



**Ehlert/Bryan, Inc.**  
Consulting Structural Engineers

June 26, 1995

Dane Archer Johnson, AIA  
323 Catalpa Drive  
Royal Oak Mi 48067

Attn: Mr. Dane A. Johnson

Re: Fuerst Farmstead  
E/B #950509

Gentlemen:

Attached, please find our report regarding the structural condition of the buildings at the Fuerst Farmstead in Novi, MI. We are pleased to report that, in general, the complex is suitable for a restoration program. Due to existing structural limitations, we request the opportunity to work with you on developing appropriate uses for the various portions of the complex.

Please note that temporary stabilization measures are recommended for the North Barn. If these are not implemented, we can offer no assurances of a reasonable expectation that this structure will remain standing. Obviously, due to the precarious nature of this structure, we recommend access be limited to those personnel with a need to enter.

We hope to continue to work with you to develop specific recommendations regarding the options for the long term restoration. In the meantime, if you have any questions or require additional information, please feel free to contact me at your convenience.

Yours truly,

Ehlert/Bryan, Inc.

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# Fuerst Farmstead

Novi, MI

## Structural Evaluation

By: George R. Ehlert, P.E.

Date: June 26, 1995

Based upon our site investigations, we are providing this report outlining the feasibility of renovating the Fuerst Farmstead in Novi, MI. This farmstead is located at the southeast corner of Ten Mile and Taft Roads. It is composed of five principal buildings, the Home, the Old Barn, and three newer barns, identified as the North Barn, the South Barn, and the East Barn. Each of the principal buildings will be discussed independently.

### THE HOME:

The home is a two story residential structure with a full basement. Its dimensions are approximately 28'-5" north/south by 45'-2" east/west, plus a covered porch, 8'-6" wide, the full length along the west side. The home was built in two phases, the westernmost 17 foot wide section being the original. The framing is rather conventional, floor joists are typically 2x8's @ 16 inches, spanning east/west at the original home and north/south at the eastern addition. The eastern addition contains a bearing wall located about two feet north of center, with a corresponding beam line in the basement. Roof framing consists of 2x4's @ 24 inches on center, with intermediate bearing walls at ten to twelve feet on center. The roof is a simple gable, sloped at an estimated 4:12 pitch, with the ridge running north/south. Along the north and south walls are narrow sections of a more steeply sloped roof. Foundations for the home consist of cobblestone at the original home and conventional concrete masonry at the addition. The basement floor is dirt at the original home and concrete slab at the addition.

The main front porch is built of massive cobblestone walls and piers, with a concrete slab, presumably on fill. The porch roof is wood framed, 2x4's @ 24 inches on center, pitched to the west. Along the south side of the original home is a large cobblestone fireplace and chimney, self supporting to the exterior of the house. Plan dimensions are approximately 7'-0" wide by 3'-6", with the height estimated at 25 feet. There is also a small porch, approximately five feet by ten feet, wood framed, at the southeast corner of the home, with a flat roof, providing somewhat of a deck at the second level.

In general, the home is in very good condition for its age. As compared to typical historical renovations, it will be rather easy to renovate this home. While some structural components are in need of repairs and upgrading, no major structural deficiencies were noted. We offer the following specific items:

1. The most significant structural item needing repair is the foundation wall at the front (west) end of the home. This foundation wall is a typical cobblestone wall, presumably remaining from the original house. Much of the wall is deteriorated and in need of repairs, with some localized areas having partially fallen loose. We recommend that the entire perimeter of this section of

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the home be excavated to allow for full rebuilding of the wall. All stones should be pointed from both the interior and exterior, with loose stones reset. The exterior face should be fully parged and waterproofed below grade. In order to accomplish this work, it will be necessary to remove the concrete porch slab. Also, due to the precarious nature of cobblestone walls, it is necessary to fully shore this section of house prior to beginning any excavation.

2. Near the southeast corner of the basement, where the stair accesses the basement, the floor framing is sagging considerably. This is a result of rather haphazard framing around the stair. The settlement of the framing is obvious, both visually and noticeable when walking across the floor. It has induced a considerable number of plaster cracks the full height of the house in this area. We recommend that either a new load bearing wall be constructed around the stair, or alternately, new beams and posts be installed to provide supplemental support in this area.
3. Depending upon the proposed occupancy, some strengthening of the main level floor framing may be required. The framing currently consists of 2x8's @ 16 inches on center, spanning either 11'-0" or 15'-0". For the 11'-0" span, there is a total load capacity estimated at around 76 pounds per square foot (psf). For the greater spans, this reduces to about 40 psf. While these are reasonable values for residential occupancies, the joists at the greater spans would need to be supplemented if significant public use or exposure to large groups is anticipated.
4. At basement window locations, floor joists are not doubled when receiving the header across the window. This should be corrected during the renovation.
5. The eastern two thirds of the basement is constructed with concrete masonry walls. These walls are in relatively good condition, requiring only a minimal amount of work.
6. Other than as described above, the first and second floor framing is in very good condition. While none of the second floor framing could be observed, there were no noticeable signs of significant settling, deflection, or any other sign indicative of a concealed structural defect.
7. At the roof level, the framing is marginal, at best. The 2x4 rafters are spanning an excessive distance. The lack of insulation has probably prevented an accumulation of snow on the roof, preventing more serious problems. At the rear (east end) of the home, the rafters are sagging, and have allowed considerable water into the house. Some rotted and cracked roof boards and rafters were observed from the attic. We recommend that supplemental framing be installed to upgrade the load carrying capacity of the roof framing. This can be either through introducing additional rafters or knee walls. The roofing should be removed, allowing for the inspection (and replacement where necessary) of all roof boards. A new roof can then be installed.
8. The moisture infiltration through the roof has caused some localized plaster damage at the second floor ceilings. This needs to be repaired following the roof replacement.
9. In some areas, there are a number of trim boards and exposed wood outriggers that are weathered. Some may be rotting. It is recommended that the renovation plan include an inspection of all of these items, replacing and/or restoring them to a sound condition.

10. The front porch is in good condition, with minor repairs needed. The slab should be removed and replaced to allow for the foundation wall re-construction as described in item #1 above. Some minor stone repairs will be required, primarily consisting of pointing cracks in the stone and the concrete caps. We also recommend a sealer be applied to the caps to reduce moisture infiltration.
11. The main chimney, at the west end along the south elevation, appears to be in fair to good condition. Some pointing has taken place in the past but appears to be ineffective. There are indications that the proper mortar was not used during the prior repairs. We recommend that all stone joints be cut out and pointed with a properly designed mortar. Additionally, it will be required to construct a new concrete cap as the existing one is cracked and deteriorating.
12. The porch and deck at the southeast corner is deteriorated to such a degree that removal and replacement is required. The concrete stoop is cracked and settled that it, too, needs replacement. This replacement can easily incorporate barrier free access requirements to the main level to allow for public occupancy.

## THE OLD BARN:

The Old Barn is a two story barn structure with a loft, measuring approximately 28'-3" north/south by 26'-5" east/west. The foundations are constructed of a combination of cut and cobblestone, and are in relatively good condition. The structural integrity of the foundations walls is intact but some localized cracking occurs at the south end. Along the west side, some localized deterioration occurs at the top of the foundation, where the heavy timber sill has shifted partially off the wall. The main level barn floor is inconsistently framed, with rough log beams at approximately 3 feet on center, and 2 inch floor planks. Solid timber beams, typically 8x8's, support the logs, and are, in turn, supported by wood posts arranged in a haphazard manner. It is apparent that posts were added on an 'as needed' basis, wherever floor sagging became significant. This framing, while overall apparently stable, will require some localized upgrading and replacement; the extent will be influenced by the anticipated use and occupancy.

The loft framing consists of 2x8's at 16 inches on center, balloon framed, spanning the full 25 feet clear width. There is a rather pronounced sag in the floor. During the restoration, we recommend that supplemental support be provided under these joists at mid-span, reducing the span to approximately 12'-6". The loft would then have a load capacity of approximately 65 psf, which is suitable for controlled, light storage. If heavier storage loading is desired, the floor joists would need to be doubled, in addition to providing the mid-span support.

The roof framing is a simple gable, 8:12 pitch, with the eave at approximately 5 feet above the loft. Rafters are 2x6's at 24 inches on center, with collar ties at every other rafter, about one third of the height below the ridge. The eave is laterally braced to the loft floor at four to six feet on center. This roof framing appears conventional for barns. As such, no upgrading is anticipated. However, as with any structure of this age and overall condition, some localized reinforcement and replacement of cracked and damaged boards should be expected.

At the north wall, there is a full width rather large door. Very little solid wall remains adjacent to the door. The lateral stability of this part of the barn is suspect, as the north wall is leaning significantly to the east, estimated at about 3 inches. It will be necessary to rework the north wall door openings to allow for the inclusion of bracing to provide long term stability.

The exterior of this barn consists of vertical wood siding. It is very weathered, with some rotted, cracked, and deteriorated boards. The entire exterior should be repaired as part of the restoration work.

We recommend some temporary stabilization be implemented for this structure. All stored materials at both the main level and loft must be cleaned out to relieve the load. It is also necessary to install some temporary steel cables diagonally across the north door opening to laterally brace the building. Finally, some temporary shoring should be installed to support the floor where the sill beam has shifted off the foundation and where the walls have partially collapsed (south end). These measures will enable the structure to remain until the full restoration program begins.

### THE NORTH BARN:

The North Barn is a single story barn with a loft, approximately 40'-6" north/south by 26'-4" east/west. The roof framing is conventional barn shaped, with a two section pitched roof, the upper section estimated at a 6:12 pitch with the lower, more vertical section, estimated at a 12:6 pitch. The loft consists of 2x6's at 24 inches on center, with a continuous 3x8 wood center support beam, running north/south, periodically spliced and periodically supported by wood posts. The loft capacity is rather limited, with the design capacity of the joists estimated at 30 to 35 psf. This low capacity renders the loft unsuitable for any significant storage. If it is desired to utilize this loft for storage, then substantial upgrading of the loft framing will be necessary. The center beam is inconsistent in its strength. The randomness of posts and splices makes it unreliable as a structural element. Depending on the proposed future use, we recommend some strengthening of the beam, re-positioning or adding posts, or some combination thereof, be anticipated as part of the restoration. In the meantime, this loft should not be used.

Significant amounts of bracing are located in the side and end walls and in the near vertical portions of the roof framing. With this bracing, it is believed the overall stability of the structure is intact, with no significant work required.

There is a poured concrete knee wall around the perimeter, with periodic cracking noted. Additionally, this knee wall has shifted significantly along the west side. During the restoration the damaged portions of this knee wall will need to be re-built.

The exterior of this barn consists of horizontal wood siding. It is very weathered, with some rotted, cracked, and deteriorated boards. While the south side is in the worst condition, the entire exterior should be repaired as part of the restoration work.

In general, this barn is in good condition with restoration very feasible. The barn can continue to be used for storage at the ground level without any temporary stabilization measures. However, the loft framing and its center support beam are sagging and have been found to be undersized. We recommend the loft not be used for any type of storage.

### THE SOUTH BARN:

The South Barn is a single story barn with a partial loft, approximately 60'-3" north/south by 30'-2" east/west. There is also a small lean-to addition the full width of the barn along the north side, extending approximately 14'-2". The roof framing is conventional barn shaped, with a two section pitched roof, the upper section estimated at a 8:12 pitch with the lower, more vertical section, estimated at a 12:6 pitch. The barn is framed with heavy timber supports and is in very good condition. The entire barn appears quite stable with only very minor, localized repairs being needed.

At the south side of the barn is the loft, approximately 26 feet by 30 feet. It is framed with 2x6's at 16 inches on center, with intermediate beams at about 10 feet apart. These are supported by steel posts integral with the stall cages. This loft was visually observed to be in very good condition, with no noticeable structural deficiencies. The design capacity of this loft is estimated at approximately 50 psf, making it suitable for controlled, light storage.

There is another loft over an interior room in the northeast corner, approximately 14 feet by 20 feet. The details of its framing could not be observed. However, this loft framing appeared to be in very good condition and stable.

Some questions exist regarding the details of the foundations. Along the south end of the east side, there appears to be only a rubble foundation, not extending to frost. This condition needs to be fully evaluated by digging test pits during the restoration process. The southwest corner foundation needs obvious rebuilding. Also, along the south side, the sill timber has shifted partially off the foundation. It is also rotted in areas and needs to be re-built.

The barn is currently being used for storage and may continue to be so used without the need for temporary stabilization.

The condition of the lean-to can be described only as fair, and in need of some repairs during the restoration. The roof is a single pitch, approximately 5½:12, framed with 2x6's @ 24 inches on center (visually estimated). Some repairs should be anticipated in this area.

The exterior of this barn consists of vertical wood siding. It is very weathered, with some rotted, cracked, and deteriorated boards. The worst conditions occur where the lean-to abuts the main barn and all around at the base. While these areas need obvious repairs, the entire exterior should be repaired as part of the restoration work.

### THE EAST BARN:

The East Barn is a single story barn with a partial loft, approximately 32'-4" north/south by 50'-5" east/west. There is also a small addition, 5'-9" east/west by 30'-0" north/south extending south from the southeast corner of the barn. The roof framing is conventional barn shaped, with a two section pitched roof, the upper section estimated at a 6:12 pitch with the lower, more vertical section, estimated at a 12:6 pitch. The barn is framed with heavy timber supports and is in very good condition. The entire barn appears quite stable with only very minor, localized repairs being needed.

At the west side of the barn, second bay in, is the loft, approximately 10 feet by 32 feet. It is framed with 2x6's at 16 inches on center, spanning east/west to beams about 10 feet apart. These are supported by wood posts integral with the horse stall walls. This loft framing is in very good condition except for some shifted wood posts that simply need to be repositioned. The design capacity of this loft is estimated at approximately 50 psf, making it suitable for controlled, light storage.

There is another loft over an interior room in the southeast corner, approximately 14 feet by 18 feet. The details of its framing could not be observed. However, this loft framing appeared to be in very good condition and stable.

The barn is currently being used for storage and may continue to be so used without the need for temporary stabilization.

The exterior of this barn consists of vertical wood siding. It is in good condition. Minor repairs to this siding should be anticipated as part of the restoration work.

The small extension wing is in poor condition, with crumbling foundation walls and rotting and deteriorated wood roof framing. This small wing should be demolished as restoration is deemed not feasible.