Blessed Sacrament Church

Hyde Square | Jamaica Plain, MA

Conditions Assessment Report

prepared for
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INTRODUCTION

Robert Silman Associates (RSA) has been retained by Tise Design Associates to perform a feasibility study of the adaptive re-use of the Blessed Sacrament Church and the Cheverus School. Both buildings are located on the Blessed Sacrament campus, a 3+ acre site in the heart of the Hyde Square neighborhood of Jamaica Plain, MA (Figure 1). The scope of the study includes a survey of the church and school to document the existing conditions, identify typical areas of structural concern or deterioration and make recommendations for repairs. Additionally, RSA will provide a brief discussion of the potential structural considerations of adaptive re-use on the two buildings. The primary focus of the investigation has been the Blessed Sacrament Church, where moisture infiltration issues appear to be causing damage at the interior.

Figure 1. Aerial View of Hyde Square

This report summarizes the findings of a condition assessment of the Blessed Sacrament Church and is based on observations from site visits conducted on June 23 & 24, 2014, and a review of existing drawings. The documentation made available to RSA includes:

- Blessed Church/Cheverus School Backgrounds developed by Tise Design Associates dated July 1, 2014

Durkee Brown Viveiros & Werenfels Architects (DBVW), preservation architects, have also been retained to provide a multi-disciplined and comprehensive visual assessment of the Church's existing conditions that identifies all building materials and assemblies, and documents the general extent and types of deterioration present along the exterior and interior of the building envelope.

Figure 2. Interior of the Blessed Sacrament Barrel Vault

BACKGROUND

The Blessed Sacrament Church is an example of early 20th century Italian Renaissance Revival ecclesiastical architecture. It was built between 1910 and 1913, with the cornerstone laid on September 28, 1913. It was designed by architect Charles R. Greco (1892–1963) in a Latin cross plan with an approximately fifty foot high barrel-vaulted main nave and an octagonal belvedere dome nearly ninety feet high at the crossing (Figures 2 and 3). The main church footprint is approximately 16,000 square feet in size and includes a 2,000+ square foot organ gallery, as well as an attached Baptistery and

Figure 3. Interior of the Blessed Sacrament Dome

Sacristy, to the southwest and northwest of the main church, respectively. The church basement is currently unfinished. Additionally, there are two large flue stacks at the north end of the church located behind the altar believed to be part of the church's original air circulation system. A cross section through the church is provided below as Figure 4.

The structure of the church consists of a combination of unreinforced brick masonry bearing walls and steel columns supporting steel roof trusses over the nave and radial steel roof trusses over the dome. These trusses support the wood-framed roof, as well as the hung plaster ceiling. Both the main floor and organ gallery floor are steel-framed with wood joist infill. Steel columns are supported by a combination of masonry and stone piers. There is not currently a finished basement level; however the basement has been excavated about 6-8 feet and allowed access beneath the church. The majority of the current structure is original, with only a pair of reinforced concrete framed stairs added at an unknown date that provide access to the altar area at the north of the structure.

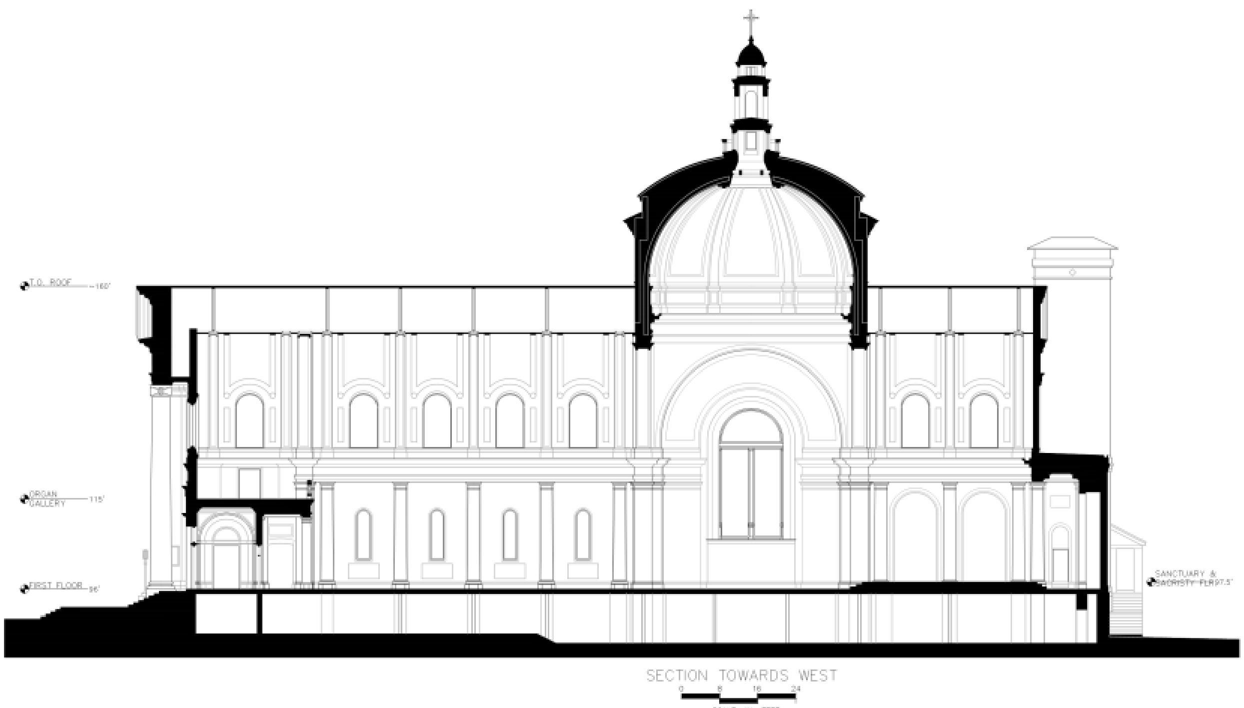

Figure 4. Section through Church Towards West

STRUCTURAL OBSERVATIONS

Roof Structure

Dome

Domes develop two primary internal forces, meridional and hoop, that act roughly perpendicular to each other. Similar to an arch, a dome develops meridional forces to transfer gravity loads to the base. In general, these forces are compressive and increase in magnitude from the crown to the base for any dome loaded uniformly and asymmetrically (Figure 5). Additionally, domes develop hoop forces that act in the latitudinal direction as parallel rings. Towards the base of a dome hoop forces are tensile, meaning that the forces on the dome increase to the point that they cause the dome to want to thrust outward. As a result, domes often have a tension ring at the base to contain this thrust.

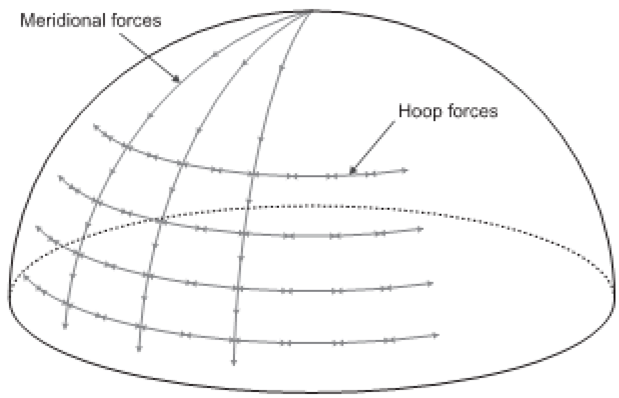

Figure 5. Internal Forces that Develop in Domes

The roof framing of the octagonal belvedere dome is shown schematically in Figure 6 below. The dome consists of wood rafters spaced at roughly 16" on center, set square to the edge of the octagon, and supported by a steel trussed dome structure. The steel dome structure consists of 8 radial steel trusses (Figure 7) connected by a series of steel members that form "rings" connecting the trusses at varying locations. These "rings" are indicated by red nodes in Figure 6. The rafters are set at two different angles (Figure 8) to create the dome roof with the higher rafters being supported fully by steel rings at either end, and the lower rafters being supported by a steel ring at the high end and framing into the masonry bearing wall forming the drum of the dome at the low end. It appears that within the masonry walls of the octagonal drum of the dome there are a number of steel truss elements. The radial trusses include a vertical member that is encased in the masonry and located at the vertex of the octagon. Additionally, there are at least two rings of terra cotta encased steel beams that support the walls of the drum and serve as tension rings to resist the thrust of the radial trusses (Figure 9). There is also a series of steel hangers supported by channels on the outside of the drum walls from which a steel ring is hung to support the ceiling of the dome (Figures 10 and 11). The radial trusses are composed mainly of steel angles with the "ring" members being either channels (Figure 12) or wide flanges. The truss connections are typically bolted connections.

The cupola that sits atop the dome is supported by 8 steel angle posts that extended up from the oculus of the dome.

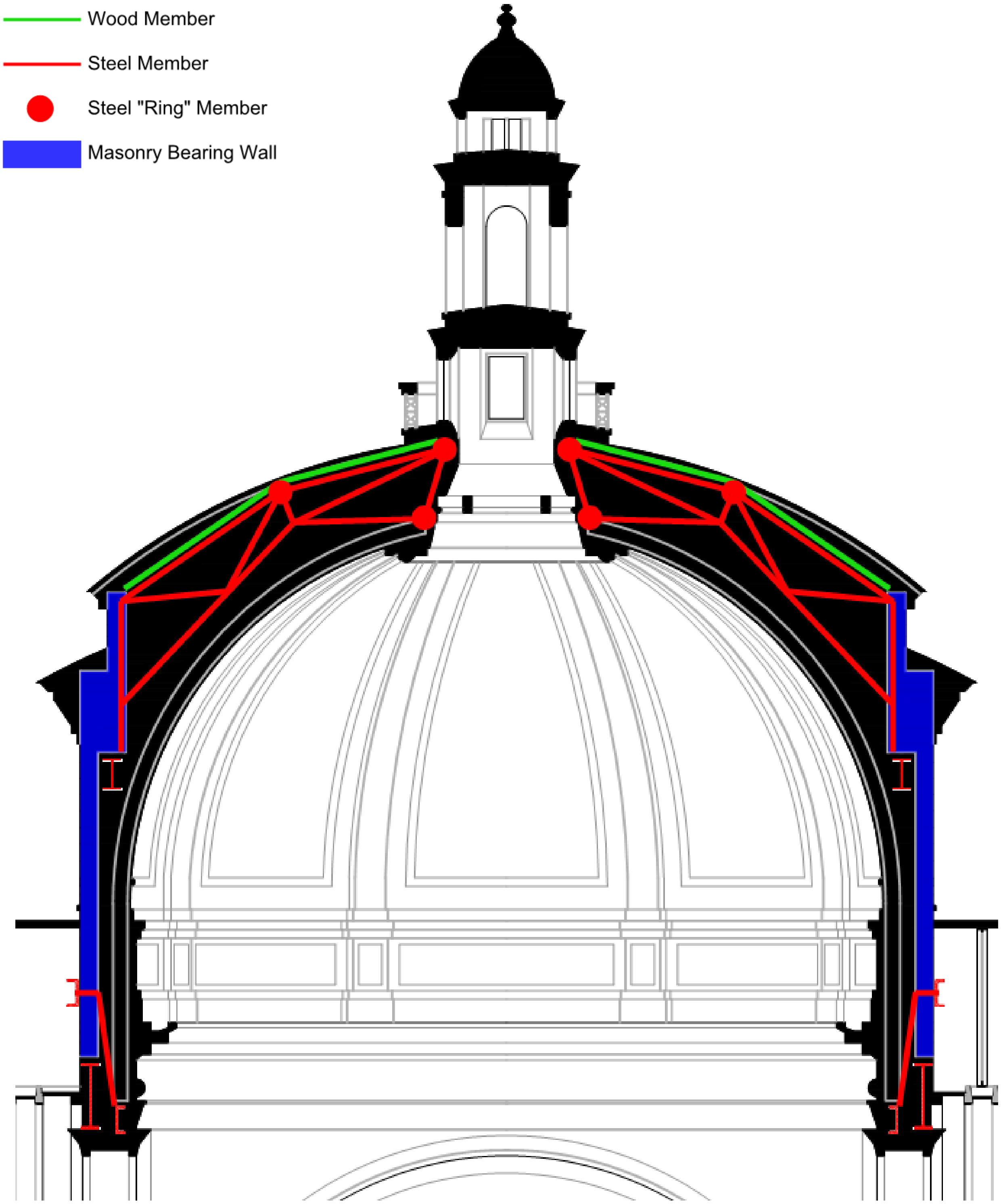

Figure 6. Section through Dome showing Schematic Structure

Figure 7. Radial Steel Trusses

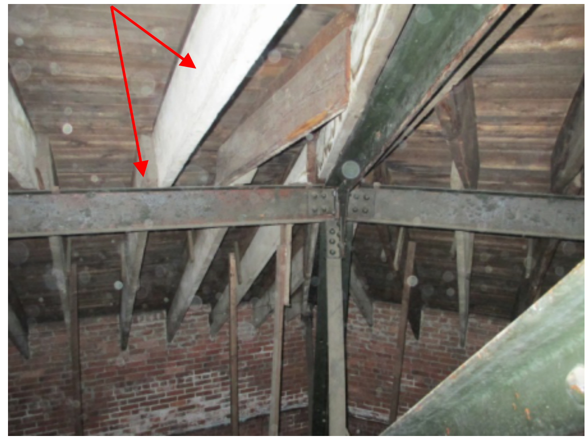

Figure 8. Dome Roof Rafters Set at Two Angles

Figure 9. Terra Cotta Encased Steel Beam at Base of Drum

Figure 10. Steel Hangers at Interior of Drum

Figure 11. Steel Hanger Picking Up Steel Channel “Ring”

Figure 12. Steel Channel at Exterior of Drum for Hangers

The roof framing at the dome appears to be in good condition. The condition of the wood rafters and steel structural elements show minimal signs of weathering, which is consistent with the general material characteristics and age of the structure. Though there are many separate elements (wood rafters, radial steel trusses, steel rings - both exposed at the roof and embedded lower within the masonry dome) that create a complex and intricate structural framing system, RSA believes the dome framing provides is adequately framed, providing an acceptable load path to translate the loads down to the vertical structural elements (explained above), and its condition is consistent with the church's age of construction.

Main Church

The roof framing of the main church over the nave is shown schematically below in Figure 13. It consists of 6 heavy timber rafters, roughly 10" wide by 12" deep, running the length of the nave (North-South) supported by triangular steel trusses (Figure 14). There are two rafters forming the roof ridge; two intermediate rafters support each side of the sloping roof that spans from the ridge to the clerestory masonry walls. The rafters bear on the steel trusses where vertical or diagonal members frame into the trusses' top chords (Figure 15). The steel trusses frame into plate-girder columns embedded in the clerestory masonry bearing walls (Figures 16 and 17), which are then supported on interior spandrel beams (discussed in later sections of the report). The trusses are spaced such that they are centered between clerestory windows.

There was no access to the roof structure over the altar or either transept so the framing systems in these areas could not be determined at this time; however, the roof structure over the nave is likely typical for these areas as well.

Similar to what was observed at the dome, the roof elements appear to be in good condition. No water damage was noted. The layout and member sizes of the roof structure appear to be structurally adequate for the observed loading conditions.

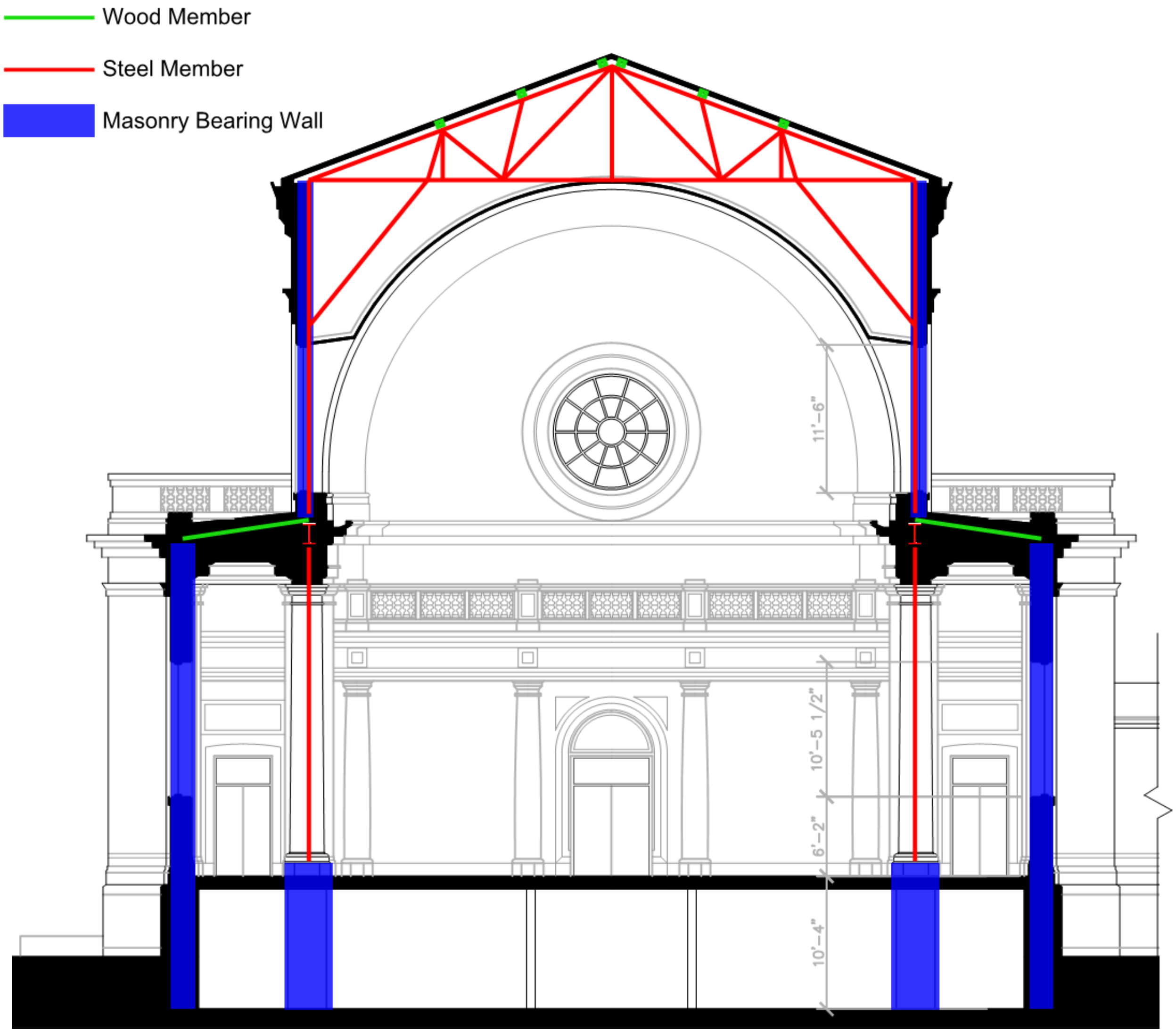

Figure 13. Section through Nave showing Schematic Structure

Figure 14. Steel Roof Truss

Figure 15. Steel Roof Truss Supporting Heavy Timber Framing

Figure 16. Steel Plate Girder Column Embedded in Wall

Figure 17. Steel Plate Girder Column Embedded in Wall

<u>Transepts</u>
The main aisle of the church is intersected by a transept at the northern end of the church at the dome. The roof framing was inaccessible at this time, and the roof could not be seen from the exterior due to the obstruction of the transept's masonry parapet walls.

<u>Side Aisles</u>
At the base of the clerestory, the church protrudes out to create east and west side aisles. These side aisles have flat roofs, slightly pitched toward the exterior to allow for proper roof drainage. There was not access to the side aisle roof framing, but a visual inspection from the ground floor at areas where framing was exposed due to extensive water damage of the interior finishes implies that the side aisle roof framing consists of wood framed rafters that frame between steel spandrel beams at the base of the clerestory and the exterior masonry walls. It is unclear at this time whether or not there is embedded steel at the top of these exterior masonry walls. The framing layout is shown schematically in Figure 13 above.

Latticed wood lath and ceiling framing under the roof joists obscured a detailed assessment of the roof framing at this time. However, access above the roof and review from the first floor showed no outward signs of structural deterioration at these elements.

<u>Space behind the Altar</u>
The space behind the altar between the two large flue stacks is covered by a flat roof. This space is roughly the same height as the side aisles. There was no access to this roof framing, but a visual inspection from the interior of the flue stacks at the basement level implies that the side aisle roof framing consists of wood-framed rafters that bear on the north exterior masonry wall.

<u>Sacristy</u>
The Sacristy roof is a flat, mansard roof roughly six feet deep. The roof is wood-framed; however the exact framing configuration was not visible. There was very limited access to the Sacristy roof due to the large height difference between the drop ceiling and roof framing; the available ladders on site could not bridge this gap. A large opening for a skylight had been cut in the sacristy roof at some point after the Sacristy's construction. There is significant sagging of the Sacristy roof in the area surrounding this skylight. This sagging is visible from the exterior (Figures 18 and 19). Since the framing could not be viewed up-close, it could not be confirmed whether or not the roof framing is structurally failing in this location. Access should be provided in order to review the condition of the roof framing in this location; until then, this area should not be accessible to patrons and proper caution should be taken by all staff that must access areas in the Sacristy.

Figure 18. Sacristy Roof with Skylight

Figure 19. Sacristy Roof with Skylight

Baptistery

The Baptistery roof framing was not visible, though an interior review revealed the plaster dome ceiling to be supported by wood lath. For more information on the Baptistery interior, please see DBVW's report.

Vertical Support Elements

Masonry

The vertical load carrying elements in this structure are a combination of steel columns and masonry bearing walls, predominantly standard red brick. Consistent with DBVW's report, RSA believes the Blessed Sacrament Church's exterior masonry envelope is generally in good condition, with localized areas of distress and deterioration that are consistent with the age and materiality of the building. The observations provided below are focused on the structural integrity of the masonry bearing wall system, for further information regarding the condition of the masonry envelope please see DBVW's report.

Dome

The dome is supported by an octagonal masonry drum highlighted in blue in Figure 6 and seen in Figure 20 on the following page. Partial mortar loss at the corners of the octagon revealed steel embedded columns in the topmost portion of the drum. These columns deliver the roof framing loads down the first steel ring embedded in the masonry. Overall, the masonry appears to be structurally sound; the embedded steel shows no outward signs of deterioration or movement, which would be translated onto the masonry elevations. There is a major area of masonry deterioration, at the drum, though it is most likely the result of improper through-wall flashing.

There is significant efflorescence in a band at the upper portion of the drum, approximately four to five feet below the top of the masonry drum (Figure 21). Upon closer review, this area has significant mortar degradation and loss; the mortar that remains is a powdery substance that is easily washed or blown away. This area of deterioration lies directly above the copper through-wall flashing.   The advanced state of brick and mortar damage is most likely due moisture infiltration through this through-wall flashing joint. The through-wall flashing creates an open joint for moisture to enter through the wall; this constant water infiltration has accelerated the mortar deterioration in this location. There does not appear to be noteworthy cracking or spalling of brick that coincides with this mortar deterioration and efflorescence; therefore, RSA believes this is most likely an envelope condition due to improper through-wall flashing.


Figure 20. Blessed Sacrament Dome


Figure 21. Efflorescence at Interior of Drum

Clerestory Walls

The main church roof is supported by steel columns embedded in the masonry clerestory walls highlighted in blue in Figure 13. The walls are in fair condition, with minor vertical cracking seen in the mortar joints between the clerestory windows (Figure 22). This is most likely attributed to freeze-thaw effects of moisture infiltration through the brick-work that is cladding the embedded steel. The interiors of the steel columns (seen from the attic) do not show any signs of water issues or rusting (discussed later in this report). The masonry appears to be structurally sound, and the cracking seen will be alleviated with proper envelope repair. The steel lintels above the windows show minor signs of rust and deterioration, typical of exterior steel exposed to the elements (Figure 23).

Side Aisle Walls

The side aisle roofs are supported by masonry walls shown in Figure 13. The masonry appears structurally sound and in good condition, with no major areas of cracking, mortar loss, spalling or efflorescence. The steel lintels over the windows show signs of rust and minor deterioration, similar to the typical weathering seen at the clerestory windows.

Figure 22. Blessed Sacrament East Clerestory

Figure 23. Steel Lintel, Representative Condition

Transept Walls

The transept roofs are supported by full height masonry walls. Overall the masonry appears structurally sound, with no major areas of cracking, mortar loss, or efflorescence and only one localized area of brick loss. Envelope repair by means of repointing is visible on the north elevations (Figure 24) of both transepts.

An entire decorative soldier course of brick above the window of the east transept wall spalled off at some point in the past (Figure 25). A steel channel is left in its place; repair brick above and at the sides of the channel indicate that this channel may have been an addition to help support the brick coursing that was once supported by the previously spalled bricks (Figure 26). The west transept gives us a clue as to how the brickwork is supposed to look and function above the window (Figure 27).

The channel at the east transept – completely exposed to the elements – is in an advanced state of deterioration. Rust is evident from grade and pitting can be seen along the underside of the bottom flange. The channel appears to be supporting the replacement brick adequately, though a closer inspection (by means of a lift) would properly identify its current structural condition. The lower steel lintels over the windows show signs of rust and minor deterioration, similar to the typical weathering seen at the clerestory.

Figure 24. East Transept Return Wall from Centre Street

Figure 25. East Transept Wall

Figure 26. East Transept Steel Lintel with Missing Brick

Figure 27. West Transept Wall

Front Façade (South)
The front facade masonry was reviewed from grade and appears to be structurally sound, with no major areas of cracking, mortar loss, spalling or efflorescence (Figures 28 and 29).

Figure 28. Blessed Sacrament Front Facade

Figure 29. Blessed Sacrament Front Façade

Rear Façade (North)
Save for the two large flue stacks, the rear facade masonry appears to be structurally sound, with no major areas of cracking, mortar loss, spalling or efflorescence.

From grade, both the east and west flue stacks show signs of masonry degradation. The northeast flue stack shows cracking, spalling, and bowing at the northernmost corners at an elevation roughly in line with the top of the clerestory windows (Figures 30, 31, and 32). The northwest flue stack has obvious repairs that are in line with the deterioration seen at the east flue stack (Figure 33). It should also be noted, that there was a significant amount of brick rubble in the basement at the base of the flue stacks (Figure 34). An interior review of the flue stacks showed an existing opening at the first floor that has since been blocked up with CMU (Figure 35). A closer review of these stacks is necessary to understand the severity of the situation.

Figure 30. Northeast Flue Stack Exterior

Figure 31. Northeast Flue Stack Brick Damage (Close-up)

Figure 32. East Elevation of Northeast Flue Stack Showing Brick Bulging Out of Plane

Figure 33. Northwest Flue Stack Brick Replacement

Figure 34. Brick Rubble at Base of Flue Stack

Figure 35. Previous Opening in Flue Stack Blocked Up

As a part of the façade, there are two reinforced concrete and masonry stairs leading into the rear of the church (Figures 36 and 37). These stairs were added at a later date, evidenced by a joint between the original building envelope and the stair envelope. There is a storage closet beneath the northwest stair which provided access to review the underside of the stair (Figure 38); the area beneath the northeast stair was inaccessible at the time. These stairs are in poor condition. The northwest stair has major spalling of the concrete beams and piers that frame the stair and a fair amount of exposed rebar. There is also severe efflorescence on the underside of the stair (Figures 39 and 40). Additionally, there is a major step crack in the exterior masonry wall (Figures 37), although it isn't as visible on the interior (Figure 41). Similar damage is present at the northeast stair, although not to the same extent. This damage is most likely a result of moisture infiltration issues.

Figure 36. Northeast Entrance Stair

Figure 37. Northwest Entrance Stair

Figure 38. Storage Space Beneath Northeast Entrance Stair

Figure 39. Underside of Northwest Entrance Stair Slab

Figure 40. Efflorescence Deposition on Building Wall

Figure 41. Interior Elevation of Northeast Stair Brick Wall

Sacristy

The sacristy masonry appears to be structurally sound, with no major areas of cracking, mortar loss, spalling or efflorescence (Figure 42). Nearly all steel lintels show minor signs of rust, but the brickwork around them appears to be in good condition. There is a minor step crack from the lower corner of the northern most basement window on the west façade of the sacristy (Figure 43).

Figure 42. Sacristy Exterior View

Figure 43. Northwest Corner With Minor Step Cracking

Baptistery

The Baptistery masonry is in poor condition, with large areas of cracking and mortar loss. The upper band of masonry has significant mortar loss and small areas of spall (Figure 44). Additionally, there are large open joints on the northeastern façade of the Baptistery in the mortar joints separating the soldier course at the corner of the octagon from the Flemish bond (Figures 45 and 46). The open joints run the full height of the wall (from the lower band of decorative terra cotta to the base of the brickwork). The masonry bearing walls of the Baptistery were not visible from the interior; however the interior space was extremely damp and humid, with severe water damage to the decorative finishes (Figure 47).

Figure 44. Baptistery Upper Band of Masonry

Figure 45. Baptistery Northeastern Elevation

Figure 46. Close-up of Brick Separation at Northeast Elevation

Figure 47. Plaster Damage on the Interior of the Baptistery

<u>Steel</u>
As noted in the sections above, the roofs of the dome and main church are supported by steel truss elements that transfer the load down to spandrel beams (at the main church) and steel compression rings (at the dome). These elements then transfer the loads down to the vertical load carrying elements of the structure, which are a combination of steel columns and masonry bearing walls. The clerestory columns are supported by terra cotta encased steel columns that form the interior boundary of the side aisles (Figure 48). The roof over the side aisles spans between these steel beams and columns and the masonry exterior wall.

The clerestory steel columns can be seen from the attic and appear to be in good condition; there are no outward signs of deterioration and the brickwork around the steel's embedment shows no signs of cracking or movement. Similarly, the small portions of steel that were visible inside the church were in good condition. It appears the terra cotta and brick around the spandrel beams and interior columns provided coverage and protected the steel elements from the moisture infiltrations affecting the decorative plaster (Figure 49).

Figure 48. Church Interior Showing Location of Clerestory Columns

Figure 49. Exposed Top of Steel Clerestory Column

Floor Framing

<u>Organ Gallery</u>
The organ gallery level is a partial mezzanine at the southern end of the nave (Figure 50). It is supported by a combination of four interior steel columns, interior piers and perimeter masonry bearing walls. There was limited access to the organ gallery floor framing; localized portions of framing were visible from two small probes that had already been opened in the organ gallery floor. The probes revealed east-west steel beams spanning between steel columns and/or brick piers at the north end of the mezzanine. The organ gallery floor framing consists of two bays of wood joists that frame between these steel elements at the north end and the masonry bearing walls to the south. The joists are two different sizes in the two bays: 1 3/4" x 9" wood joists spaced at 16" on center and 2" x 14" wood joists spaced at 16" on center. This is consistent with the two different length spans present at the organ gallery level. From the limited area of review, it appears that both the wood and steel elements of the organ gallery framing are in good condition with no visible signs of structural instability or material deterioration.

<u>Main Church</u>
The first floor framing was visible from the unexcavated basement space the full length of the church (Figure 51). The exposed ground floor framing consists of wood joists that span between east-west running steel beams (Figure 52); these beams span between interior steel columns, interior brick piers and the perimeter exterior masonry bearing walls. The steel beams range in size from small 6" channels to deep 18" W-shapes based on their spans and the amount of flooring they are supporting. This floor framing is quite regular, with the

majority of the wood members being 2" x 12" wood joists spaced at 16" on center. Shorter spans at the north in the space behind the altar and at the south under the choir are 2" x 10" wood joists spaced at 16" on center. There are a few areas of longer spans, including the framing under the altar, which are 2" x 14" wood joists spaced at either 12" or 16" on center. The framing under the altar has been upset (raised) to accommodate the raised altar. The wood joists and interior steel framing appear to be in good condition; there were no signs of structural stability concerns nor were there significant signs of deterioration.

The floor under the narthex differs from the rest of the church; while the main portion of the nave, transept and altar is a wood joist system supported on steel framing, the framing beneath the main entrance is a flat terra cotta arch flooring system (Figure 53). Terra cotta tiles span between steel beams; a central keystone midspan allows the terra cotta to act purely in compression as a flat arch support system. This change in construction was likely due to heavier decorative loads at the narthex compared to the rest of the church: while the main area of the church is tiled with checkerboard tile flooring, the entry has decorative terrazzo flooring and marble-clad walls. The terra cotta flat arch flooring appears to be in good condition.

Figure 50. Organ Gallery

Figure 51. Underside of First Floor Framing from the Basement

Figure 52. First Floor Interior Steel Beams and Column

Figure 53. View of First Floor Structure Beneath Narthex

<u>Sacristy</u>
The first floor level of the Sacristy floor framing was not visible, and therefore, could not be reviewed.

<u>Baptistery</u>
There was limited access to the underside of the Baptistery framing from the basement, but it was noted that the floor framing is similar to that at the narthex: a flat terra cotta arch system spanning between steel beams. This area has finishes similar to the entry (terrazzo flooring and marble wall paneling), which is most likely the reason for the choice in terra cotta arch floor framing. Only a small portion of the framing could be seen, so a complete review of the area could not be completed at this time.

Basement

The Sacristy basement is a slab on grade structure that provides access to the unfinished basement beneath the church. The church main basement is an unfinished area that appears to have an uneven layer of disrupted soil over its entire surface; the height of the space is anywhere from four to six foot clear from grade to underside of the first floor steel. Along the west side of the building, the soil level rises from the south end of the church to the north, making it difficult to determine the depths of each foundation relative to each other and to grade.

The layer of disrupted soil is probably the soil removed and relocated when the interior footings were being inserted. The basement level did not show any significant signs of distress or deterioration; staff stated that there has never been a water infiltration or ponding issue in the basement. From the basement, the structural foundations were reviewed.

Foundations

The building is founded on a combination of stone wall footings, brick and stone piers, and concrete footings.

<u>Masonry Walls</u>
The masonry perimeter walls are founded on continuous stone footings. The brick masonry transitions to a granite stone course approximately one foot above the soil level; beneath this course is an ashlar stone continuous wall footing. The bottoms of these footings were not visible and could not be determined at this time.

The foundation is thickened beneath the stone altars at the east and west transepts due to the heavier marble altars. These foundations each consist of two brick piers three foot wide-by-four foot deep, with a masonry arch spanning between them. This is set flush with the interior face of the transept wall. The bottoms of these footings were not visible.

The masonry walls and continuous wall footings appear to be in good condition with no visible signs of settlement, distress or deterioration.

<u>Dome</u>
There are four major piers supporting the dome structure at the foundation level (Figure 54). It is unknown whether this load is being carried to the piers by masonry or steel columns. These piers are brick and roughly seven and one-half feet square founded on stone footings set on a concrete mud slab. These robust foundations are in good condition with no visible signs of distress or deterioration.

<u>Steel Columns</u>
The steel columns are supported on two different types of footings. The major steel columns that are supporting the clerestory walls are supported by three foot square brick piers that are founded on stone footings set on a concrete mud slab (Figures 55 and 56). The remaining steel columns, which are supporting

only the first floor framing above, are founded on two foot square concrete footings (Figure 57). These columns also generally have a two foot square wood plank box-out around their base allowing visual access to the base plate; this was most likely shoring to locally insert the interior footings without excavating the entire basement. The columns foundations appear to be in good condition with no signs of structural instability or distress.

Figure 54. Stone Foundation for Interior Brick Pier

Figure 55. Brick Pier at Clerestory Column Footings

Figure 56. Stone Foundations Beneath Clerestory Columns

Figure 57. Concrete Spread Footing Interior Steel Columns

STRUCTURAL RECOMMENDATIONS

Overall, the Blessed Sacrament Church is in very good condition. The majority of the masonry bearing walls, structural steel, and wood framing that RSA was able to view show no outward signs of distress. Localized areas showed significant deterioration but the extent was inconclusive due to limited access (particularly at the brick flue stacks, the transept lintel and the sacristy roof) and should be investigated further. This additional review will determine whether these sections pose any immediate structural threats. At this time, caution should be taken around these areas. The remaining items that were reviewed showed no imminent life safety concerns; however, repairs are still recommended for standard care and maintenance of the structure.

The table below lists current building conditions on the site, with recommendations for how to address the observed damage. The conditions have been prioritized according to three levels depending on the urgency of the recommended repair; this will aid in phasing the required repair work needed at the church. Priority 1 items are existing conditions that may pose a life safety risk and represent conditions that can lead to further deterioration or structural instability of building materials and systems; they should be addressed within the next year. Priority 2 items are moderate concerns intended to address building materials that are in poor condition but do not pose an imminent life safety concern. These repairs represent areas that, when addressed, will mitigate future material degradation and distress; they should be addressed within the next 1-5 years. Priority 3 items are repair items that are not immediate concerns but should be addressed as part of a regular maintenance campaign on site.

Priority 1 Items

Building Component	Condition	Recommendations
Brick Flue Stacks	From grade, both flue stacks show significant bowing, cracking, and spalling.	Further investigation and analysis is recommended to assess the stability of the flue stacks. Access by means of a lift would allow a closer review of the extent of brick damage. Should it be found that the stacks are in a serious state of instability, immediate steps must be taken to stabilize them. Once stable, a proper repair campaign can be mapped out.
Sacristy Roof	The sacristy roof is visibly sagging and the condition of the roof framing is currently unknown.	Access to this area is recommended to determine the stability of this roof structure. The framing is to be reviewed to determine whether or not this is the failure of just the roofing material or the roof framing system as well. Should it be determined that the roof framing has collapsed, the area should be cautioned off immediately and temporary shoring should be inserted to stabilize the area.
East Transept Lintel	A band of brickwork has spalled off and a steel channel inserted in its place to support the above decorative brickwork. The channel appears to be deteriorated – though the extent is unknown.	Access by means of a lift is recommended in this area to determine how deteriorated the steel channel support is and if the surrounding brickwork is damaged. If visual inspection reveals the steel to no longer providing the necessary support for the brickwork, the area should be immediately shored.

Priority 2 Items

Building Component	Condition	Recommendations
Brick Flue Stacks	From grade, both flue stacks show significant bowing, cracking, and spalling.	Due to the extent of cracking on the east flue stack and the attempted repair on the west flue stack it should be assumed that repairs could include a full rebuild of the upper portion of the flue stacks or the introduction of new structure to help support the upper portion of the flue stacks. This program would be secondary to an immediate stabilization of the flues should further investigation reveal them to be in an advanced state of deterioration.
Sacristy Roof	The sacristy roof is visibly sagging and the condition of the roof framing is currently unknown.	The roof that has collapsed and should be removed and replaced. If further investigation reveals failure of the roof framing, a new roof structure must be designed and implemented.
East Transept Lintel	A band of brickwork has spalled off and a steel channel inserted in its place to support the above decorative brickwork. The channel appears to be deteriorated – though the extent is unknown.	Depending upon the severity of the condition, repairs could range from the removal of the steel channel and localized brick repair to a complete removal and replacement of several brick courses in order to stabilize the masonry in this location.
Baptistery Masonry	The Baptistery masonry is in poor condition, with large areas of cracking and mortar loss. The upper band of masonry has significant mortar loss and small areas of spall. Additionally, there is a large open joint on the northeastern façade.	Refer to DBVW's report for recommednations on masonry envelope elements. Further investigation, possibly with some moisture monitoring and invasive probing into the open joint, is recommended to determine the makeup of the walls to determine whether repairs are either localized brick repair or complete disassembly and rebuild.
Rear Church Stairs	The two reinforced concrete and masonry stairs leading into the rear of the church are in poor condition, with areas of cracking, movement and severe concrete deterioration.	These stairs should be repaired. The concrete landing and steps that are severely cracked and deteriorated should be recast and the brick walls rebuilt.
Baptistery Lintel	There is a minor step crack beginning from the lower corner of the northern most basement window on the west façade of the sacristy, indicative of a more significant level of rust jacking at bearing end of this steel lintel	Lintel is to be scraped, primed and painted. Bearing ends are to be locally rebuilt once the steel is properly recoated.

Priority 3 Items

Building Component	Condition	Recommendations
Window Lintels	The windows lintels show minor signs of rust, typical of exposed steel.	All the window lintels should be scraped, primed and repainted. The brick around the lintels should be reviewed to ensure no rust jacking is occurring at the lintel bearing ends.

CONSIDERATIONS FOR FUTURE USE

There are two main considerations for future use of the Blessed Sacrament Church as a community space. The first is the adequacy of the main floor framing and the second is the potential creation of a habitable basement space.

The development of the church into a community space will require that the current structure can support the required loading criteria for the proposed intent of the space. Typical gathering spaces require a live load capacity of 100 pounds-per-square foot. A cursory review of the main floor framing indicates that the flooring could not support this code-mandated assembly load; however, this preliminary analysis assumes conservative structural values for the wood framing without knowing the exact species and grading of the wood joists. Therefore, wood grading should be completed to determine the actual structural properties of the framing to allow a more accurate structural analysis. Should the wood grading not provide stronger values, additional floor framing pieces (also known as sister joists) can be added to bolster the floor's capacity. Since the framing is exposed in the basement below, adding reinforcement appears to be a viable option.

The second consideration is whether or not the basement could be converted to habitable space. The major consideration in this possibility is the desired depth of the basement relative to the bottom of the existing foundations. As long as the finished grade of the new basement space would remain above the elevation of the shallowest bottom-of-footing, excavation of the basement could proceed without requiring underpinning of any of the foundations. In addition to being costly, underpinning poses a serious risk to the structure, as there will be associated settlement that could cause new damage to the structure. Based on our initial observations, RSA was not able to obtain bottom-of-footing elevations for either the masonry bearing walls or the interior columns. Two test pits were dug at interior columns, but the bottom-of-footing was indeterminable. The masonry bearing wall footings seem to be at a higher elevation than the interior footings. If this is the case, the entire basement would not be able to be lowered due to the proximity of the wall footing to grade without extensive wall underpinning efforts. It would be possible to convert a smaller interior area of basement space without undermining the wall footings.

The level of fill in the basement appears to increase from the rear of the church towards to south end of the church approaching the sidewalk—it is not known if the footings maintain a constant elevations despite this slope. Additionally, the basement-level steel columns founded on concrete footings seem to be placed shallower than the large stone and brick masonry piers. In order to better understand the potential to convert the basement to habitable space, a series of test pits would need to be dug to provide a clearer picture of the various footing elevations that exist. In addition, it is recommended that a geotechnical engineer be retained to determine soil properties, such as depth of water table, soil stratum, and other foundational information necessary to determine the plausibility of converting the basement.