



Neringa Design Architects

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Ms. Julie Grynwich, Director
New Buffalo Township Library
33 N. Thompson St.
New Buffalo, MI 49117

RE: Existing library foundation and footing evaluation

Dear Julie,

I met with Doctor William Davidson, professional structural engineer and Andrews University professor emeritus, on December 18th, 2009 to evaluate the footings and foundation walls of the existing library, in order to determine whether they could support an additional floor load from a possible second story addition. The construction drawings for the current library prepared by Allegretti Architects in 1976 show a 12" thick reinforced concrete masonry (block) foundation wall with 12" x 12" reinforced concrete piers at 11 feet on center. The footing under the concrete masonry wall is shown to be 24" wide by 12" thick; the footing under the piers is shown to be 48" x 48" x 12" thick. We did not have the soil boring report at that time. The calculations are as follows:

Existing 1st floor load: 150 psf (library stack rooms) live load + 50 psf dead load = 200 psf x 20' (1/2 of 40' building span) = 4000 # per lineal feet + 600 # per lineal feet (weight of foundation wall + footing) ÷ 2' (footing width) = 2300 psf soil bearing capacity; therefore the soil bearing capacity needs to be 2300 psf or better. The foundation wall can support the 1st floor only.

The roof is supported on the piers:

$40\# \text{ live load} + 15\# \text{ dead load} = 55 \text{ psf} \times 28' \text{ (1/2 of 40' building span + double the overhang)} = 1,540 \# \text{ per foot} \times 11' \text{ (span between columns)} = 16,940\# + 780\# \text{ (weight of glulam roof beam)} = 17,720\# \div 2,300 \text{ (assumed soil bearing pressure)} = 7.7 \text{ square feet of footing required for the pier. The footing is } 4' \times 4' = 16 \text{ square feet minus } 2' \times 4' \text{ feet of which is used to support the 1}^{\text{st}} \text{ floor} = 8 \text{ square feet. That is what is required to support the roof load only.}$

Since a 2nd floor addition would probably not eliminate the span of the glass openings on the 1st floor, the weight of the 2nd floor would bear on the piers in addition to the roof load. The geotechnical report states an actual soil bearing capacity of 3,000 psf rather than 2,300 psf. Taking this into consideration, the footing at the pier could support a total load of 30,000 #. $30,000\# - 17,720\# \text{ (roof load)} = 12,280\# \div 11 = 1116.36\#/\text{ft} \div 20' = 55.8 \text{ psf total possible additional weight that could be imposed upon the pier, not enough to support the live load of 60 psf required for reading rooms, let alone the dead load.}$

To summarize, the existing footing can not support an additional library floor load. It must be emphasized that our calculations were based on the drawings prepared by Allegretti Architects. We do not know how the footings and walls were actually constructed. It is visible that the concrete piers were not installed. We do not know if the concrete block at those locations have rebar and are grouted solid. Our recommendation would be to support a new 2nd story and roof on columns outside the existing structure.

Note: psf means pounds per square foot

Sincerely yours,

A handwritten signature in black ink, appearing to read "Neringa Peseckas". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Neringa Peseckas, registered architect