

STANDEN ENGINEERING SERVICES

**Expert Soils Engineering, Structural Inspections, and
Construction Materials Evaluations**

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JHStanden@StandenEngineering.com

October 17, 2011

Mr. Tom McMurtrie
City of Ann Arbor Public Services
301 E Huron Street
PO Box 8647
Ann Arbor, MI 48107-8647

RE: Structural Observations
Existing Pole Barn Building
2950 E. Ellsworth Rd.
Ann Arbor, MI 48108

Dear Mr. McMurtrie:

As requested, on October 13, 2011, a site study was performed on the building at the above-referenced address. The purpose of the study was to perform a limited structural inspection on the building with respect to observed settlement. This letter, with the attached photographs, is the report of my findings and conclusions.

Description of Property and Observations:

The building is located on the south side of E. Ellsworth Road, just west of Platt Road (Photograph 1). The building faces south, toward a parking area and driveways (Photographs 2 and 3). The building consists of three interconnected buildings with similar construction. The west section (original building) has a gable roof with the ridge orientated north and south. The center and east sections (east additions) have a gable roof with the ridge orientated east and west. A small shed-roof structure is located on the northeast corner of the building (Photograph 4). The building has various sized overhead doors on the west, north and east sides.

The structure is typical pole-barn construction with treated-lumber posts and beams, wood roof trusses, metal siding, and standing-seam metal roof. The building has a concrete slab-on-grade. The west section of the building was built in about 1980, the center section was built in the late 1980s, and the east section was built in about 1991.

The building is located over the north end of the City of Ann Arbor Phase I Landfill. Review of the soli boring logs for two of the observation wells near the building (PW-4 and PW-3R-01) indicates that the building straddles the north face of the old landfill. Sections of the north and west walls are supported by natural soils while the south and east walls are built over old soil fill and refuse.

The soil conditions have resulted in differential settlement of the building foundations and floor slabs. The southeast corner of the building appears to have settled at least 12 inches (Photograph 5). The settlement has caused rain-water runoff to accumulate at the east end of the building. The original section of the building, at the west end, is relatively level. An elevation survey of the building has not been performed at this time. Because of the soil conditions, additional settlement is expected.

The post and beam construction and the wood trusses are fairly flexible and tolerant of differential settlement. The settlement of the wall posts has caused the trusses to slope down from the north wall to the south wall (Photograph 6). The gable-end trusses at the east and west ends of the east additions are stressed by the differential movement (Photographs 7 and 8). Several lateral braces have come loose and the steel connector plates are stressed. The movement of the trusses has also caused several of the angled stiffeners along the north wall to crack.

The settlement has also caused some displacement of the metal siding and roofing. This has made the siding and roof more susceptible to wind damage. Gaps in the metal siding and roofing is allowing rain water to enter the building and may cause long-term corrosion concerns at the nailed joints.

Conclusions:

Due to the soil conditions below the building, it would be very difficult to stop the movement and return the building to its original condition. Foundation underpinning, floor slab jacking, and stiffening of the structure would likely cost more than tearing down the existing structure and building a new building with deep foundations and slab supports. Foundation underpinning or installation of new deep foundations through the refuse fill would raise environmental concerns that may be difficult to deal with.

Despite the movement of the posts, trusses, and floor slab, the building is not in danger of collapsing at this time. However, some remedial actions are recommended:

- The gaps in the metal siding and the roofing should be patched to minimize water intrusion into the building.
- The gable-end trusses at the east and west ends of the east additions should be attached to the adjacent trusses with diagonal bracing.
- The angle bracing at the north wall, between the posts and the bottom chords of the trusses, should be inspected and reattached as necessary.
- Additional 45° diagonal bracing should be installed between the center, vertical members of the trusses to add lateral support to the roof framing.

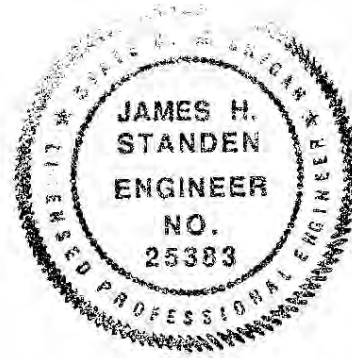
- Water drainage should be improved at the east end of the building to minimize the amount of water that is percolating into the soil and contributing to the settlement.
- The sanitary sewer line for the bathroom located at the northeast corner of the building should be checked for settlement and flow constraints.

If you have any questions or need additional information please contact me.

Respectfully,



James H. Standen, P.E.
Consulting Engineer



Attachments:

Terms and Conditions of Report
Photographs



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TERMS AND CONDITIONS OF REPORT

This report is expressly made subject to the following terms and conditions to which all persons that receive and rely thereon agree:

1. Said report is given with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality and applies only to facts that are within Engineer's knowledge or could reasonably have been ascertained by Engineer. This inspection is limited to visual observations of apparent conditions existing at the time of the inspection. Latent and concealed defects and deficiencies are excluded from the inspection. No portion of the building was dismantled during the inspection.
2. Said report reflects and is an expression of the professional judgment of Engineer.
3. Said report is given as to the best of Engineer's knowledge, information, and belief as of the date hereof.
4. Said report is expressly limited by the scope of services Engineer has been employed by Client to perform. This inspection and report are not a guarantee or warranty, implied or expressed, regarding the adequacy or condition of the inspected structure.
5. To the fullest extent permitted by law, Client and Engineer waive against each other (and the other's employees, officers, directors, agents, partners, and consultants) any and all claims for or entitlement to special, incidental, indirect or consequential damages arising out of, resulting from, or in any way related to this report. Client and Engineer agree that Engineer's total liability to Client shall be limited to the total amount of compensation received by Engineer for this report.
6. The parties acknowledge that Engineer's scope of services does not include services related to a Hazardous Environmental Condition (the presence of asbestos, PCBs, petroleum, hazardous substances or waste, and radioactive material).



1. Aerial photo from Microsoft BING taken in about 2007. Building faces south.



2. Front of building, west end.



3. Front of building, east end.



4. East end of building.



5. Southeast corner of the building has settled at least 12 inches.



6. Trusses slope downward from the north to the south wall.



7. Siding gaps and truss movement at the east gable end of the roof.



8. Loose bracing and stressed members at the west gable end.