SHEPHERD OF THE VALLEY LUTHERAN CHURCH

TRUSS CONDITION ASSESSMENT

December 2020

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LOVED BY GOD; LOVING OTHERS

Prepared for:

Shepherd of the Valley Lutheran Church
4212 Mendenhall Loop Road
Juneau, Alaska 99801

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INTRODUCTION

On December 14th, 2020, PDC Engineers was contracted by Steve Landvik, of Shepherd of the Valley Lutheran Church, for the purpose of conducting a condition assessment on the trusses of their building located at 4212 Mendenhall Loop Road in Juneau, Alaska.

The scope of this condition assessment included a site visit for observations and a report which discusses findings and provides recommended remedial actions. This report is intended to provide the reader with a description of the current condition of the trusses and to provide cursory recommended steps forward; however, this report is not a design for repair. The scope of this report does not address the following:

- Components of the roof assembly other than the trusses.
- The condition of all other building components.

For the sake of clarity, Mendenhall Loop Road is considered to be located west of the assessed building.

BACKGROUND

The building was erected in the mid-1980s and is comprised of three sub-structures annexed together to create the larger building. The portion of the building assessed for this report was the northern sub-structure: this building is approximately 40' x 60', wood framed, and uses a custom architectural style which adopts gable end walls in conjunction with a hip located at the midpoint of the ridgeline. The gable end walls are balloon framed with thirty-two full span, premanufactured scissor trusses between. The trusses are roughly 40' span and installed at 2' on-center.

OBSERVATIONS

Existing Construction

The trusses were manufactured from 2x6 nominal dimensional lumber for the top chords, bottom chords, and vertical webbing members under the ridgeline, while the remainder of the webbing members were constructed with 2x4 dimensional lumber.

The truss connections were typical truss plate connectors, Mitek or similar, and rely on the 'teeth' of the plates for fastening; several nails were also used to fasten many of the plates (see Figure 1). The truss plates connecting the bottom of the vertical webbing members to the bottom chords measured approximately 9-1/2" x 13-1/2". The truss plates connecting the top of the vertical webbing members to the top chords measured approximately 5-1/2" x 6". The truss plates connecting the 2x4 webbing members to the chords were not analyzed in detail because they were observed to be in good condition.

Notable Deficiencies

The trusses appeared to be predominately in good condition, with no observable signs of stress such as excessive warping, cracking, or rot; however, of the 32 premanufactured trusses,

approximately 9 presented signs of significant vertical slippage, with greater than ¼" separation between the vertical webbing members and the top chords. The amount of separation between the vertical webbing members and the top chords varied from 0" to 5/8". See Figure 2.

Where vertical slippage had occurred, the truss plates on one or both sides of the vertical webbing members have also laterally separated from the posts, resulting in a loss of plate tooth embedment. The amount of lateral separation between the truss plates and the vertical webbing members varied from 0" to approximately 3/8". It is important to note that, at 3/8" separation, the teeth of the truss plates were fully disengaged from the vertical webbing member. See Figure 3.

Where the plates were separated from the vertical webbing members, grooves were etched into the surface of the webs indicating that the separation had occurred in situ, after truss assembly. See Figure 4.

DISCUSSION

Implications

Because the vertical webbing members have separated from the top chords in situ, after installation, the connections undergoing separation are effectively in a state of failure. The duration of development for the connection failure is unknown; the separation may have developed during a short period of time during a severe climatic event, for example, or it may have developed more slowly, perhaps over the course of the lifetime of the structure. Regardless, it is possible that the connection failure currently observed in 9 of the premanufactured trusses may begin to manifest in the remaining trusses and that, eventually, a catastrophic failure may occur.

Considering the possibility of further progression in truss separation and potential for eventual catastrophic failure, the separation currently observed may represent an immediate life safety risk, especially considering the frequency of extraordinarily inclement weather experienced this season. Continual monitoring for further separation is warranted, and an immediate repair should be implemented. Remedial actions are recommended as outlined in the next section.

Mode of Failure

The mode of failure is likely the inadequacy of the connection capacity relative to the experienced load.

RECOMMENDATIONS

Summary of Recommended Actions

In light of the observations and discussions presented in this report, the following remedial actions are recommended to ensure continued performance of the building:

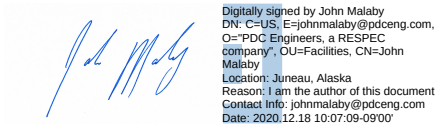
- Until a repair has been implemented, remove excess snow to minimize the loads supported by the roof.
- Repair the truss deficiencies using one of the options listed below:

- Replace the truss plates connecting the top of the vertical webbing member to the top chord of all premanufactured trusses.
- Install two additional vertical web members, one on either side of the existing vertical web, for all premanufactured trusses.

Please contact PDC Engineers if you require clarification of the content in this report.

We appreciate being of service to the Shepherd of the Valley Lutheran Church on this project.

Regards,



John Malaby, EIT

Structural

Figure 1 – King Post and Top Chord Truss Plate w/ Nails

Figure 2 – Vertical Separation at Top of King Post

Figure 3 – Lateral Separation at Top of King Post

Figure 4 – Surficial Scraping from Plate Slippage