

## **Professional Engineering Group, LLC.**

Civil Engineering & Land Surveying Consultants.

October 27, 2014

Mr. Shannon Lachenman  
Brookstone Homes  
7241 Wooster Pike  
Cincinnati, OH 45227

Re: St. Mary School Structural Inspections

Mr. Lachenman:

We have completed our inspection of two locations at the above referenced facilities. Specifically, we looked at structural issues with the following:

- 1.) Old Gym, Southwest Corner
- 2.) New Gym, Near the Southwest Corner

Below, please find our findings and recommendation for each location:

### **Old Gym**

Upon our inspection of the Old Gym, we found an older structure (50 years old or more), with construction consisting of block and brick load bearing walls, supporting the roof structure. The footing was not visible, but is assumed to be poured concrete.

During our inspection, we observed stair step cracking occurring at the south west corner of the building on the south wall. The cracking was fairly wide (up to 1" in width), and occurred from near the floor to within 5' of the ceiling. The exact width was difficult to determine as the interior of the gym had recently been painted, and the exterior cracks had been caulked due to waterproofing. The majority of the distress was limited to the south wall, and did not seem to be occurring on the adjacent west wall. The cracking and displacement observed appeared to be in plane.

Based upon our observations of the issues, it is our belief that the cracking is occurring due to settlement of the foundation at the southwest corner of the building. At this time, it is unknown if additional settlement is continuing, as is often the case, settlement starts and stops based upon soil conditions present during either very dry or very wet periods. Fortunately the south wall in questions appears to be carrying a limited load from the roof, as the trusses span to bear on the east and west walls. This limited loading, combined with the in plane settlement of the wall provides evidence that there is little chance of quick failure. Any additional settlement will likely result in widening of cracks and not a catastrophic collapse.

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### **Old Gym Recommendations:**

Our first recommendation would be to continually monitor the existing cracks. The best method would be to keep a continuing log of crack widths in several locations in an attempt to determine if settlement is continuing to occur. The log should be completed on a by-weekly or monthly basis. Should you find that continual settlement is not occurring, we would recommend repairs to exterior brick and mortar joints to seal out any moisture, and continual monitoring going forward.

Should you find that settlement is ongoing, it would be our recommendation to perform underpinning of the foundation, primarily at that the south west corner of the building, in order to widen the existing foundation and reduce the load on the soils. This additional work would require a specific design, which we would be happy to complete, should it be required.

### **New Gym**

Upon our inspection of the Newer gym, located at the current school facility, we found movement in the concrete block wall on the east wall (interior) near the south east corner of the wall. The movement observed is not typical, as instead of settlement, the movement is lateral, with a well defined (with clean breaks along mortar joints) section of the wall offset about an inch from the interior plane of the remainder of the wall.

Based upon our observations there are two possible reasons for the lateral displacement observed:

- 1.) the wall was built in this manner.
- 2.) a lateral force is, or has in the past, been applied to the wall, which resulted in the lateral displacement of the wall section.

Based upon our observation of the surrounding portions of the building, it appears that reason number 2, would be the more likely explanation. The header beam above the curtain wall on the south entrance is located in the correct location to be responsible for the movement. Short of destructive inspection, determining the exact cause of the movement is not possible, however possible causes include lack of proper steel tolerances at the time of construction as well as water penetration in combination with

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the freeze thaw cycle. Based upon our cursory inspection, external forces such as wind, do not seem to be causing the issue.

**New Gym Recommendation**

Our recommendation would be to monitor the wall to determine if additional movement is taking place. We would recommend taking a measurement of the lateral displacement at the corner with the largest displacement on a bi-weekly or monthly basis.

Should you find that the movement has stopped, then continual monitoring would be all that we would recommend as the wall is currently structurally sound and able to transfer the loads to the building foundation.

Should you find that additional movement is continuing to occur, we would need to inspect the roof framing over the south entryway in order to better assess the cause of the movement. This would involve removal of the roof and ceiling covering as well as some brick on the exterior of the building.

Should you have any questions or require any additional information, please do not hesitate to contact me at (513)284-3232

Best Regards,

**Professional Engineering Group, LLC**



Mark D Walker, P. E., P.S.  
President