BRUEGGEMANN ENGINEERING
C.A. #4627 EXP. 6.30.14
523 W. BROADWAY ENID, OK 73701
P: 580.233.8533 F: 580.540.8906
www.bhb-engineers.com

June 23, 2014

Tim Ohm and Church Board Members
Sacred Heart Catholic Church
627 12th St.
Alva, OK 73717

Re: Structural Recommendations for the 1969 Fellowship Hall Addition to the Sacred Heart Catholic Church, Alva, OK

Mr. Ohm and Church Board Members:

Pursuant to your request, this report is the final recommendation concerning the roof structure for the 1969 Fellowship Hall Addition to the Sacred Heart Catholic Church.

HISTORY

On July 7th, 2011 the roof structure was inspected by Brueggemann Engineering which a report dated September 21, 2011 was submitted to the church. This first report described the damage to the job-built trusses which appeared to be caused by the failure in the plywood gusset connection either at the heel joint where the top and bottom chords intersect, or at a bottom chord splice. The joint failures were not visible during this first inspection. The first inspection report also recommended a more detailed inspection be performed to verify the integrity of the roof structure.

On May 29, 2013 Sacred Heart hired Brueggemann Engineering to provide a structural roof repair to the area of concern. Preliminary drawings were developed which included new steel support beams and steel columns. The structural repairs were intended to strengthen the roof by adding additional support to the existing trusses, and repair trusses with critical damage. A final detailed inspection was performed on the roof structure on April 25, 2014, prior to completing final structural repair drawings.

FINAL INSPECTION SUMMARY

A detailed inspection of the truss components was performed on April 25, 2014 by Brueggemann Engineering. The purpose of this inspection was to identify individual truss members that required repairs during the construction effort.

Several plywood gusset connections had visible slip or cracking along the top and bottom chords. Also it was determined that the bottom chord is spliced at the center of the trusses. This is likely a major

contributor to the excessive truss deflection since this location resists the highest tensile loads. As the previous inspection showed, several observed trusses had crushing at the ridge where the top chords intersect. During the inspection the weight of an inspector standing on the bottom chord at the center of the truss caused what appeared to be the center bottom chord joint to vertically slip.

The plywood gussets were glued and stapled at the intersection of the truss members. The glue appears to have deteriorated and can no longer resist the shear forces, leaving the staples to resist the shear. In my opinion the staples are not capable of resisting the total member forces alone; resulting in the crushing and slipping that was observed during the inspection. Out of the nearly 50 trusses in the building at least 23 trusses had crushing, for noticeable joint slipping.

A string line was pulled north-south along the east roof slope, west roof slope, and the ridge. Vertical deflections of approximately 2" to 3" were measured along the west and east roof slopes, and approximately 3.5" of vertical deflection were measured along the ridge. The greatest deflection where located near the center of the fellowship hall room.

CONCLUSIONS

The areas of the roof with the greatest deflections are over the fellowship hall where the truss span is the greatest and no interior partitions are available to support the trusses as they sag.

In conclusion, it is my opinion that the structural integrity of the roof structure has worsened since 2011 when it was first inspected. Based on the damage seen, I believe the roof structure is not capable of safely resisting the heavy snow loads northwest Oklahoma has gotten over the past couple years.

Reinforcing the roof structure is not adequate option. In my opinion the roof structure should be completely replaced before this next winter. A rough estimated cost for a contractor to replace the roof structure completely is $300,000 to $500,000.

Sincerely,

Geoffrey E. Brueggemann, P.E.

BRUEGGEMANN ENGINEERING 410A N. INDEPENDENCE, ENID, OK 73701 P. 580.233.8533 F. 580.237.0068