



April 16, 2014

Mr. Peter Zembrowski  
Construction & Design Services, Inc.  
PO Box 8873  
Madison, WI 53707

**SUBJECT:** 827 E. Gorham Street  
Structural Assessment  
MP-Squared Project No: 1411046W1

## **INTRODUCTION**

MP-Squared Structural Engineers, LLC (MP2) was retained by Construction & Design Services, Inc. to observe and comment on the structural integrity of the framing at 827 E. Gorham Street, a residential rental home, in Madison, Wisconsin. MP2 made two visits to the property; once on March 28, 2014 at approximately 8:00 am and then again on April 9, 2014 at approximately 5:00 pm. The purpose of this report is to summarize our observations.

## **OBSERVATIONS**

827 E. Gorham Street is a wood framed rental home likely used for student housing and built circa 1847. Please note, this is a general assessment of the structural integrity of the existing framing, not a rigorous structural analysis; however, we did calculate the loading in two types of members that visually appeared under duress with the roof free of snow.

The damage and deficiencies observed were pervasive and generally fell into three categories: Wood deterioration, undersized members, and poor workmanship/framing deficiencies.

### Wood Deterioration

We observed wood deterioration likely caused by insects, fungi, and fire. Insect damage was found on the first floor framing and second floor framing (see Images 16, 21, 22, 27, 42 & 43). Fungi deterioration, likely a combination of dry, white, and wet rot, was noted on the first floor, wall framing, and roof framing (see Images 8, 9, 12, 13, 23, 24, 27, 30, 38, & 41). Fire damage was noted throughout the roof framing on the second floor (see Image 37).

### Undersized Members

There is a lower roof over a portion of the first floor that frames a hip; the hip beam is a 2x4 and spans 18'-0" (see Images 1, 32, & 33). We analyzed the capacity of the 2x4 by applying roof dead load and uniform snow load; we found the member to be 192.3% overstressed.

A 3.75" x 6" beam supports the first floor framing (see Images 28 & 29). We analyzed the beam to support the floor dead and live loads and found the beam to be 1,097.7% overstressed.

### Poor Workmanship/Framing Deficiencies

It is unknown what, if any, building code or wood specification was in effect in 1847, the time period the house was constructed. By today's codes and construction practices this structure would not be allowed to be occupied.

The perimeter floor framing that bears on the foundation wall does not appear to be anchored to the foundation. In some areas, the floor joists do not even bear on the foundation wall, they are simply nailed to the rim joist. In other cases, the floor joists, likely untreated, bear directly on the concrete wall (see Images 11, 14, 15, 19, 25)

There is only a single sill plate for the roof joists to bear on and the joists do not line up with the wall studs (see Images 34 & 35).

Hurricane ties connecting the roof joists to the sill plate are not used. In general, the only clips observed were installed recently, likely during this most recent renovation, in an attempt to bring the framing up to current standards (see Images 12, 21, 23, 24, & 34).

We observed notches at the ends of floor joists that exceed the NDS limit that a notch not exceed one-fourth the depth of the member (see Images 17 & 31).

### **ASSESSMENT/CONCLUSION**

The insect, fungi, and fire damage has caused a significant reduction in the strength of the existing framing; this damage, in combination with undersized members, and the other deficiencies noted above lead us to the following conclusion: All the existing framing should be removed and replaced with framing designed and constructed per the current Wisconsin Uniform Dwelling Code and American Wood Council's National Design Specification for Wood Construction.

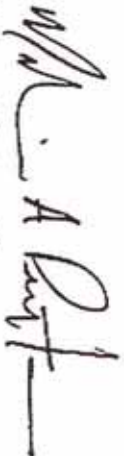
### **LIMITATIONS**

Our observations were limited to a hands-reach assessment. The assessment conducted by MP2 was limited to observable conditions.

A rigorous structural analysis of the structure/s is beyond the scope of our contract and has not been performed. Typical connections and the structural adequacy of framing members have not been verified by rigorous structural analysis. The observations were limited to the items stated in the report.

Sincerely,

MP-SQUARED STRUCTURAL ENGINEERS, LLC



Melissa A. Peyton, P.E.  
Structural Engineer / Principal

Enclosure: Report Images 1 - 43

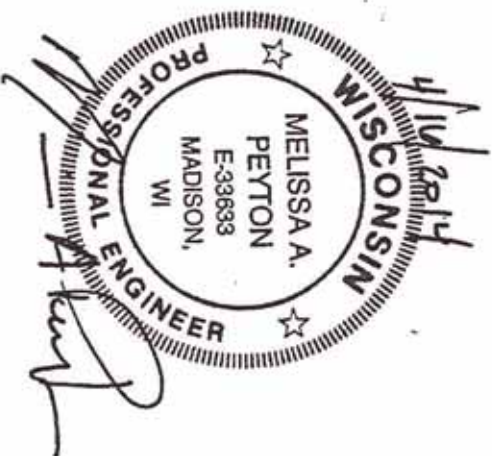






Image 1: Exterior view showing two lower hip roofs.



Image 2: Exterior view.



Image 3: Exterior view.



Image 4: Exterior view.





Image 5: Exterior view.



Image 6: First floor framing extending beyond the face of the foundation wall & exterior wall framing.



Image 7: First floor framing extending beyond the face of the foundation wall & exterior wall framing.



Image 8: Rotting wood bearing on the foundation wall.





Image 9: Rolling wood bearing on the foundation wall.

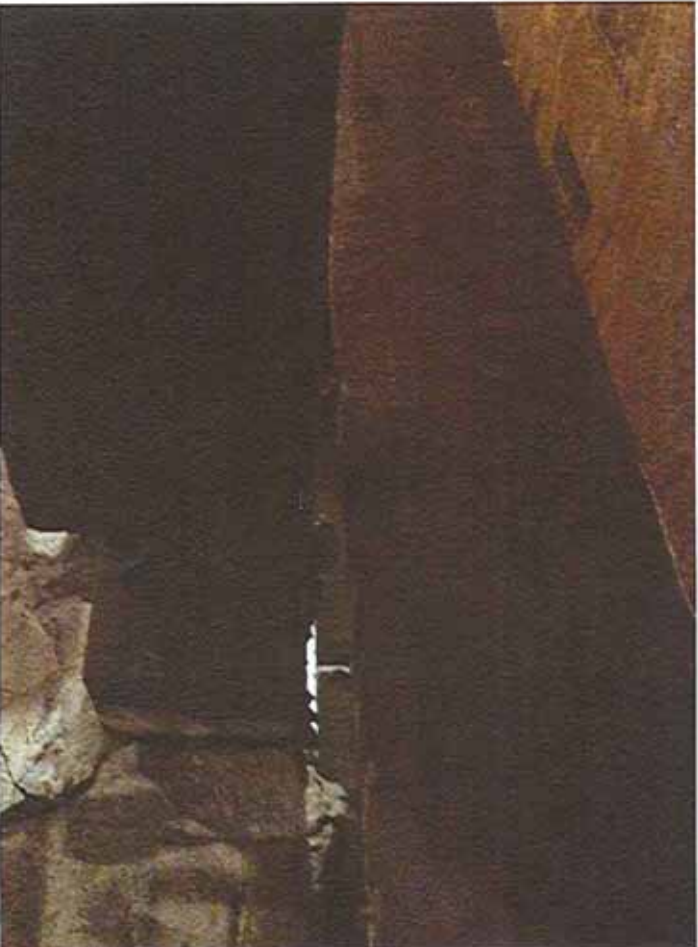


Image 10: Floor joist not bearing on support beam.





Image 11: Wood beam bearing directly on concrete with notch.



Image 12: Deteriorated joist with new clip.



Image 13: Severely deteriorated support beam.



Image 14: New floor joists not bearing on foundation wall, supported by rim joist.





Image 15: New floor joists not bearing on foundation wall, supported by rim joist.



Image 16: Floor joist with apparent insect deterioration.



Image 17: Floor joist with notch bearing on support beam.

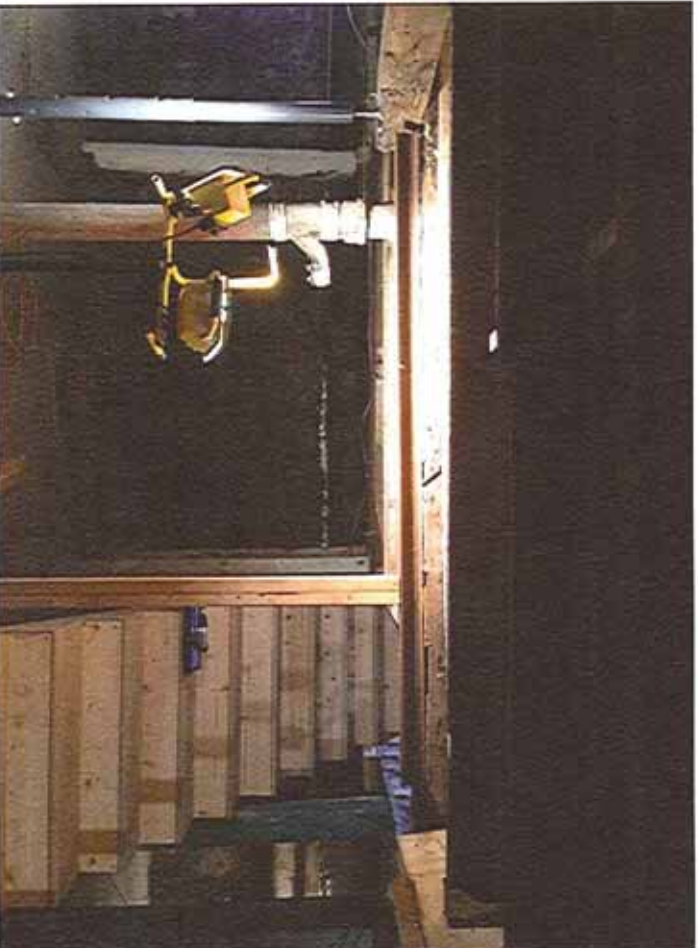


Image 18: Steel W-beam possibly shoring existing support beam; shoring unstable as installed.



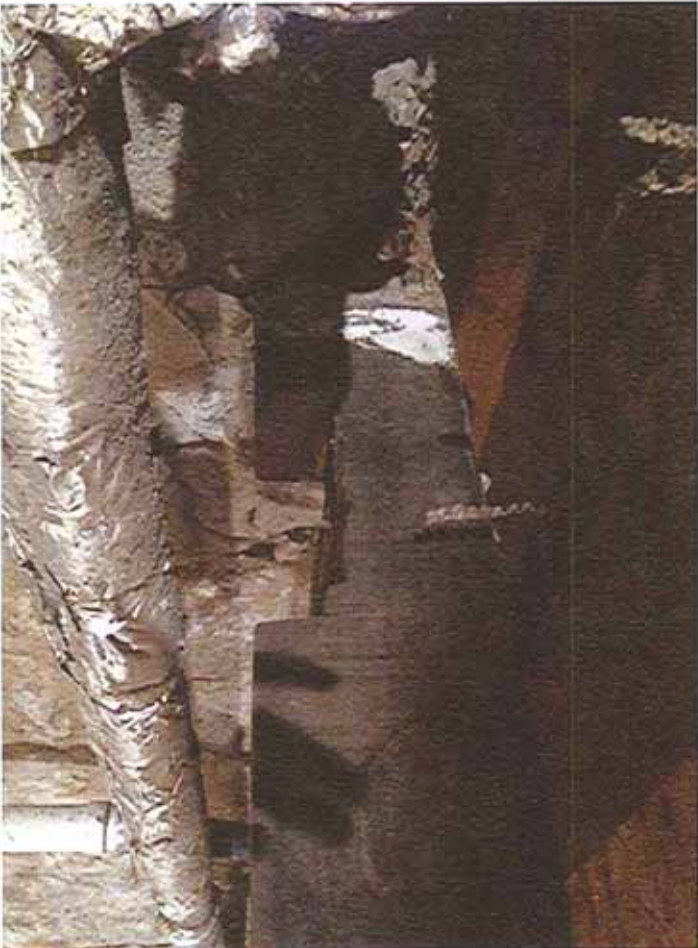


Image 19: Deteriorated support beam with notch.

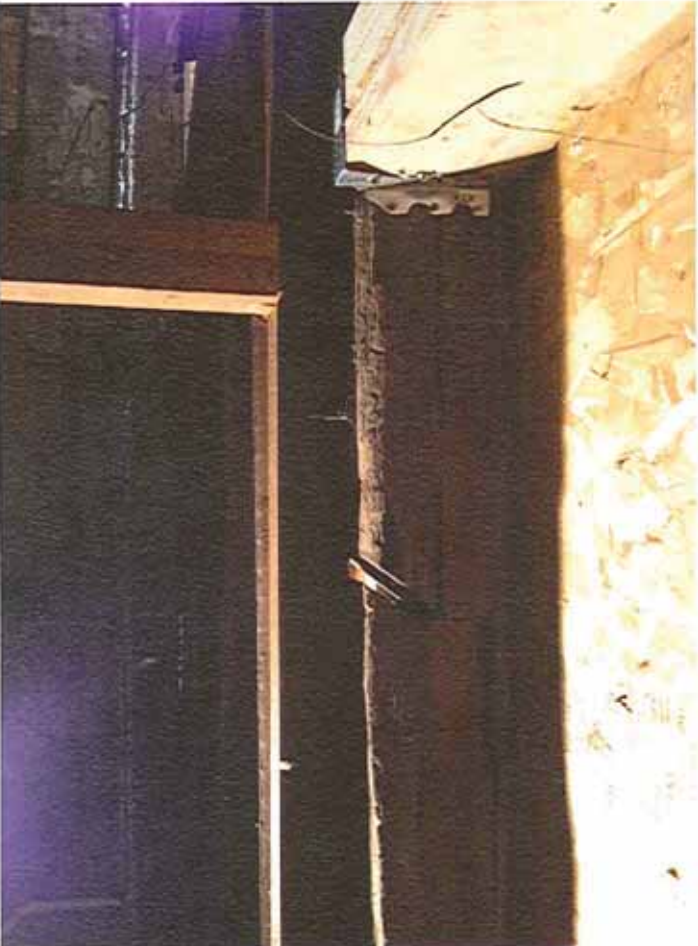


Image 20: Support beam with apparent shear failure.



Image 21: Joist with apparent insect deterioration.



Image 22: Joist with apparent insect deterioration and shear failure.





Image 23: Joist with deterioration and new hanger.



Image 24: Beam to beam connection. Note deterioration.



Image 25: Joists bearing directly on concrete foundation wall.



Image 26: Floor joist with apparent insect deterioration.





Image 27: Floor joist with damage/deterioration.



Image 28: View of undersized support beam.

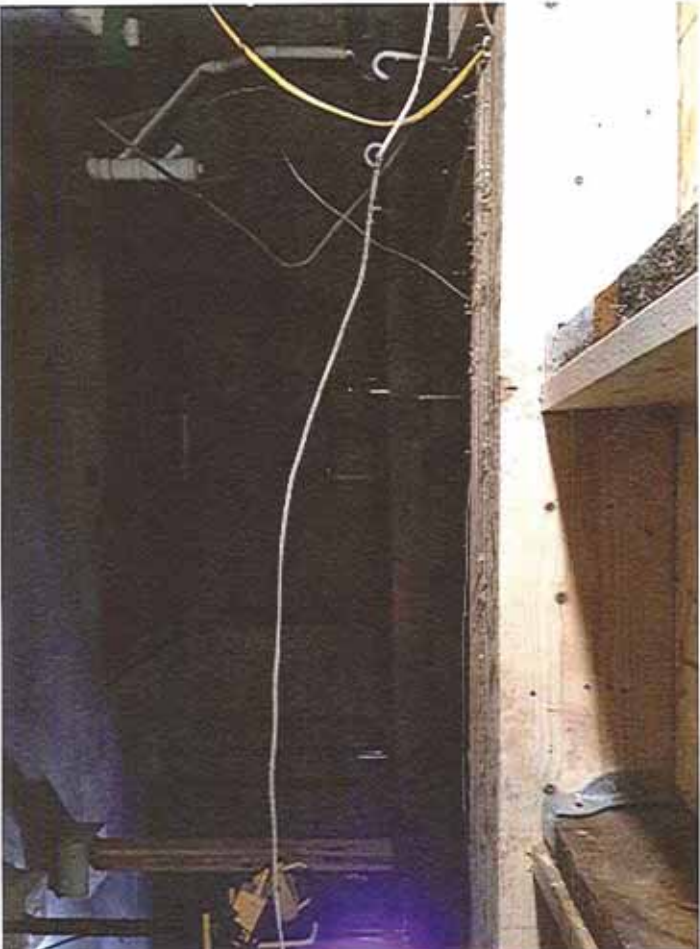


Image 29: View of undersized support beam.

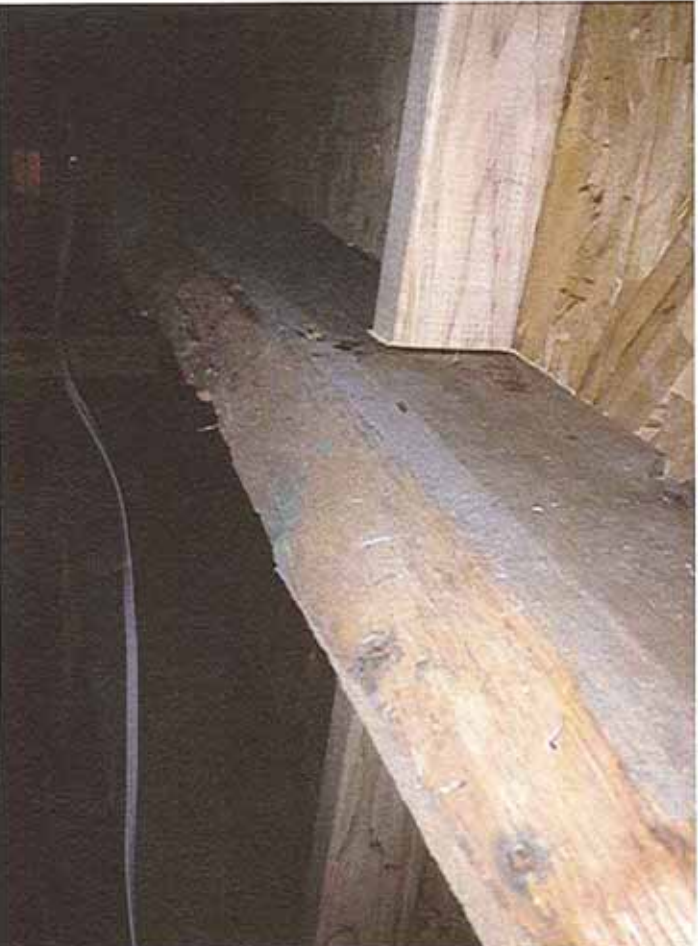


Image 30: View of damaged joist.





Image 31: Floor joist with notch exceeding NDS limitations.



Image 32: Undersized hip beam.

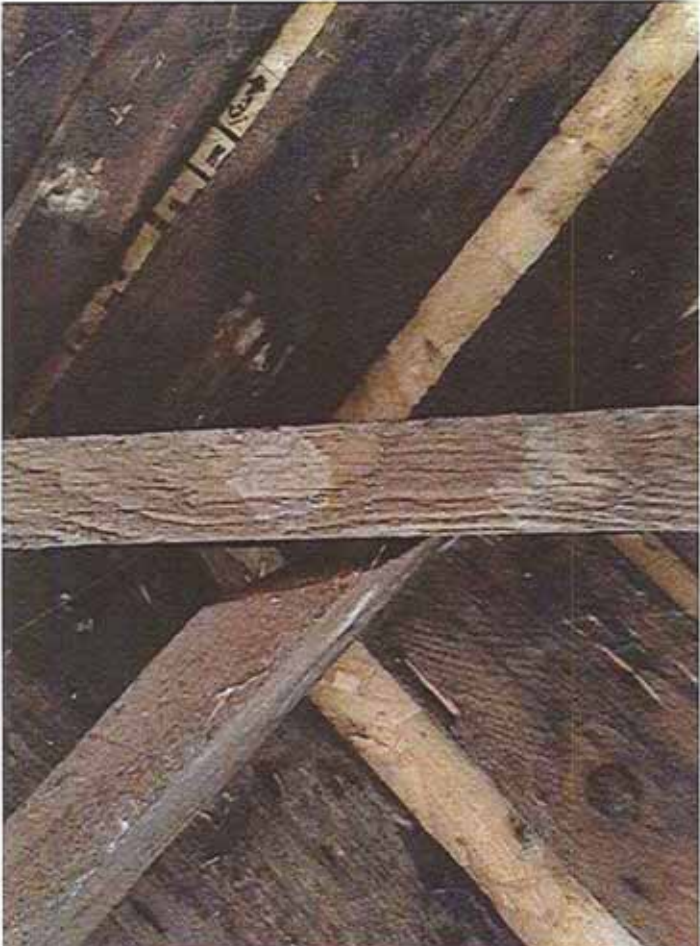


Image 33: Hip joist to hip beam connection.



Image 34: Single sill plate supporting roof joists.





Image 35: Single sill plate supporting roof joists.



Image 36: Single sill plate supporting roof joists.



Image 37: Fire damage.



Image 38: Deteriorated wall stud.





Image 39: Discontinuous wall stud.



Image 40: Wall framing at perimeter.



Image 41: Deteriorated framing at exterior wall.

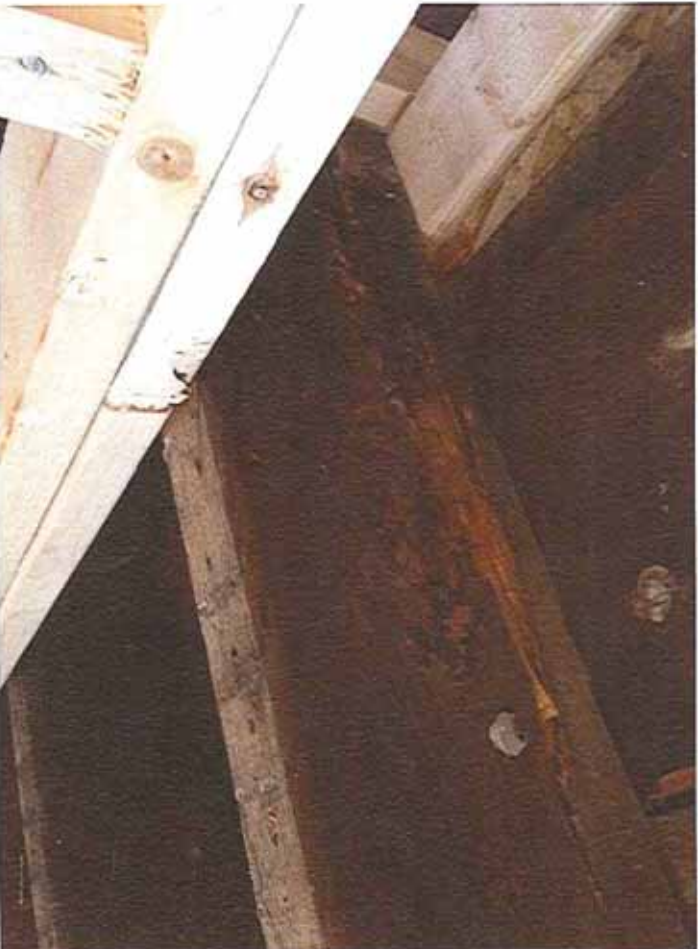


Image 42: Deteriorated second floor joist.



2/1/2017



Image 4.3: Deteriorated second floor joist.

