, breaches, and exposed copper seams were noted.

Chimney

The clay masonry chimney near the east end of the church consists of single wythe construction, with outside dimensions in plan of 2 foot 7½ inch square. The chimney extends roughly 20 feet above the roof and includes a limestone cap. The flue is lined with a clay or cement-based material. The clear width of the flue is 23 inches in both directions. A steel band wraps the chimney and is attached to a rod extending back toward the ridge of the gable (Figure 17) in an apparent attempt to provide additional lateral support to the chimney. It is not clear whether the chimney remains in service.

- Overall, the chimney was in poor condition. The top 8 feet of the masonry was generally found to be loose, with voids in the mortar joints visible. The flue liner is cracked and displaced at the top of the chimney.
- At the steel tie location, the upper 8 feet of the chimney has shifted ⅛ inch to $^{3}/_{16}$ inch to the south. Mortar joints are severely deteriorated (Figure 18).

- The lower portion of the chimney shows widespread advanced deterioration of the mortar joints, with erosion and efflorescence. The southwest quadrant of the lower chimney exhibits full depth mortar deterioration (i.e. the mortar joint turns to powder when lightly disturbed), and the brick near the base shows evidence of shifting/movement.
- In its current state, the steel tie assembly does not appear to provide reliable lateral support to the chimney. The upper portion of the chimney is cracked and gaps between the perimeter band and lower portion of the chimney will allow for independent movement. Additionally, even assuming undamaged conditions and proper attachment, the thin rod would provide appropriate structural stiffness only for winds approaching from the northward direction. Its flexibility would not provide much support for the chimney for wind loads in any of the other three directions.

Bell Tower

The church bell tower is constructed in a similar fashion to the main clay masonry walls of the church. However, the typical thickness of the backup brick is four wythes instead of the three used on the remainder of the building. Arched and corbeled masonry wall areas at the turret and belfry levels consist of even thicker walls. Inspection of the interior of the tower reveals no additional or supplemental structural system was added to accommodate the southwest turret which supports the spire. Like the rest of the church exterior, the bell tower consists entirely of unreinforced masonry construction. The base of the bell tower flares to a width of 14 feet 2 inches on the south face, and 11 feet 8 inches where it intersects the main church wall on the west elevation. The belfry (i.e. the level where the bell rests) is located about 41 feet above adjacent ground, while the main and spire battlements are about 62 feet and 66 feet above ground, respectively. Figure 19 shows the bell tower as viewed from the southeast. Visible in the photo are the decorative arches and stepped portions of the clay masonry along with the limestone accents.

At the belfry level and above, WJE noted the following:

- OBC ground out the mortar joints on all faces of the bell tower down to the belfry level in preparation for repointing work in June 2013. Although this is a fairly conventional masonry repair method, given the partially filled bed joints, grinding out the face joints in this manner leaves all brick above the belfry level in a substantially weaker state, regardless of the condition of the remaining mortar. As previously stated, this weakened condition of the wall likely contributed to the partial collapse on the north elevation as stated in our July 1, 2013 report to Catholic Mutual Group.
- The condition of the mortar joints above the bell level is extremely poor, both in the veneer and backup brick.
- Due to the poor joint conditions, widespread areas of brick were found to be loose, and some units could even be removed from the veneer by hand at locations that appear visibly sound from the ground (Figure 20). Though the majority of the veneer brick units themselves remain intact, some localized cracking was observed.
- Some masonry units had dislodged and fallen from the main arch on the east elevation. OBC previously reported that these bricks dislodged during their grinding operations.
- The recessed stepped corbels show visible vertical displacement of the brick (Figure 21), along with some damaged units.
- The main and spire battlements are all extremely weathered and loose. We observed some previous replacement of masonry units and repointing repairs. Many repaired areas exhibited cracking and

spalling. The battlements have no reinforcement or positive connection to the structure below and can be easily moved by hand.

- The copper spire is in poor condition. A random dimpling pattern, punctuated with some penetrations of the copper was observed, most prominently on the south and east exposures of the spire. Also noted were missing copper fasteners and corroding galvanized fasteners that appear to have been added after original construction as part of a repair effort. Further, the base of the spire had several locations where the copper skirt was missing, leaving the supporting wood exposed. A series of 8 steel rods were found to tie the spire to the clay masonry below. These rods were intact but appeared somewhat loose on account of the condition of the masonry below.
- The limestone accents above the belfry generally remain in good condition. The vertical mortar joints between the limestone blocks, however, had eroded away at most locations, providing further avenues for water infiltration.

In general, conditions on the lower portions of the bell tower beneath the belfry level were observed to be considerably better than the upper portions. Masonry conditions were found to be similar to those observed at the remainder of the building facade. Additional observations are summarized below:

- An EPDM membrane roof was installed at the belfry level over top of the original lead coated copper (Figure 22). This membrane was no longer adhered around the edges of the roof, and has also failed where the material terminated or lapped. Sealant had been previously added at some roofing terminations and penetrations (e.g. around the steel supports of the bell). This sealant was not well bonded.

- The interior of the bell tower shows signs of active water leaks and moisture damage. The existing openings for the bell ropes (Figure 23) provide an open path for water to enter the building, particularly if snow accumulates above the height of the hole. Ceiling plaster damage was extensive at the south end. Additionally, heavy peeling of the interior paint was noted on the walls along with some cracking of the plaster above the south and west window arches. This is consistent with moisture driven deterioration from the roof leaks described above and through the lower bell tower walls.

- One of our exploratory openings on the lower bell tower confirmed similar lack of headers or other mechanical connection of the veneer to the back-up brick. Some deterioration of the back-up mortar was evident at this opening.

Interior Conditions

WJE's assessment of the structural systems and finishes on the interior of the building are summarized in the following paragraphs.

First Floor Framing

The framing supporting the first floor typically consists of 1x6 wood deck boards running at 45 degrees over 2x10 sawn lumber joists spaced at 16 inches and spanning in the north-south direction. The joists bear on pockets in the masonry bearing walls and on top of built-up beams in the interior of the church (Figure 24). Joist spans vary slightly, but typically are approximately 10 feet 6 inches. The built-up beams typically span approximately 12 feet and consist of five 2x12 members connected together with a nominal amount of nailing. The 2x12 members did not appear to be sufficiently fastened together to behave compositely with each other. It is not clear if composite action was intended in the original design. The main beams typically bear on a foundation consisting of a square clay masonry pier (1 foot 10 inches wide) that rests on a cast-in-place concrete spread footing. Given the vintage and detailing of the structure, it is likely that these concrete footings are unreinforced. The wood framing connections are made with face and toe nail connections.

WJE reviewed representative conditions of the floor framing within the basement and crawl space of the church. The framing was generally in good condition, and the wood showed no signs of structurally significant deterioration, but we did observe the following:

- The built-up main beams did not always have uniform bearing on the masonry piers. At multiple locations, one of the outer 2x12 members had little or no bearing on the masonry pier (Figure 25). In these cases, however, the other four 2x12 members had significant bearing length atop the pier (typically 7 to 9 inches).
- A single partial fracture was observed in a joist located near the south wall between the second and third masonry piers from the west end of the crawl space (Figure 26). The partial fracture originated at a knot in the wood. This condition did not appear to be recent based on the dirt accumulation and coloration of the wood inside the fracture. No distress to the floor finishes was noted at this location.
- Portions of the original deck boards have been replaced with oriented strand board (OSB) on the north side of the sanctuary between the first and second piers from the west wall (Figure 27). The reason for the repair/replacement of the decking was not clear. Some cracked tiling was noted near the rear of the church (discussed later), but the OSB was not located at the cracked tiling above. Nor did WJE observe any framing damage immediately beneath the cracked tile units.
- WJE noted a number of poorly detailed nailed connections (e.g. nails into the end grain of the wood), particularly where joists had been terminated at cross-header locations for mechanical equipment penetrations through the floor, or the change in framing direction at the basement stairway, for example. Some of these connections showed signs of minor slip/separation of the framing members (Figure 28).

Roof Framing

WJE examined the roof framing by accessing the main attic from the choir loft. The main roof structure is comprised of a series of heavy timber trusses tied together with steel tension rods and straps. The main trusses are spaced roughly 13 feet 6 inches apart and are generally configured in a “scissors” arrangement consisting of angled top and bottom main chord members (6x8 timbers) with a ⅞-inch-diameter steel tension rod linking the top and bottom chords at the center of the span. However, a number of additional collar-ties and struts fill in the panels of the main scissor shape. The top chord slopes at 45 degrees, while the bottom chord rises at approximately 30 degrees. Lag bolts are used for connections between main members of the trusses. The trusses span the full width of the sanctuary and bear on the north and south masonry walls. 2x8 diagonal bracing spans between the trusses. Figures 29 through 33 present various views of the attic and roof framing.

The first truss from the west wall in the main attic is of a slightly different configuration and has no main vertical steel tension rod at the center of the span. Instead, this truss relies on extensions of the bottom chord members toe-nailed into the top chord and a set of collar ties (one 2x4 high on the truss and a 2x6 connecting the bottom chord extensions) to achieve truss action.

The remainder of the roof framing consists of 1x6 tongue and groove decking boards running over 2x6 rafters aligned parallel to the main trusses. The rafters are spaced between 17½ and 21½ inches on center and are supported by 6x6 purlins which span between the main trusses at a spacing of approximately 7 feet 3 inches. The ridge board sandwiched between the rafters is a 2x6. The framing for the smaller dormer gables is not visible inside the attic, and it is likely simply "stick-framed" onto the main roof rafters and decking. Ventilation of these gable areas, therefore, is also independent of the main attic, which receives ventilation through end gable wall vents on the east and west elevations.

WJE verified selected dimensions of the as-built construction, finding them to vary somewhat from those reported in the March 2006 report issued by Brown Engineers, Inc. A copy of this report is included as Appendix A. The overall condition of the roof framing was good, with little evidence of widespread damage or deterioration. WJE did observe the following specific conditions related to the roof framing:

- The ends of the roof trusses appear to have spread outward, causing the trusses to deflect downward under loading:
    - The attic framing shows signs of spreading and separation (e.g. movement at purlin bolts, partial nail pull-out). Exposed wood surfaces resulting from separation and/or spread exhibited a dark patina, indicating that such movement and separations were not related to recent movements.
    - Measurements of the masonry buttresses revealed an outward lean of the masonry walls (specifically the buttresses beneath the main trusses). This movement was more pronounced at the center of the church away from the end masonry walls, which partially restrain spreading movements.
    - WJE measured the rotation of the hammer trusses inside the sanctuary (Figure 34), which are suspended from the main trusses above via unknown framing and rest on stone corbels in the masonry wall. The slopes of the top members of each hammer truss varied and were typically larger toward the center of the church and measured between ½ to ⅝ inch-per-foot at the most pronounced locations. The measured slopes were roughly in accordance with those reported in Brown Engineers' 2006 report (some exceeded the cited range and others were below it), but it was not clear whether the rotation of any particular hammer truss had increased since 2006.
    - There is a slight but perceptible deflection in the ridge of the main gable observed from the building exterior (Figure 35). This is also consistent with increased truss spread and outward leaning of the buttresses near the center of the church.
- From a distance, WJE observed potential moisture-related deterioration at some of the bearing locations of the roof framing on the masonry wall. Figure 32 shows moisture damage at the south corner of the west main gable. The structural implications of this deterioration were not readily discernible.
- The first truss from the west wall exhibits obvious signs of prior spreading under load. This is manifested in the partial pull-out of the nailed bottom chord extension connections (Figure 36). Similar to the typical trusses, the patina of the wood along exposed surfaces indicates that this movement likely occurred earlier in the life of the structure and has since stabilized.

- Some truss members and purlins exhibited signs of noticeable checking[2] (up to 2½ inches deep), and some of the checking appeared to be more recent based on coloration of the wood (Figure 37).
- The decking boards have isolated areas of damage such as checking, splitting and disengagement of the tongues and grooves (Figure 38). This damage may be related to repeated nailing of the decking during multiple re-roofing projects.
- Isolated diagonal braces were found to be partially disengaged from the truss chords (i.e. nail pull-out), or exhibited considerable sagging. However, the presence of the roof deck and purlins stabilizes the trusses, and the braces were likely installed to provide stability during the construction process.

Finishes

The interior of the church is generally finished with plaster and decorative wood trim elements. Figure 39 is an overall view of the church interior. The ceilings are typically wood lath and plaster construction, including the main barrel vault that runs the length of the sanctuary. A church parishioner indicated that due to previous deterioration of the barrel vault plaster, the entire vault had been sheathed with curved plywood panels that were installed over the original plaster and then covered with a thin plaster screed.

The flooring finishes of the church are generally carpeted, though the seating areas in the sanctuary are exposed hardwood decking. Additionally, large format tiling has been installed at the Mary Vigil and near the information table at the rear (west end) of the sanctuary.

WJE observed the following regarding the interior finishes during our field investigation:

- The barrel vault ceiling showed a regular cracking pattern at 4 ft. spacing, consistent with the typical size of plywood sheets (Figure 40). The separations in the plaster-covered wood vault panels are likely due to natural seasonal changes in the moisture content of the wood over time (i.e. as the wood dries, it shrinks, causing the thin plaster screed to crack).
- Several areas of cracking were observed in the plaster covering the perimeter masonry walls. This cracking often correlated with areas of high moisture exposure in the clay masonry observed on the exterior of the building. Figure 41 shows an example of a plaster crack at the southernmost arched window on the west wall in the choir loft. This crack extends up from the arch toward the ceiling at a location observed to have a poor flashing detail during the exterior investigation.
- Limited cracking was observed in the soffit plaster. One notable area of distress was located on the north and south slopes of the sanctuary, east of the first roof framing truss from the west wall.
- Some cracked tile units near the information table and Mary Vigil (Figure 42).
- One larger area of plaster ceiling failure was observed at the southeast sacristy; a parishioner indicated the damage was due to a prior roof leak that had reportedly been repaired (Figure 43).

DISCUSSION

Our investigation revealed somewhat widespread distress and deterioration in the exterior building envelope of the church building. While advanced deterioration at the upper bell tower and chimney warrants extensive repair or replacement, the majority of the structure remains in a serviceable state. With

[2] Checking is cracking of the wood parallel to the grain, usually due to loading or changes in moisture content, that does not propagate through the thickness of the structural member.

appropriate maintenance of the building envelope and remediation and repair of noted structural concerns, the building could continue to be used for the foreseeable future.

Masonry

The deterioration of the masonry exterior walls is primarily related to cracking, debonding, and erosion of the mortar joints between the bricks. The previously installed skim coat of mortar has outlived its useful life, and continued moisture exposure has weakened the underlying original mortar joints throughout the facade. Deterioration has progressed to the point that some bricks could be moved by hand. The lack of full header courses between the veneer and brick backup and the lack of fully filled bed joints results in a veneer system that is more vulnerable to movement-related damage. The bricks themselves generally appeared to be in fair or good condition, with only isolated cracking and other distress. Likewise, no significant problems were noted with the stone foundations or the decorative limestone portions of the facade.

It is not surprising that the most advanced deterioration on the facade was located in the elements with the most severe exposure: the upper portions of the bell tower and the chimney. These elements receive little or no protection from surrounding structure and may also be more prone to freeze-thaw cycling and related deterioration. On the bell tower in particular, years of water infiltration from failing or damaged roofing, poorly detailed flashings, and exposed skyward mortar joints has accelerated deterioration of the mortar. The level of deterioration is such that it may no longer be practical to repair these components. Remedial options are discussed in the recommendations section of this report. As a precautionary measure, the sidewalk closure at the southwest corner of the church beneath the bell tower should remain in place until stabilization repairs or removal is completed. It is also advisable to extend the closure eastward past the rear of the church to include the area near the chimney.

Windows and Sealants

Windows appeared to be in serviceable condition with only a few isolated cracked panes of glass. Urethane sealants around the window perimeters have reached the end of their service lives and are in need of replacement. Paint failure on exposed wood framing was also widespread, but no significant areas of decay were noted during our assessment.

Roofing

The main roof over the sanctuary was in generally good condition and no signs of ongoing leaks were evident or reported by church staff. Copper gutters were in fair condition and were observed to be generally functional. Proper maintenance of the roofing and gutters is critical in limiting moisture ingress through the building envelope. Localized repairs to the damaged EPDM membrane near the bell tower and the roofing at the belfry level of the bell tower should be performed.

Structural Floor Framing

The wood floor framing of the sanctuary appears typical for structures of this vintage and no signs of significant distress or decay were noted. WJE analyzed the capacity of the typical joist and beam framing based on conservative estimates of the wood material properties for structures of this vintage. Based on our observations in the basement and crawl space, WJE assumed a No. 1 lumber grading for the joists and main beams. The species of lumber was not determined by laboratory testing, so we conservatively assumed the properties for the Eastern Softwoods species group based on the appearance and vintage of the lumber. While our analysis indicates that the joists are adequate for a common code-prescribed occupancy live load of 60 pounds-per-square-foot (psf) for assembly areas with fixed seating, the main beams may be nominally overstressed for this loading based on our wood assumptions. Further, our analysis also revealed that some joists and main beams primarily supporting walkways and aisles (i.e. at the front and rear of the church) may be overstressed if subjected to the current code-prescribed 100 psf live load for such areas. Though the church is not necessarily required to comply with modern code requirements, more refined analysis and positive identification of the lumber species from wood samples would better establish the load carrying capacity of the floor framing.

The cracked tile in the rear of the sanctuary did not coincide with any distress in the framing below. Although the cause of the cracking is not entirely clear, it could either be related to deflection of the floor framing or to impact. The fractured floor joist warrants repair as a matter of good practice. In addition, metal joist hangers are recommended to replace the less reliable end grain nailed connections.

Structural Roof Framing

Deflections of heavy timber trusses are fairly common in older church structures, especially if the exterior walls do not possess adequate strength and lateral stiffness to restrain the outward thrust generated by the trusses at the top of the wall. Although WJE did not perform a structural analysis of the roof framing, it appears reasonably sized and conventionally detailed based upon our experience with similar structures. No obvious signs of recent structural distress were evident, and measured displacements were in general agreement with those provided in the Brown Engineers report from 2006. Likewise, cracking in the interior finishes was relatively minor and not indicative of recent large-scale movement. Further analysis and review would be required to determine the reliable load carrying capacity of the trusses for comparison with characteristic snow and wind loadings. It may also be prudent to verify truss bearing conditions at the exterior wall to confirm that moisture-related deterioration is not occurring.

The addition of insulation in the attic combined with relatively poor ventilation via the louvers at the ends of the main attic may result in changes in wood moisture content and increase the potential for condensation and additional checking in the wood framing over time. The recent increase in checking in some isolated structural members may be related to changes in wood moisture contents that are associated with the addition of thermal insulation to a previously un-insulated space. Though the level of checking is not concerning at this time, periodic monitoring of the roof framing condition is warranted to ensure more serious damage to the wood does not accumulate.

REMEDIAL RECOMMENDATIONS AND BUDGETARY COST ESTIMATES

Based upon our completed investigation, significant repairs are warranted in the near term to address deterioration in the building envelope. To assist the Parish with budgetary planning, WJE has summarized key repair and maintenance items below and provided a general description of the anticipated work involved. We have limited our review to items that will likely require at least some level of action within the next several years.

Budgetary estimates for these items were developed by OBC based upon their experience at the building and with previous similar projects. The information received by WJE from OBC is included as Appendix B. The recommendations contained herein are not intended to be comprehensive, nor or they intended to be design-level documents; WJE recommends that an Illinois-licensed architect or structural engineer be retained by the Parish to develop design documents once an overall course of action is settled on by the Parish. Based on the extent of the recommended maintenance and repairs, the Parish may wish to consider phasing the work over multiple years to meet budgetary and logistic constraints.

Near Term Repairs (2013)

The following items should be addressed before winter.

Chimney

If the chimney is operational, it should be demolished and either rebuilt or replaced with a metal stack.

- OBC budgetary cost for chimney demolition: $13,500
- Allowance for new chimney: $10,000

Upper Bell Tower

Option 1: Demolish the upper portion of the bell tower above the belfry level. Install new copper cap and roofing at the belfry level. If desired, the existing bell tower construction could be documented in adequate detail to permit future reconstruction to match its current appearance. Alternatively, a new steeple/spire to house the bell could be constructed on top of the remaining portion of the tower. Once demolition is complete and a temporary moisture barrier is established on top of the belfry, the Parish could defer any further modifications or enhancements.

- OBC budgetary cost estimate for demolition: $211,000
- Allowance for documentation of existing construction: $10,000
- Allowance for new steeple/enclosure: $50,000

Option 2: Salvage and rebuild the upper bell tower. This will likely entail demolition and complete rebuilding of the veneer and first backup wythe above the belfry. Supplemental shoring and full scaffolding of the tower will be needed to provide access and stability during the work. The rebuilt upper tower should incorporate appropriate reinforcing as well as ties and/or headers, and the complete rebuilding of the battlements with appropriate reinforcement and connection to the main structure. The copper spire will also require repair or replacement.

- OBC budgetary cost estimate: $433,000

As indicated above, the Parish should maintain protective construction fencing around the perimeter of the bell tower and extend fencing along the south sidewalk past the chimney to protect against falling debris. Additionally, while the bell tower remains in its current state as the Parish makes arrangements to proceed, the temporary wire tieback and tarping of the collapsed area on the north face of the bell tower should be adjusted to ensure that it will not act as a sail attached to the weakened portion of the building during a high wind, and that no additional water can collect in the tarp during rainstorms to add additional weight to the most unstable portion of the tower. WJE recommends that the tarp be reviewed monthly by OBC.

Supplemental Structural Analysis

Before continuing with exterior facade repairs, the Parish may desire to have a limited structural analysis performed to assess the load carrying capacity of the main roof trusses and selected other key structural components. As indicated above, the church structure was most likely not designed by a professional, but rather developed by a contractor based upon conventional construction practices. While the church structure need not meet all the requirements of the current building code, an additional analysis may be beneficial in evaluating the sensitivity of key structural elements of characteristic loadings from wind and snow considered for new structures. The results of this analysis may inform the Parish decisions about future usage of the building.

- Allowance for supplemental analysis $20,000

Intermediate Term Repairs (2013-2015)

The repairs discussed in this section should be considered in the next two to three years to promote continued serviceability of the church building.

Note that two options for tuck pointing repairs are presented. The first is a conventional partial depth repair where only the outer ½ inch is removed and replaced. Given that the existing bed joints are not fully mortared, and using the condition of the previously installed skim coat as an example, this approach may only provide a durability of 10 to 15 years. For a long-term repair, a full removal of the outer layer of mortar and installation of up to 3 inches of mortar to fill the void should be considered. Such repairs would require shimming bricks until mortar is installed, and would thus be significantly more expensive. However, a durability approaching 50 years could be expected when coupled with lateral tie repairs as described below.

Lower Bell Tower

- Grinding and repointing of all masonry veneer not being rebuilt.
- Selective demolition and rebuilding of approximately 10 percent of the veneer that is most highly deteriorated.
- Post-installation of helical ties or similar measures at regular intervals (e.g. 16 in. on center) to mechanically connect the veneer to the backup brick in all areas not rebuilt.
- Installing new sealant joints or flashing at all skyward-facing stone head joints. Sealant joints should include backer rods or bond breaker tape to prevent three-sided adhesion.

- OBC budgetary cost estimate (Option #1: ½ inch depth repair): $81,500
- OBC budgetary cost estimate (Option #2: 3 inch depth repair): $130,000

Main Church Facade

- Grinding and repointing of all masonry veneer (including limestone) not being rebuilt or recently pointed by OBC as part of their 2013 repairs.
- Demolition and rebuilding of the veneer at the gable areas and surrounding masonry, where deterioration is most advanced.
- Post-installation of helical ties or similar measures at regular intervals (e.g. 16 in. on center) to mechanically connect the veneer to the backup brick in all areas not rebuilt.
- Replace broken protective glazing; consider providing integral vents in all new protective glazing.
- Provide new perimeter sealants at all windows and doors.
- Clean, prime, and paint all wood trim and window frames.
- Repair miscellaneous damage to flashings, gutters, and downspouts. Selective replacement in kind.
- Install new sealant joints or lead came flashing at all skyward-facing stone head joints. Sealant joints are to include backer rods or bond breaker tape to prevent three-sided adhesion.

- OBC budgetary cost estimate (Option #1: ½ inch depth repair): $425,000

- OBC budgetary cost estimate (Option #2: 3 inch depth repair): $605,000

Note that many of the items included for the main facade can be phased over multiple years to meet budgetary constraints. It may be prudent to focus first on areas that exhibit the most advanced deterioration, and postpone actions on less critical areas until funding is available or repairs become exigent.

Wood Framing

- Install steel joist hangers at end-nailed connections in the floor framing to ensure long-term stability.
- Repair partially fractured floor joist (remove and replace, or sistering).
- Monitor the movement of the roof framing and hammer trusses (and masonry buttresses) to verify that the structure has stabilized. Take measurements in 2013 and periodically monitor.

  - Wood framing repair allowance $5,000

CLOSING

Decades of exposure to the elements has led to advanced localized deterioration in the building envelope of the main church building at Holy Family Church. The most advanced deterioration is found in the brick masonry comprising the upper portions of the bell tower and the chimney. These components require extensive repairs in the near term. Away from these locations, the brick masonry facade is in better condition, but is in need of significant maintenance and repair. Decorative portions of the building exterior such as the lead windows and wood trim are performing serviceably, but are in need of routine maintenance such as sealant replacement and painting. The structural systems of the church building also appear to be performing serviceably with no signs of significant distress. Previously reported deflections of the roof trusses did not seem to have worsened appreciably since 2006, but should continue to be monitored. It may be advisable to complete a more detailed analysis of key structural components prior to commencing significant repairs to the building facade. Taken as a whole, the results of the recently completed field investigation indicate that the existing structure is certainly salvageable, but will require a significant amount of repair and maintenance in the next several years to safeguard its long-term viability.

FIGURES

Figure 1. Overall view, west elevation.

Figure 2. Overall view, south elevation.

Figure 3. Overall view, east elevation.

Figure 4. Overall view, north elevation.

Figure 5. Inspection opening on south elevation gable showing spilling of backup brick mortar into otherwise open collar joint behind veneer. Note high amount of voids in the head (vertical) joints and some bed joints in the backup.

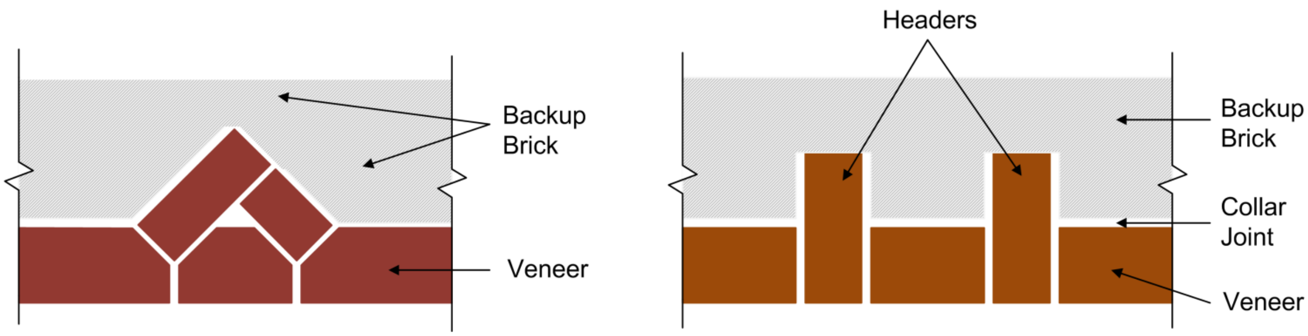


Figure 6. Contrasting veneer tie-back details. Left: Notched-brick approach used at Holy Family. Right: Conventional header course.

Figure 7. Notch-cut brick construction, as observed in the inspection opening on the east elevation of the lower bell tower.

Figure 8. South elevation gable inspection opening showing the middle void between the original veneer mortar joints (yellow arrow), along with the lighter colored skim repointing failing near the opening (black arrow).

Figure 9. Inappropriate/missing flashing at interface of bell tower and south end of west main gable. Water can freely penetrate into the building here from the gable roof and direct exposure from above.

Figure 10. Veneer brick displaced approximately ¼ inch outward on south elevation middle gable.


Figure 11. Typical condition of protective glazing at main stained glass windows on north and south elevations.


Figure 12. Broken protective glazing at main stained glass window on west face of bell tower.

Figure 13. Failed sealant along joint in limestone coping on west main gable showing patterned cracking induced by ultra-violet exposure.

Figure 14. Peeling and missing paint coating at wood window framing.

Figure 15. Nail penetrating lower roof EPDM membrane (arrow) on south elevation near bell tower. Note also bulging of membrane and masonry debris in gutter away from downspout.

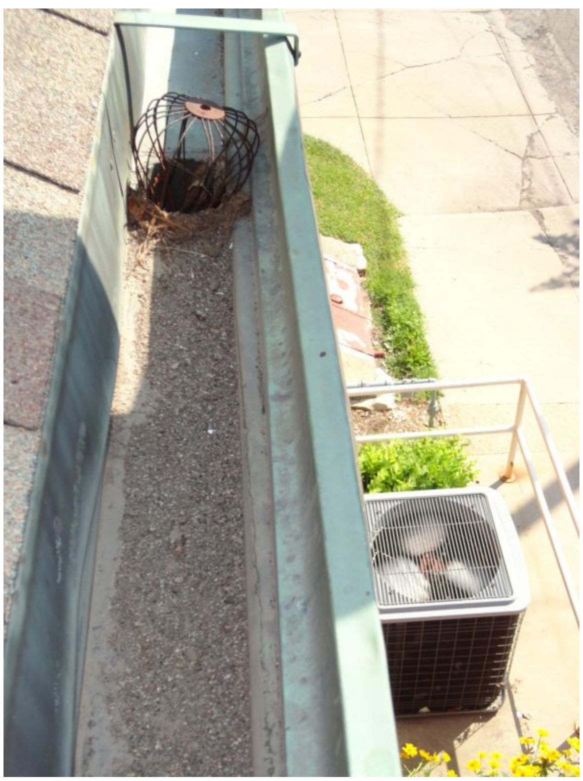


Figure 16. East elevation gutter with dirt buildup indicating ponding

Figure 17. Overall view of chimney from the southeast showing steel band and anchor rod extending toward gable ridge.

Figure 18. Severe deterioration of chimney mortar joints in vicinity of steel band. Some joints completely missing.

Figure 19. Bell tower as viewed from the southeast.

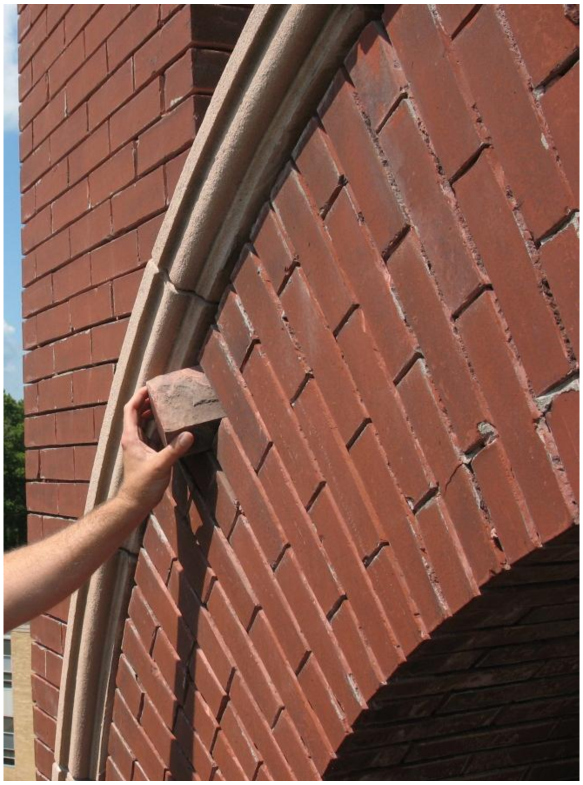


Figure 20. Loose brick removed from tower arch by hand.

Figure 21. Visible downward displacement (arrow) of recessed courses above main arches on upper bell tower.

Figure 22. Belfry membrane failed and peeling back from roof edge; underlying original lead-coated copper intact.

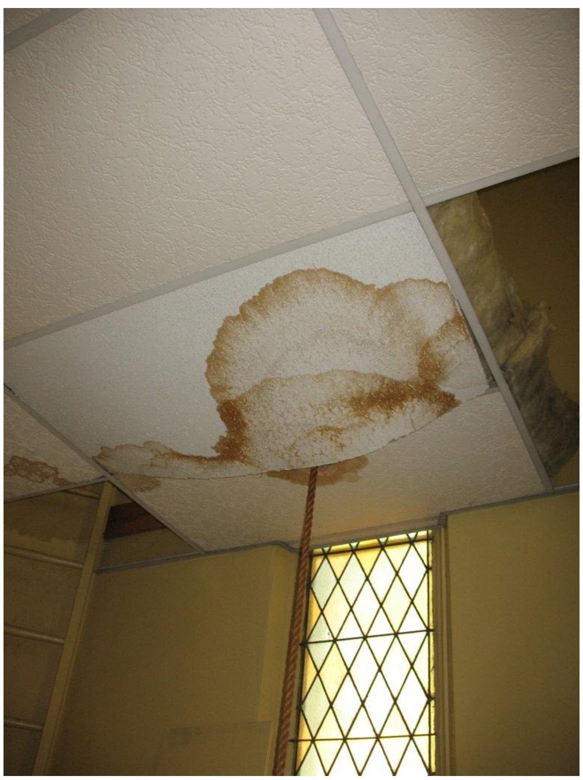


Figure 23. Water damage on drop ceiling of bell tower interior. Note belfry rope hanging through gap in the ceiling.

Figure 24. Overall view of joist and beam framing beneath sanctuary.

Figure 25. Near 2x12 member of built-up main floor beam does not bear on masonry pier (arrow). Other 2x12 members do bear on pier.

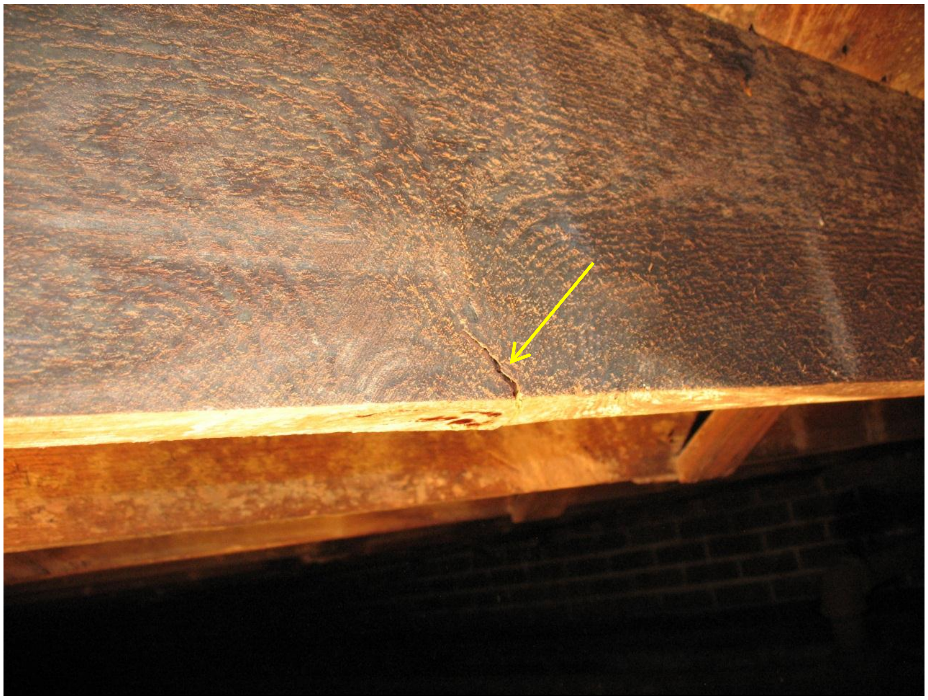


Figure 26. Partial fracture of 2x10 floor joist originating from knot on bottom of member.

Figure 27. Oriented strand board flooring, north side of sanctuary.

Figure 28. End nailed joist connections to frame around a ductwork penetration of the floor deck. These should be supplemented with steel joist hangers.

Figure 29. Roof framing viewed from center of attic looking west. Dark vertical bars are steel tension rods at center of each typical truss.

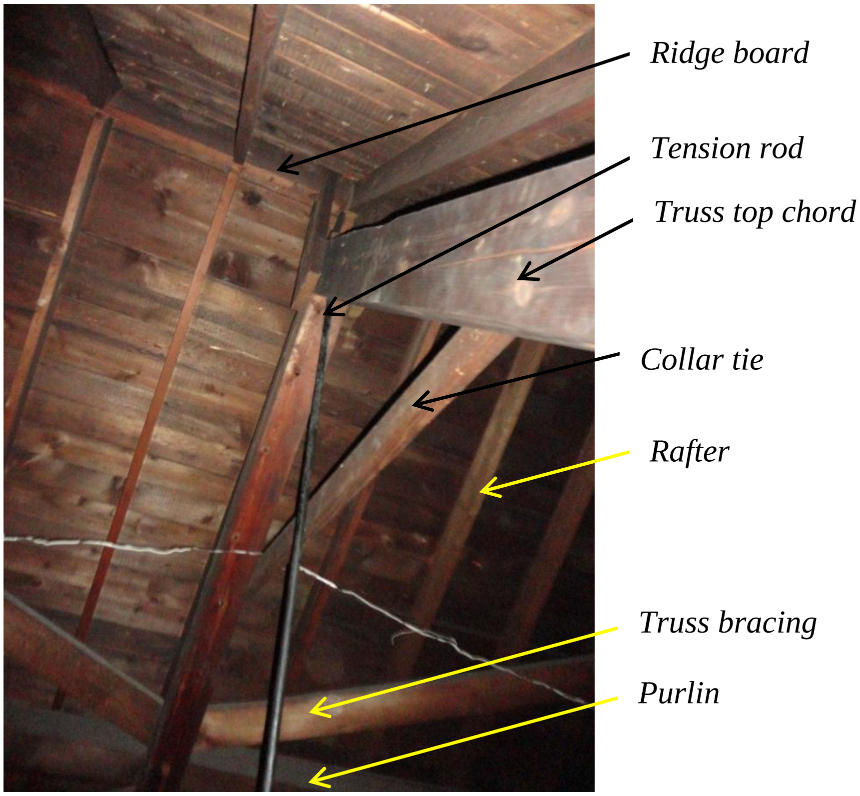


Figure 30. View of typical attic framing.

Figure 31. Steel tie rod connecting strut to top chord further down typical truss.

Figure 32. Rafters bearing on wood sill on top of masonry wall near southwest corner. Note light discoloration near bearing location of rafters as possible moisture-related deterioration.

Figure 33. Partial view of north side of first truss from the west wall. Note bottom chord extension nailed to top chord has separated (arrow).

Figure 34. *Measuring slope of hammer trusses inside sanctuary.*

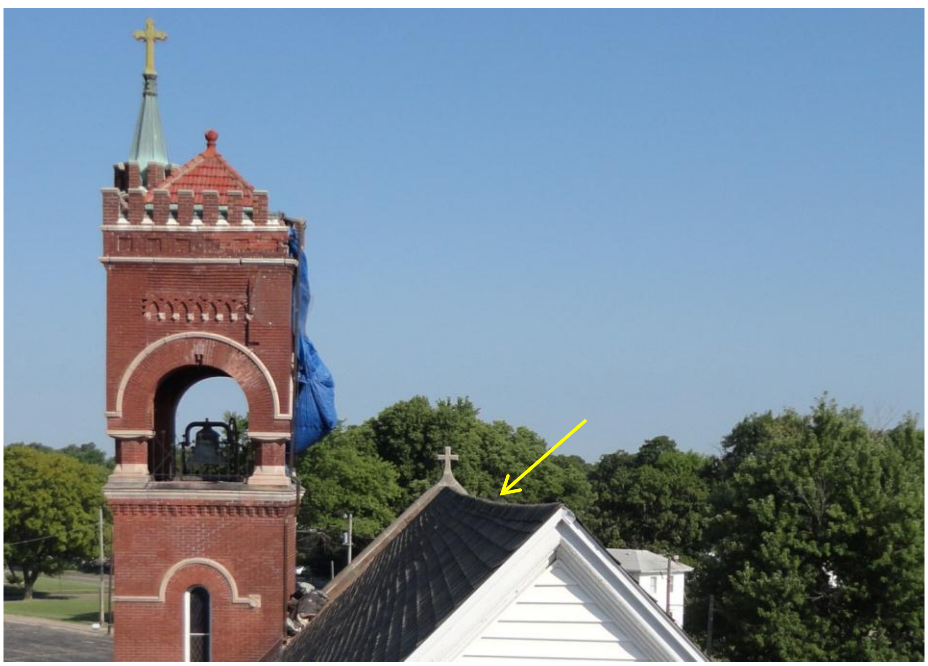


Figure 35. Deflection visible in ridge of main church roof consistent with outward spread of roof trusses and buttress leaning.

Figure 36. Partial pull-out of westernmost truss bottom chord extensions at connection to top chord. Separation likely old given dark coloration.

Figure 37. Checking of purlin, approximately 2.5 inches deep. Light coloration within crack may indicate recent formation or growth of this check.

Figure 38. Typical damage to roof decking.

Figure 39. Overall view of church sanctuary.

Figure 40. Parallel cracking in plaster skim over plywood panels at barrel vault.

Figure 41. Crack in plaster at south window of west main gable.

Figure 42. Cracked flooring tile near the information table.

Figure 43. Plaster ceiling failure in southeast sacristy.

Appendix A

2006 Report by Brown Engineering

COPY

brown engineers

RECEIVED MAR 13 2006

March 12, 2006

Holy Family Catholic Church
c/o Joe Fitzpatrick
Fitzpatrick Electric
PO Box 242
Lincoln, Illinois 62656

Dear Mr. Fitzpatrick:

At your request, I met with you at the Holy Family Catholic Church at 320 South Logan Street in Lincoln, Illinois on March 10th. The Church is considering remodeling and improvements and it was desired to have an inspection to determine its structural condition. We spent two hours examining the interior and exterior of the church, the wood floor framing in the crawl space and the roof structure.

The church was built in 1903. It is a tall, one story structure with a partial basement and partial crawl space. There is a masonry bell tower at the southwest corner. The walls supporting the roof structure appear to be wood framing. Alternately, they could be solid masonry with furred out plaster walls. The various structural areas are discussed below. A cross section thru the church is enclosed with the report.

FIRST FLOOR FRAMING

The crawl space framing was seen from the basement area. It was found to consist of 4 spans of 2x10 wood joists at 16 inch centers across the 41'-5" width of the church. The joists are supported on built-up wood beams(5-2x12's) supported on masonry piers. The built-up beams are touching or very close to the earthen crawl space surface. This is violation of codes which requires a minimum clearance of 12 inches between wood framing and earth. Evidence of termite tracks exist on the face of joists and extend up into the wood deck but no termite damage or signs of active termites was seen. The church reportedly has a termite inspection annually.

No calculations of floor capacity were made but the joist and beams appeared to be level and the floor feels stiff as one walks on it. It is likely that the framing would meet the building code load requirement of 60 psf for fixed seating plus pew weight plus floor dead load. Calculations would

brown engineers, inc., structural consultants
801 east lawrence avenue • springfield, illinois 62703
tel 217/ 528-8481 • fax 217/528-8486 • e-mail: normb@brownengineers.com

have to be made to verify this.

The floor slopes approximately 12 inches toward the altar. The cast iron radiators placed in wall niches on each side of the Church slope downward. It is not known if these were placed level and have since sunk for some reason or if they were installed with a slope.

BEARING WALLS AND ROOF STRUCTURE

The ceiling of the church is a circular barrel vault in its center area meeting " hammer" trusses projecting out from the walls and hung from the roof structure and the walls. The ceiling between the "hammer" trusses has barrel vaults perpendicular to the center vault.

We went up into the attic space and examined the roof structure. The roof is pitched at 45 degrees, a 12:12 slope. The rafters running up the slope are 1 5/8" x 5 1/4" (2x6 nominal) at 20 inch centers. The rafters are supported on three 6x6 beams which bear on the top chord of five heavy timber trusses spaced at 13'-5". These five trusses line up with and help support the wood "hammer" trusses attached to the walls. There are masonry pier projections on the outside of the building also lining up with the trusses.

The upper potions of the truss, which could be seen from the walk boards, were measured and are shown on the enclosed sketch. Some lower solid timber members of the truss were seen attached to the top chord but their alignment can't be seen without further inspection and possible removal of plaster ceilings.

The top element of the "hammer" truss, which was originally horizontal, now slopes downward on both sides of the sanctuary. This is very noticeable as one enters the Church. You measured a downward slope of 2-3 inches in 8 feet. I placed a 4 foot level on the inside surface of the exterior bearing walls and found that both walls lean outward along their full length.

The leaning of the walls and the sloping of the hammer trusses is due to a basic structural behavior which we have seen before in this kind of roof structure. The roof trusses have a sloping bottom chord, forming trusses called scissor trusses. Such a truss behaves like an arch and exerts a horizontal force on the top of the wall. The walls lean out and the truss deflects downward. Based on the 2 to 3" slope of the "hammer" truss attached to the walls, the roof trusses may be deflecting 6 inches or more.

It is not known if the roof structure and walls have reached a point of stability or if slow, additional outward movement of the walls is occurring or could occur. One solution commonly used to prevent any further wall movement is to run steel tie rods across the interior at the trusses, thru the walls and connected to a horizontal steel member on the outside face of the building. The appearance of the rods will have an architectural appearance which may be objectionable.

If it is desired to determine in detail the structural adequacy of the roof structure and walls, it would be necessary to inspect the trusses and determine all member sizes. A computer analysis would need to be accomplished to verify adequacy. The total out-of-plumbness of walls need to be determined, the details of the wall construction measured and the effect of eccentric load on the leaning walls analyzed.

EXTERIOR WALL SURFACE

The exterior face brick appears to have been completely tuckpointed at some time in the past. Numerous pieces of mortar 2 to 6 inches long or longer have fallen out of the joints. The depth of the tuckpointing appears to be very shallow. Tuckpointing is normally done to a depth of approximately 3/4 inches to bond it adequately to the brick. In my judgement, the mortar joints can be expected to continue to fall out. An experienced, commercial masonry contractor should be engaged to inspect the wall and provide advice and cost estimates for possible tuckponting of the entire exterior walls.

SUMMARY

1. The floor framing appears to be adequate but a more detailed inspection and calculations are needed to verify that. Consideration should be given to lowering the earth level in the crawl space to provide clearance between the wood and the earth and lessen the chances of termite damage.

2. The roof trusses and bearing walls have deflected considerably and leaned outward, respectively, and their structural adequacy should be examined in detail if the intent is to continue to inhabit the Church for a significant period. If a major remodeling takes place, the "hammer" trusses would presumably be rebuilt to a level position. This would entail removing and rebuilding the vaulted, plastered ceiling at the side aisles. This would be very costly. It would be prudent to tierod the building to prevent additional wall movement and truss deflection from taking place.

3. The tuckpointed mortar joints of the exterior walls should be inspected by an experienced masonry contractor. If full tuckpointing of the exterior wall is required, costs may be expected to be high.

If you have any questions regarding this report or if we can be of any further help, please contact us.

Sincerely yours,

BROWN ENGINEERING, INC.

Norman K Brown

Norman K. Brown

LICENSED STRUCTURAL ENGINEER
NORMAN K. BROWN
81-3027
SPRINGFIELD ILLINOIS
STATE OF ILLINOIS

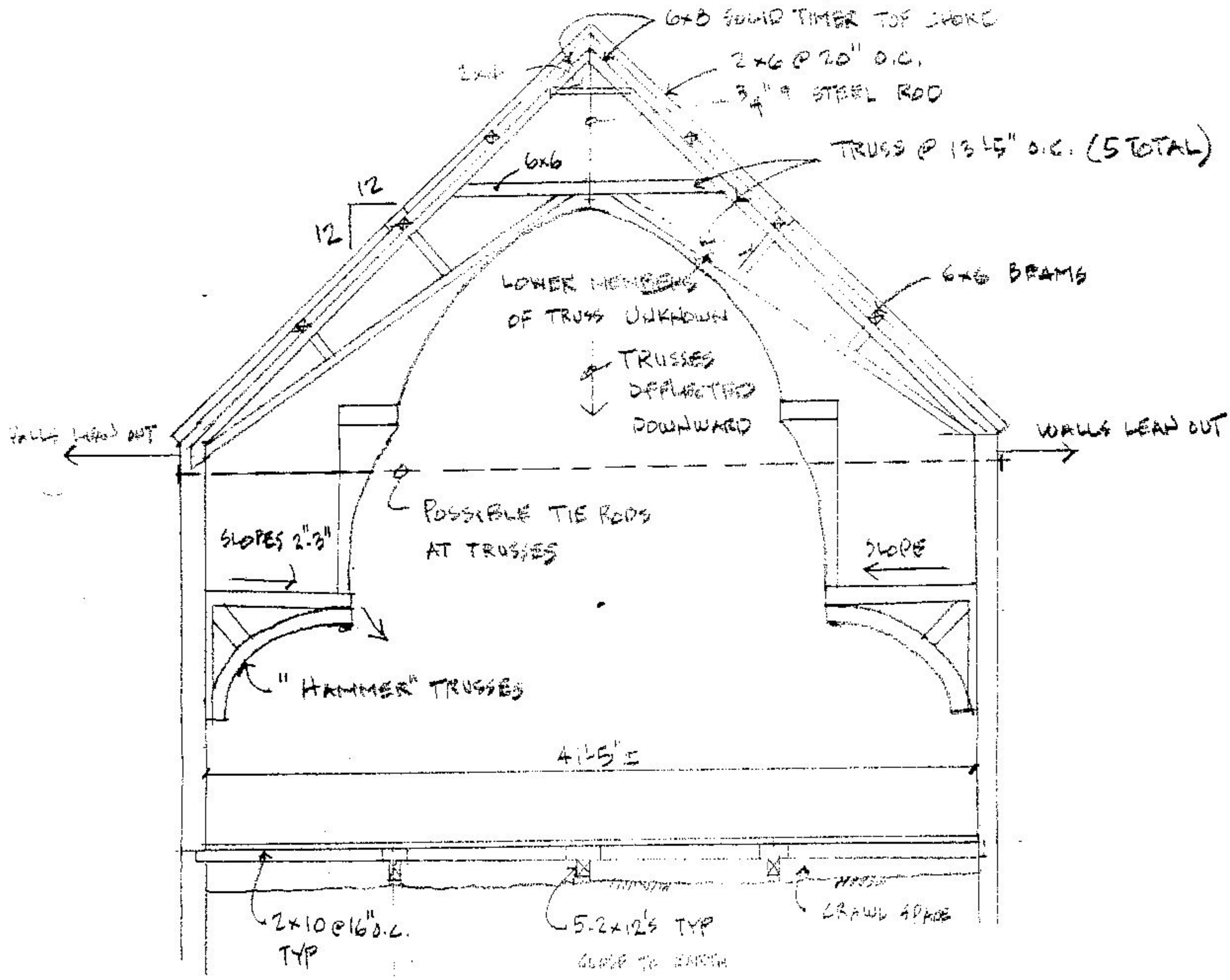
BY NB DATE 3/11/06

CHKD. BY ________ DATE ________

BROWN ENGINEERS, INC.
STRUCTURAL CONSULTANTS
801 E. LAWRENCE AVENUE
SPRINGFIELD, ILLINOIS 62703
(217) 528-8481 FAX: 528-8486

JOB NO. 2632

HOLY FAMILY CHATHOLIC CHURCH



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Appendix B

Budgetary Cost Information Prepared by Otto Baum Construction

OTTO BAUM COMPANY, INC.
CONTRACTORS

866 N. MAIN STREET MORTON, IL 61550
Ph. 309/266-7114 - FAX 309/263-1050

BUDGET PRICING

DATE: **August 20, 2013**

BID: We hereby propose to furnish material & labor to complete the work outlined herein for the sum of:

See Below

To:
Kurt Holloway
Wiss, Janney, Elstner Associates, Inc.
Northbrook, Illinois

Email: KHolloway@wje.com

We hereby submit bid for:

PROJECT: **Holy Family Parish, Lincoln, Illinois**
Masonry Repair Budget Pricing

BELL TOWER SALVAGE/REBUILD SCOPE INCLUDES: **BUDGET: $ 433,000.00**

- Document layout of original masonry construction with photos and measurements.
- Dismantle and rebuild all battlement features around the top of the tower.
- Dismantle and rebuild outer 2-wythes of brick down to belfry level.
  Temporary shoring of roof and arches will be installed as necessary.
- Remove and reset stone as needed for brick reconstruction.
- Repair spire base and roofing.

BELL TOWER PARTIAL DEMO SCOPE INCLUDES: **BUDGET: $ 221,000.00**

- Document layout of original masonry construction with photos and measurements for future use.
- Carefully dismantle all brick, stone, spire, roofing, and framing down to belfry level.
  Temporary shoring of roof and arches will be installed as necessary.
- Remove and replace roof at belfry level.
- Install copper parapet caps at new belfry parapet level.

LOWER BELL TOWER SCOPE #1 INCLUDES: **BUDGET: $ 81,500.00**

- Grind and repoint all stone and brick joints on lower tower, 1/2" depth.
- Cut out and replace 10% of the brick veneer.
- Install helical ties 16" o.c. throughout masonry façade.

LOWER BELL TOWER SCOPE #2 INCLUDES: **BUDGET: $ 130,000.00**

- Grind and repoint all stone and brick joints on lower tower, 3" depth.
  Repoint full depth, shimming brick as necessary for temporary support until mortar is installed.
- Cut out and replace 10% of the brick veneer.
- Install helical ties 16" o.c. throughout masonry façade.

MAIN CHURCH SCOPE #1 INCLUDES: **BUDGET: $ 425,000.00**

- Grind and repoint all stone and brick joints on church, 1/2" depth. (except bell tower and rebuild areas)
- Rebuild brick (2-wythe) on dormers at areas indicated on sketches. (south dormer not included)
- Cut out all window and door perimeter sealant joints and reseal.
- Install helical ties 16" o.c. throughout masonry façade.
- Remove and replace shingles, tins, and parapet copper at gables/dormers for brick rebuild. Temp in as needed to keep dry for brick repairs.

PROJECT: **Holy Family Parish, Lincoln, Illinois**
Masonry Repair Budget Pricing

MAIN CHURCH SCOPE #2 INCLUDES: **BUDGET: $ 605,000.00**

- Grind and repoint all stone and brick joints on church, 3" depth. (except bell tower and rebuild areas) Repoint full depth, shimming brick as necessary for temporary support until mortar is installed.
- Rebuild brick (2-wythe) on dormers at areas indicated on sketches. (south dormer not included)
- Cut out all window and door perimeter sealant joints and reseal.
- Install helical ties 16" o.c. throughout masonry façade.
- Remove and replace shingles, tins, and parapet copper at gables/dormers for brick rebuild. Temp in as needed to keep dry for brick repairs.

CHIMNEY SCOPE INCLUDES: **BUDGET: $ 13,500.00**

- Demolish chimney cap and all brick down to below roof line.
- Install framing and new roofing at abandoned chimney opening.

SCOPE EXCLUDES:

- Historic lime putty/laboratory formulated mortars. This can be added if requested.
- Temporary heat and enclosures. We will work while temperatures allow.
- Removal or relocation of mechanical, electrical, and/or plumbing interferences. We will work around.
- Replacement of windows or protective glazing.
- Bonds
- Permits
- Tax on new materials

CLARIFICATIONS:

- Please note that this scope was derived from the WJE notes and photos dated July 25, 2013.
- New brick and mortar to match existing as closely as possible from available local brick supplier stock.
- All work to be performed during regular business hours.
- Water and electric to be provided by Owner.
- Pricing assumes work will be completed before next scheduled labor rate increase (May 1st).

CONTRACTOR'S GUARANTEE		**ACCEPTANCE OF BID**	
We guarantee all material used in this contract to be as specified above and the entire job to be done in a neat, workmanlike manner. Any variations from plan or alterations requiring extra labor or material will be performed only upon written order and billed in addition to the sum covered by this contract. Agreements made with our workmen are not recognized.		The above specification, terms and contract are satisfactory, and (I) (We) hereby authorize the performance of this work. BY (please print):	
DATE: **08/20/13**	SIGNED: **Dan Bagley**	DATE:	SIGNED:

This contract is void 30 days from date unless signed and returned to bidder.
WE COMPLY WITH ALL WORKMAN'S COMPENSATION & PROPERTY DAMAGE LIABILITY INSURANCE LAWS
All information contained herein is confidential and proprietary.

Member of ***Sealant Waterproofing & Restoration Institute***

Dan Bagley

From: Barry Moore <bmoore@kreiling.com>
Sent: Monday, August 19, 2013 3:51 PM
To: Dan Bagley
Cc: Tim Moore
Subject: Holy Family Church Lincoln, IL

Dan,

Here's what I have so far. I think this is everything:

Remove and replace roof inside bell tower. Nothing fancy just functional.
Remove and replace approximately 100 lineal feet of copper parapet at same location.
Haul away debris. **$17,570.00**

Demo and rebuild spire base roofing (copper, ice and water, solder, etc.)
Haul away debris.
$33,220.00

Remove shingles, tins, and parapet copper at 6 smaller gables.
Include some type of temporary dry in.
Replace shingles, copper tins, and copper parapet when complete.
Haul away debris. **$91,014.00**

2 larger gables (including main)
Same as smaller gables above.
$37,234.00

Chimney demo and reflash with copper and new shingles.
Haul away debris.
$6,423.00

We will provide the disposal of materials. All other lifts provided by OBCI. We will work with OBCI to insure temporary dry in and efficient completion of work.

***** **budget pricing only** *******

Barry Moore
Estimator
Kreiling Roofing Company
2335 W. Altorfer Dr.
Peoria, IL 61615
Ph. 309-673-3649 x 110
Cell 309-573-8497
bmoore@kreiling.com