



September 16, 2009

The Roman Catholic Bishop of Great Falls
121 23rd Street South
Great Falls, MT 59405

Attn: Joe Loncki

Re: Old Fort Benton Catholic Church of the Immaculate Conception
Site Investigation

On August 20, 2009, we performed a site inspection to determine the structural conditions of the Old Fort Benton Catholic Church of the Immaculate Conception. During the site visit we did a visual inspection of the structure's main floor, partial basement and the exterior. On the main floor a relative level survey was performed to help us better understand the areas that may be experiencing settlement and/or the effects of clay soil heave. This letter summarizes the results of the inspection and provides recommendations for repairs with rough construction cost estimates. This letter also contains photographs that were taken during our site visit. This letter does not address non-structural items and cost estimates for painting, floor refinishing, wall resurfacing, etc..

General

It is our understanding that the old church was built in 1905 after the first church had previously burned down. This church functioned until 1968 when a new church was built to be able to handle a larger congregation. Since that time, the old church has not been used on a regular basis.

The structure of the old church contains rock foundation walls with mortared joints. The exterior walls of the church contain a rock exterior face with interior 4" wide by 8" tall clay brick and both containing mortared joints. The roof is a timber structure with beams and purlins and a timber shingled roof cover. The inside face of the ceiling contains tongue and groove slat boards.

Site Inspection

During our site inspection we noted the following items with a discussion explaining the likely cause of some of the problems (note that directional references in this letter are all made assuming north is parallel with Choteau Street and the east side of the building is the main entrance):

1. During the site inspection it was explained to me that the roof leaks. This seems apparent due to the age and appearance of the roof (see photo to the right) and the signs of water stains on the underside of the structure. From what we could see during our inspection, there was no roof or wall insulation that could be detected.



2. A level survey of the main floor was performed revealing the following information:
 - a. The main floor near the outer foundation walls has elevation differences up to nearly 2" with the low spots located in the southeast and northeast corners (in the chapel towards the entrance) and the high spots located in the northwest corner (near the chapel front) and along the center of the south wall.
 - b. The center of the main floor in the walkway between the benches has elevations that vary from .6" to 3" above the exterior foundation walls with the center of the floor being the highest.

The cause of the differences in main floor elevations is likely due to: foundation settlement, moisture induced clay soil heaving below the interior columns and walls, a poorly leveled floor during construction or a combination of two or more of these. Settlement can be the result of moisture contributing to loosely compacted soil below the foundation.

3. The steps on the west portion of the south side of the building are sinking likely resulting from poorly consolidated soil originally placed below the concrete steps (see photo to the right).



4. There is poorly graded soil around portions of the building. This poor grading can introduce moisture next to the building and contribute to clay soil expansion and/or settlement of the foundation.

5. There are cracks or gaps in the mortar along the outside of the foundation wall and rock upper wall with some of the cracks up to 1" wide. There are also areas in the church where the mortar between the interior orange clay tile is cracked (especially noted on the north wall near the stairs). Many of these areas over the years have been patched with a grout or cement based product (see photo to the right).



6. There are cracks in the interior wall plaster placed on the clay tile throughout. This is usually a result of walls shifting from settlement or from age (see photo to the right).



7. The gutters and downspouts are in poor condition and should be replaced.

8. There are cracks in the entry steps likely resulting from loosely compacted soil below the concrete. The front steps slope down to both sides (see photo to the right).



9. Mortar in the rock foundation walls and in the exterior rock walls is deteriorating and falling out from the joints to the base of the walls. This is likely the result of the original lime mortar deteriorating over time which can be common in a structure this old. The deterioration is severe near the base of the rock wall outside possibly due to sprinklers speeding up the deterioration process. It is also severe in the exposed areas of the basement foundation walls. Some areas of severe deterioration have 2" or more of the mortar deteriorated (see photos below).



10. In the basement there is a portion of the timber retaining wall holding back the crawlspace dirt that is failing. It appears that the timber post holding back the dirt has rotted causing this wall to fail (see photo to the right).



11. In the past, the tops of the basement columns have been shimmed and/or regouted and releveled. Indications of releveled columns can be seen by the timber shims and sometimes grout placed under the floor system beams (see photo to the right). It is possible that the columns at one time had settled and this was done to relevel the columns. However, as our floor elevation survey noted, the floor is generally higher in the middle. This is possibly due to over correcting during the releveling of the floor or due to clay soil heave under the columns after the releveling was performed.



12. Deteriorated brick retaining wall in the basement. This appears to be unfired brick that overtime has deteriorated. While it is deteriorating it doesn't appear to be an immediate structural threat (see photo to the right).



13. Severe deterioration of the mortar in the basement columns with some areas between the rocks containing very little mortar left (see photo to the right).



Summary

The church has some structural concerns including: mortar deterioration, settlement or heave of the foundation and/or floor, cracked walls, deteriorated brick, broken retaining walls, settling steps and roof leaks. By fixing these items according to our recommendations below, the church building should be structurally adequate.

Recommendations and Construction Cost Estimates

We recommend that the following items be repaired with a short explanation and construction cost estimate for the repair:

1. Replace the roof. Since it appears there is no roof or wall insulation, it may be possible to install insulation under the roof slats during the roof replacement. This will make the building more energy efficient. Adding wall insulation will not be possible unless an additional stud wall is added to the inside of the building which can hold insulation (not considered in the estimate).

Construction estimate to reroof including the east side wall = **\$40,000**

Construction estimate to remove slats, apply roof insulation, resheath = **\$35,000**

2. Replace the front steps (east side) and the south steps. This can be performed by demolishing the concrete and pouring new concrete. It may also be possible to grind smooth the existing front concrete steps (east side) and patch the crack with an epoxy concrete product (Sika) although this would be a temporary repair and would not fix the slope on the steps. The south stairs would need to be replaced entirely.

Construction estimate to replace south and east concrete steps = **\$5,000**

3. Regrade the outside perimeter of the church to add positive drainage away from the building (at least 3%) and place sod over the regraded area.

Construction estimate for regrading = **\$7,000**

4. Repair cracks and gaps in the mortar of the exterior upper rock walls and the lower foundation walls and columns exposed inside the basement and the crawlspace of the church using a masonry mortar. On the outside, try to match the color of the mortar close to the existing color. Before applying the mortar, make sure the cracks are cleaned out and any loose mortar is removed. It may be beneficial to excavate down around the outside of the foundation wall and determine the need to patch the foundation wall below grade. If the mortar is deteriorated, this should be included in the repairs.

Construction estimate for repairing and patching wall gaps and cracks = **\$90,000**

5. Replace gutters and downspouts making sure that the downspouts push the water away from the building at least 10 feet.

Construction estimate for replacement of the gutters and downspouts = **\$5,000**

6. Repair the collapsing retaining walls in the basement. The timber wall can be replaced using a railroad tie post embedded in the earth every 5' in a 12" diameter concrete hole (min. 3' depth) to support newly placed horizontal railroad ties to resist the lateral earth pressures. The deteriorating brick retaining wall is still standing but can be replaced with a similar post and railroad tie system.

Construction estimate for replacement of the deteriorating retaining wall (not including the replacement of the brick wall) = **\$3,000**

7. Repair all other items including: replastering the interior walls, refinishing the floor, painting the interior and exterior where required, thoroughly cleaning, etc.. No construction cost estimate was provided for these non-structural items.

For additional services, we can provide specifications and in some cases details that will help the contractor more adequately understand and perform the above recommendations. Contact us if you would like us to prepare this material.

Once the repairs are performed, the foundation walls and interior walls need to be observed for continued movement. If the movement continues, resupporting the foundation walls may be required using items such as helical piers.

We appreciate the opportunity to perform this inspection and provide this letter. Please contact us with any questions.

Sincerely,
Thomas, Dean & Hoskins, Inc.



Rodney R. Blake, P.E.
Structural Engineer