

Quinn Chapel
HPRES 5012 001 Building Diagnostics
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Spring 2010

Structure

Quinn Chapel sits on a solid limestone block foundation on top of which the load bearing exterior masonry walls of the church are built. These limestone blocks have been cut to varying square sizes and mortared together. This block foundation is found along all exterior walls of the church, providing the necessary support for the upper levels of the chapel. Through historical research, the limestone was identified as Indiana limestone. When examining the foundation of the structure, limestone blocks were used to a height of approximately five feet above the finished floor. Above five feet, the exterior walls are constructed of multi wythe common brick set in a common bond pattern. On the north and west facades the outer wythe is limestone. On the east and south facades the multi wythe brick wall is not faced can be seen on the exterior of the building. Thirty cast iron columns support wooden timbers that in turn support the floor joists of the upper floors. Fourteen cast iron columns extend from the basement and continue through to the upper floors of the structure terminating at either the second floor sanctuary space or in the attic space in which they support the scissor truss system. The floor system consists of wood beams and joists. Four beams, measuring thirteen and three quarter inches tall by nine and a half inches wide, span the length of the structure on each floor. These beams are set atop either the brick columns in the basement area or atop the cast iron columns on the upper stories. Wood joists span between the beams creating the floor structure for each of the stories. In the attic area, scissor trusses are constructed of the same wood beam structure seen supporting the floor joists. Metal I-beams support the balcony areas in the main sanctuary space. Instead of wood beams being placed atop cast iron columns, here metal I-beams are placed atop the cast iron columns. These metal I-beams are used in the same capacity as the wooden beams found both above and below the balcony area but for a reason unknown at this point, the I-beams were used as a substitute material.

Basement

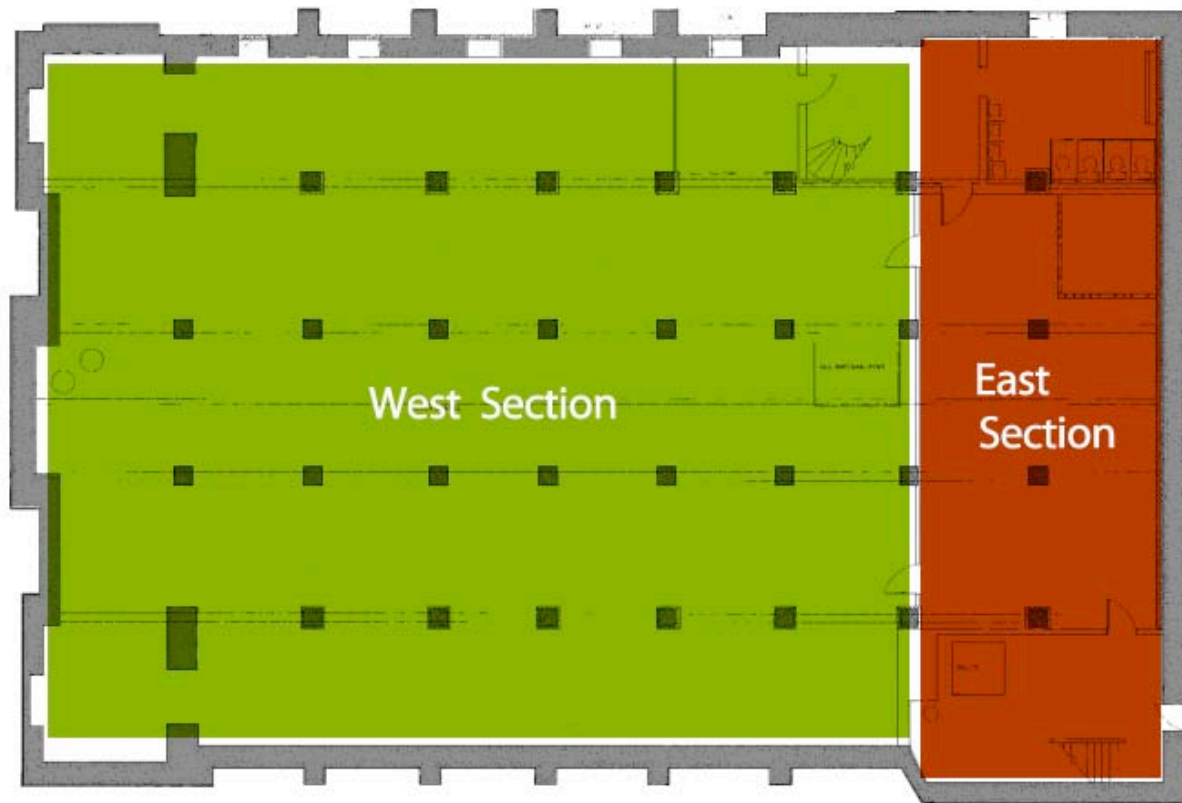


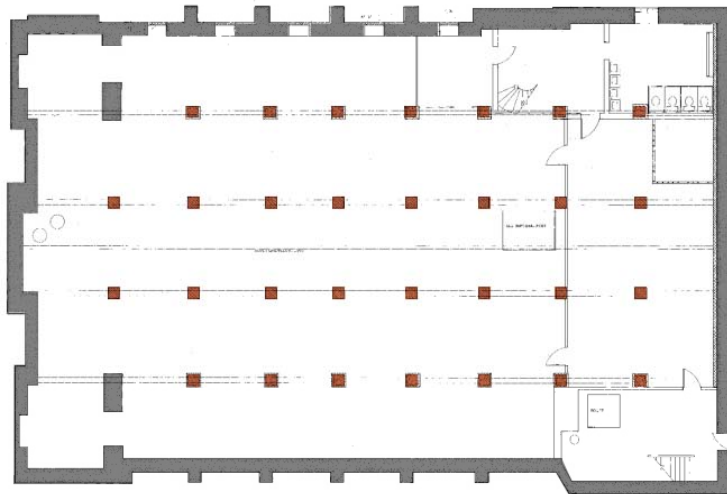
Figure A - Plan showing East and West sections of basement

The basement of Quinn Chapel will be discussed by cutting it into two sections with an east section and a west section. The east section occupies approximately one fourth of the eastern portion of the basement area. The eastern section of the basement has a lower finished floor height finished to approximately six to six and a half feet tall with a concrete slab floor and walls and ceilings have been covered in lathe and plaster and finished with a painted surface. The western section of the basement has a dirt floor and a lower ceiling height of approximately five feet high and the ceilings and walls can best be described as unfinished. The unfinished walls show the exposed limestone foundation and ceilings show the joists and beam structure supporting the first floor above.



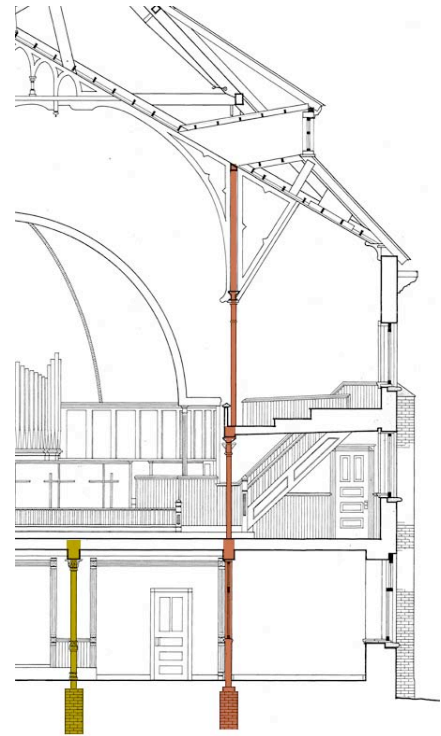
The perimeter basement walls of the entire church are constructed of limestone blocks that have been mortared together. Overall the limestone block foundation exhibits a few areas of surface spalling, missing blocks or visual signs of distress. The visible portion of the mortar holding the blocks together is intact with minimal signs of deterioration. One exception must be made for the eastern foundation wall of the church. This wall was constructed entirely of concrete masonry units and the limestone wall was not visible. The CMU wall is a newer intervention into the structure and from visual inspection is in good condition with no signs of cracking both in the blocks and in the mortar joints. In the western section of the basement, two additional smaller foundation walls that are approximately four foot long by two feet wide are found, built of limestone block. These two walls act as interior foundation walls that support the two towers on the West facade of the church. The walls again exhibit few signs of surface fatigue and no missing block members.

Thirty piers, constructed of common brick are found throughout the basement area. These thirty piers support the upper stories by carrying either a wall or a cast iron column. The brick piers are twenty-four inches square and are set in a grid pattern, eight piers deep by four piers wide. For this example, deep is referred to as from the east to west elevation and wide is referred to as from the north to south elevations. The two smaller limestone foundation walls, mentioned above, take the place of two piers on the northwest and



southwest corners of the basement. The brick piers are set on concrete footings, and rise up to terminate at the base of the first floor framing. Two brick piers located in the western portion of the basement have been altered. The top caps of the columns have been rebuilt with a flared top entirely in masonry and the columns are higher than the rest found in the adjacent area. The two rebuilt piers extend through the flooring. All the brick piers found throughout the basement exhibit no signs of cracking or missing members.

At the top of the brick piers two types of systems were found. On the north and south rows of piers a limestone block was placed onto which the cast iron plate of the column was placed. The center two rows of piers simply terminated with common brick onto which the iron plate for the column was placed. Initial research shows that the outer two rows of piers carry the weight of the first floor, sanctuary space floor, balcony area and the scissor truss system from the roof above. The inner two rows of piers carry only the weight of first floor and sanctuary space above. Because of the difference in loading on the inner and outer rows of columns one possible explanation is that the limestone block helps distribute the weight as the load is transferred down through the brick pier.



Atop each of the brick piers a cast iron column is placed. These cast iron columns consist of the shaft of the column, which continues through the floor to the upper stories, and a base plate that sits atop either the brick pier or limestone block. The cast iron columns and base plates exhibit few signs of surface corrosion. No holes or cracks were observed in the columns or base plates throughout the basement area.



In addition to the brick piers supporting the cast iron columns, they also support timber beams that create the flooring structure for the first floor. Four rows of beams measuring thirteen and three quarter inches tall by nine and a half inches wide span between the brick piers. These beams span east to west in the church and provide the main structural support for the floor joists which span between the beams. The beams exhibit a noticeable downward deflection at mid span and surface checking was also visible in many of the timbers throughout the basement. The beams are in good overall condition and the deflection was consistent from one beam to another. The checking was found mainly in the center portions of the beams, which is likely due to the beam drying out over time. No noticeable vertical cracking running across the grain was seen where the beams met the brick piers or mid span and wood rot was also not seen throughout the basement.



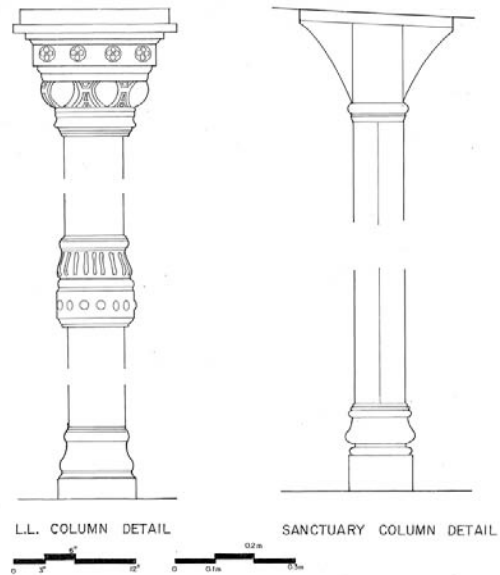
Atop the wood beams the floor joists of the first floor are placed. Where the large beams run east to west in the church, the two-inch by twelve-inch floor joists, spaced at twelve inches on center, span north to south. The floor joists measure two inches wide by twelve inches tall. The floor joists are crossed braced from one joist to another dimensional lumber. The floor joists do not exhibit any deflection as was found in the large beams. Rot was not seen in any of the floor joists or in any of the cross bracing. Where the floor joists tied into the outside walls, visible portions of the timbers were free from rot and decay and it is also worth noting that the floor joists tied into the outside wall through common brick and not directly into the limestone foundation. In the unfinished western portion of the basement the limestone foundation continued up to approximately five feet above the dirt floor. Above the five-foot mark the perimeter foundation transitioned to common brick and that is what the floor joists tied into.



Atop the floor joists wood planks of the subfloor for the first floor are visible. The wood plank subfloor was placed perpendicular to the floor joists and was butt jointed with no space being left between boards. Water staining could be seen on the underside of the subfloor especially in the southwest corner of the basement where there is known substantial water infiltration from a leaking roof. The subfloor exhibited several signs of water staining although no rot or decay was found.

First Floor

The first floor space of the church is composed of many of the same structural elements that were found in the basement aside from one major element. Instead of the brick piers supporting the upper floors, now the cast iron columns are visible throughout the structure. In the basement the base plate and base of the column shaft was seen atop the brick pier. Here in the first floor space, the cast iron columns continue through the floor upward to the ceiling to support the flooring structure of the second story sanctuary space. The cast iron columns have a painted surface and decorative cast iron capitals have been fixed to the tops of the columns where they meet the ceiling surfaces. Not all thirty columns are visible in the first floor space as some are buried inside interior walls.

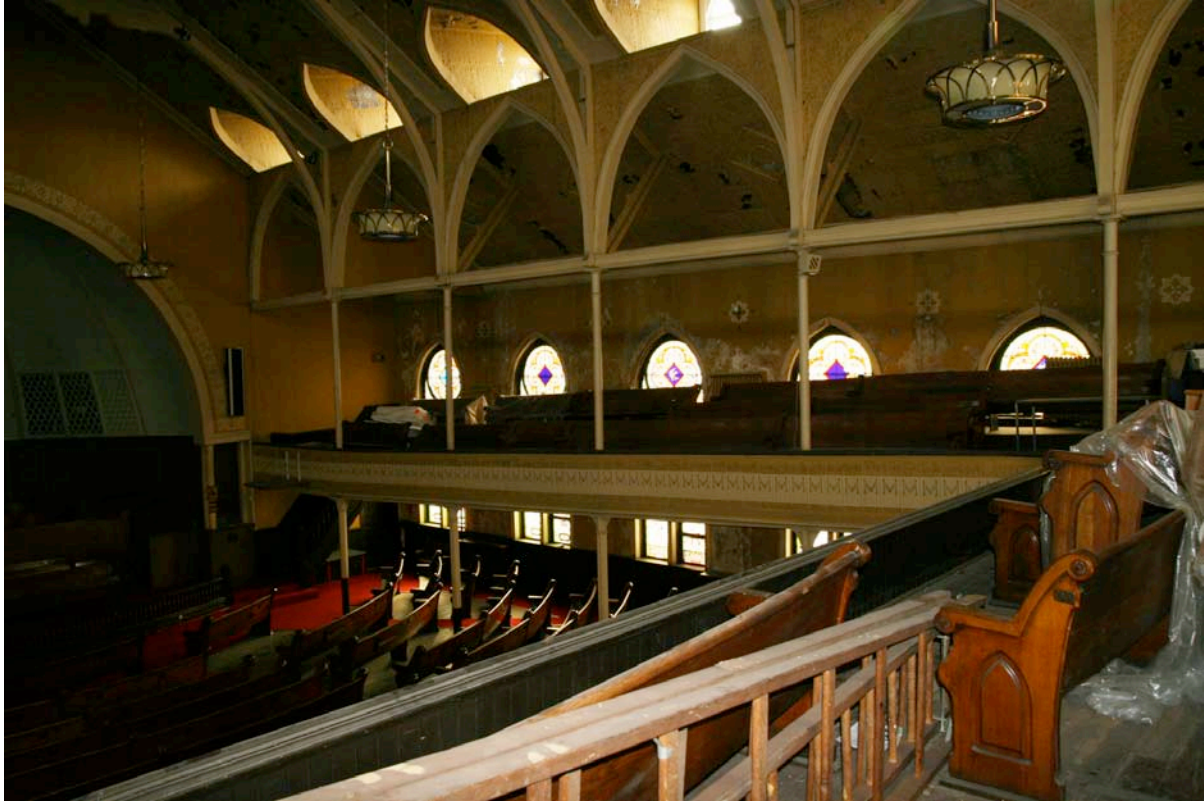


Examining the visible fourteen columns all exhibited no signs of surface corrosion although some decorative capitals were missing or had signs of separating where the two cast iron capital pieces met.

Much of the structure that was visible in the basement was obscured by finished walls and ceilings on the first floor level. One portion of the first floor, the eastern portion, was undergoing renovation and the ceiling structure was visible. Here the same timber beam was seen running east to west spanning between the cast iron columns. The beam exhibited the same features as were seen in the basement. The beam had downward deflection that was visibly noticeable mid span and surface checking was seen toward the center surfaces of the beam. Atop the large beam two by twelve inch floor joists at twelve inches on center were placed identical to what was seen in the basement. The beam and floor joists that were visible exhibited no rot or vertical cracking and were in good overall condition. The exterior walls of the church were covered in a plaster finish and the load bearing masonry was not visible on the interior.



Second Floor – Sanctuary Space



The sanctuary space of Quinn chapel is comprised of a lower floor, which is the main worship space where the altar is found, and an upper balcony area. The balcony area wraps around the main worship space on the south, west and north side sides of the church and is supported by eight cast iron columns that were visible on the floor space below. The main nave of the church is an open area that

reaches upward to a vaulted ceiling some three stories above the sanctuary floor and is framed out with wood trusses. Only eight cast iron columns can be seen, four each, supporting the north and south balconies. The cast iron columns are identical to those found on the first floor

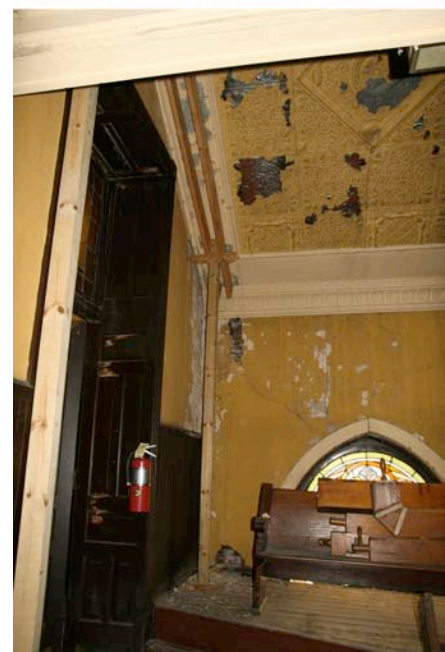


space and are finished with a painted surface. All columns were in good overall condition with no signs of surface corrosion or cracking. One portion of the sanctuary space, the southwest corner of the church, suffered extensive water damage from a leaking roof. In this area the plaster was partially missing and a

metal I-beam was present. This metal I-beam was found supporting the northern edge of the southern balcony. Where the large timbers spanned between the cast iron columns on the first floor below, here the metal I-beam spans between the cast iron columns. The metal I-beam did have surface corrosion in the water-infiltrated area although enough of the beam was not present to make a good visual examination. The remaining structural elements of the sanctuary space were covered with lathe and plaster finish and a visual inspection could not be made of the floor joists or remaining metal I-beams. Again all the interior walls were covered with a plaster finish and only minor cracking was seen on the exterior load bearing walls.

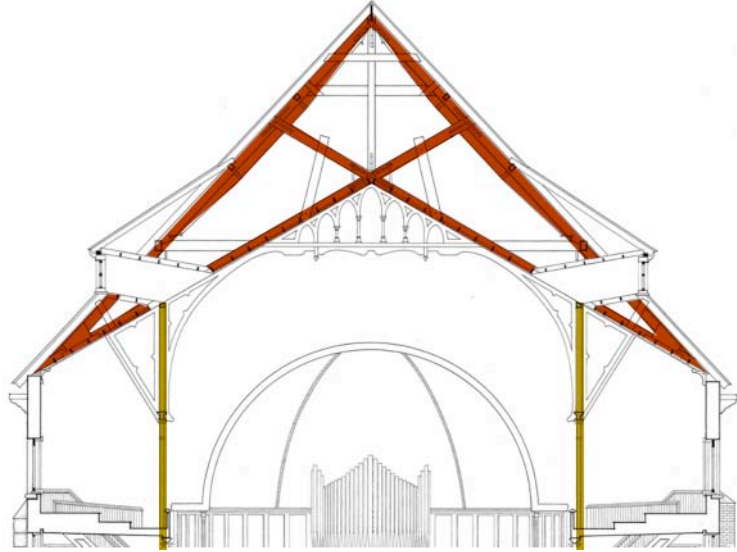
Balcony

In the balcony area all eight visible cast iron columns were examined and found to be in good condition. All the columns have a painted surfaces and no surface corrosion or cracking was seen. The wooden roof truss system was examined and found to be in good condition. There are metal angle brackets that hold the center truss to the roof trusses and this appears to be a recent intervention. The metal brackets are not painted and through bolted. Several areas of the truss system had peeling paint especially in the water-damaged areas. In the southwest corner of the balcony where the east-west structural beam ties into the southwest tower extensive wood rot was found. This area correlates to the rusted metal I-beam found directly underneath in the sanctuary space. In addition to the rotted beam, temporary supports were constructed using two by four inch dimensional lumber. This bracing ran along the balcony roofline and ran down to the floor at the southwest corner of the balcony and along the southwest wall of the tower that sustained heavy water damage.



Attic

A scissor truss system composed of wood beams and sandwiched two by twelve lumber supports the roof. The scissor truss system found in Quinn Chapel is composed of four structural members. Two top beams frame out the roofline of the church while two beams cross diagonally underneath forming an “X” shape.



underneath forming an “X” shape. This “X” transfers the downward thrust created by the weight of the roof to the outside walls. The effect achieved by using a scissor truss system is that interior spaces can now be vaulted achieving greater height and volume in the sanctuary space. The wooden members are used in conjunction with metal rods and structural steel plates to create the truss system. The scissor truss



system is buttressed from outward thrust on north and south sides of the church by brick buttresses that are visible on the outside of the church walls reaching upward to the roofline. At the roofline the buttresses meet the trusses where they tie into the outside walls. On the inside of the church two outer rows of cast iron columns that continue up through balcony area provide vertical support to



the truss system allowing load to be transferred back down to the brick piers in the basement. The scissor truss system appeared in good overall condition with no deflection in the span and no checking as had been found in the floor timbers on the lower stories. One major intervention was seen in the southwest corner of the attic area. A series of wood joists and timbers had been cut out and laminated beams had been inserted. At the junction of where the joists met

the large timbers a large piece of structural steel was inserted to tie the old portions to the new. Also a large area of roof decking boards had been replaced in the vicinity of the repairs. This area correlates directly to the rotten timbers and corroded metal beam-beam found directly below on the lower stories. On the day of examination the repaired area appeared dry and this was confirmed by examining the same area on the lower floors. Also it is worth noting that prior to the examination several days of rainy weather had occurred and the repaired area showed no signs of moisture infiltration.

Mechanical Systems

Electrical System



Throughout Quinn Chapel remnants of knob and tube, cloth covered wire and gas lighting were found, although the exact date the building was electrified is unknown. Quinn Chapel is supplied with electricity via an overhead line that enters the building at the southeast corner of the property. The main line is then fed down to the main supply panel located inside the back door at the southeast corner of the church. From there the main lines continues into the southeast corner of the basement where a series of subpanels are found. This southeast corner of the church is where the major mechanical systems of the church are located. In addition to the subpanels for electricity being located here, the two main boilers that fire a steam radiator system are located in a room adjacent to the electric panels.

The electric panels at the southeast corner of the basement are a mix of breaker panels and fuse boxes that feed to various locations throughout the church. The breaker panels appeared to be newer



although no date was found on them. The fuse panel adjacent to the breakers contained eight fuses. Again there was no date or labeling as to what this panel fed. Throughout the remainder of the basement several other subpanels were found and were a mix of fuse panels and

breakers. There were several different generation of wiring found in the basement area. Remnants of knob and tube wiring were found. All since removed, the ceramic conductors were the only pieces left that led to this discovery. Secondly rigid black conduit was found containing cloth-wrapped wiring. This was

determined when a junction box was discovered without a cover plate. The cloth wiring wrapped with electrical tape lie inside and from the box led a semi-rigid armored cable. The semi-rigid cabling fed through the floor to the first floor of the church. And finally, rigid galvanized conduit was found from the recent renovations. This conduit was in good condition and no open junction boxes were found using this system.



Heating System

The heating system of Quinn Chapel is a natural gas fired steam radiator system composed of both single and double pipe radiators. In the east corner of the basement, adjacent to the men's restroom a large oil tank is present. The tank has two pipes extending from the top of the tank, both of which are cut off and capped. Prior to the natural gas fired burner, oil was used to heat the chapel, although the date of transition is unknown. The natural gas supply enters the basement at the northeast corner of the building adjacent to the men's restrooms. A gas pipe then runs south across the basement to the boiler room



located at the southeastern corner. Inside the boiler room, two large boilers are found and appear to be in working order. Again no date was found on the boilers but at the time of examination both were working

and a flame was present inside each of the boiler tubes. The steam lines that fed from the boiler showed signs of surface corrosion. The steam lines that fed from the boiler divided into a large array of smaller metal lines that fed throughout the building. The supply lines were in good condition and of the ones examined terminating at the radiators none were to be leaking or contain surface corrosion.

The radiators found throughout the church were a mix of single and double pipe systems. On the first floor double pipe radiators were found on the south walls of the assembly space but adjacent them on the north wall, single pipe radiators were found. The radiators found on the north wall were much more decorative, having patterns cast into the fins. These decorative single pipe radiators were typical of what was seen throughout the rest of the church. In the sanctuary space the radiators found in the balconies and main nave matched those found in the first floor assembly space identically. All the radiators found throughout the church were in good condition, showing no surface corrosion and of those examined, none appeared to be leaking.



Air Conditioning

Quinn Chapel does not have an air conditioning system and air venting is provided through operable windows throughout the church.

Plumbing

Plumbing was not examined as part of this report. It is our recommendation that a licensed plumbing inspector inspect the plumbing.

Recommendations

1. In the sanctuary space, further testing and examination should be made to determine if the metal I-beam was structurally compromised by corrosion caused by the water infiltration.
2. In the balcony space, further analysis should be conducted to determine the extent of wood rot of the structural member in the southwest corner. Surface rot was visible to the finished carpentry and signs of heavy water infiltration were found in this area. The wooden beam should be examined to confirm that it is not compromised.
3. In the southwest corner of the balcony area further examination is recommended to see what structural issues will need to be addressed to remove the temporary bracing.
4. It is recommended that a general code review be performed of the entire electrical system of the church. Junction boxes missing covers, electrical junctions outside junction boxes and Romex wiring were found in our inspection.
5. The steam lines that fed from the boiler showed signs of surface corrosion. Further testing by a licensed professional would be needed to determine if this surface corrosion is of any concern.