



BEAM REVIEW
Argyle Community Centre
10812 Hwy 522
Arnstein, Ontario

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EXECUTIVE SUMMARY

On September 7, 2018, Mr. David Gatien, P.Eng., of Tall Pines Engineering Ltd., visited the Argyle Community Centre at 10812 Hwy 522 to perform a visual structural review of two ceiling framing beams.

The beams were determined to be custom wood sections located in the attic space, rather than in the ceiling bulkheads as previously believed. The design method and strength are unknown; however, it is apparent the beams are sagging and one connection has failed.

The roof framing is also a concern as it appears to be supported on the ceiling joists which are sagging.

Briefly, the following was concluded from our review:

1. The capacity of the custom beams cannot be determined without significant destructive investigation and expenditure.
2. Roof framing is supported by the ceiling joists, which are hung from the beams. This is not a common form of construction and without significant destructive investigation and expenditure, the capacity of the roof, ceiling joists, and their connections cannot be determined.
3. In consideration of the condition of the beams and joists, and the unknown capacity of the roof, **it is the opinion of Tall Pines Engineering Ltd. that the building is not safe for occupancy.**

While analysis of the structure may be possible, the results of the analysis may determine the beams do not have the required capacities.

Temporary use of the building may be possible if shoring is erected to support the beams. However, until the capacity of the roof and ceiling can be confirmed as discussed above, the building cannot be safely occupied during the winter months due to increased loading on the roof from snow.

In addition to the structural concerns, the air supply plenum as found to be quite dirty. It is highly recommended that consideration be given to consultation with an environmental testing firm to verify the air quality in the building prior to opening the building to the public again.

1.0 INTRODUCTION

At the request of Mr. Steve Martile, P.Eng., of Patrick Sprack Limited (PSL), personnel from our firm visited the Argyle Community Centre at 10812 Highway 522 in Arnstein, Ontario, to review two ceiling framing beams.

The purpose of the visual review was to assess sagging in the beams that had been reported to us by Mr. Martile. This report is intended to summarize the observations made during the review, and present conclusions and recommendations.

It is understood that this report will be submitted to the local community board responsible for the building (Board) for review.

1.1 BACKGROUND

The following was reported to us:

- The building was originally a school with a flat roof.
- The 'tee' shaped structure was modified, and additions were constructed. A sloped roof was also added.
- The dates of the original construction and additions is not known.
- The existing HVAC is supplied via the subfloor space.
- PSL was contracted to install a new HVAC system. When the sagging was discovered by PSL, this review was commissioned with the approval of the Board.

1.2 EXISTING DOCUMENTATION

No existing drawings were available for reference during the review or at the time of this writing.

2.0 FIELD INVESTIGATION

On September 7, 2018, Mr. Dave Gatien, P.Eng., of Tall Pines Engineering Ltd., visited the property to review the beams. A visual structural review was performed from the interior and exterior of the building, and the attic space. A small section of the ceiling finishes (wood paneling) at the intersection of the two beams was removed by Mr. Gatien to allow visual access to the connection and determine the beam sizes. Mr. Warren Whitehead, of PSL, and Mr. Stephen Brushey, of the Board, were present for the duration of the review.

Unless noted, the following was excluded from the review as it was not deemed necessary for the purposes of this report or it was outside of the scope of work:

- Assessment of the geotechnical conditions.
- Destructive testing or investigation, unless noted.
- Material testing.

- Calculations with regards to any building code requirements (e.g. Structural capacities, area of glazing, fire separation requirements, required room areas, etc.), unless noted.
- The identification and analysis of mould or any other designated substance.
- Review of engineered systems other than structural (e.g. Mechanical, Electrical, etc.).

2.1 DESCRIPTION OF STRUCTURE

The subject property is located on the north side of Highway 522. The building is a one-storey structure with a hip-style roof (see Photo 1).

The building is approximately 50' x 65' and houses a large open hall, bathrooms, a kitchen, mechanical room, etc. and is used as a community centre.

The roof is framed with rough cut timber and strapping, and finished with sheet metal roofing. There is no sheathing. The load-bearing walls are of unknown construction – wall framing was not accessible at the time of review due to finishes. Interior walls are finished with wood paneling and the exterior of the building is clad with metal siding.

It was reported that the floor is constructed of wood joists over a slab-on-grade and load-bearing walls have foundations walls below. Foundations were not accessible for review.



Photo 1: View of the front of the community centre.

2.2 OBSERVATIONS

The following was observed during the review:

1. The roof is framed with rough cut timber (Refer to Photo 2). Metal roofing is applied directly to strapping on the rafters. The rafters are supported on struts extending to the ceiling framing (refer to Photo 3). The strut locations do not correspond to a wall location below – they are support by the ceiling joists. In some areas, the ceiling framing consists of the original structure's flat roof. Ceiling joists are visibly sagging on the north side of the hall area.



Photo 2: Roof framing viewed from the attic. Note the struts visible in the background.



Photo 3: Struts supporting the roof rafters.

2. From within the hall area, it appears the ceiling is supported by a beam spanning approximately 35'-0" with a secondary beam supported at mid-span, approximately 24'-0" in length. Bulkheads extending down from the ceiling surface indicate the perceived beam locations. Refer to Photo 4.



Photo 4: The main hall area. The two bulkheads are denoted by arrows; the area where finishes were removed is denoted by the circle.

3. Despite the bulkheads in the hall area giving the appearance of beams, when finishes were removed, no beams were found. From within the attic space, it was apparent that the ceiling is supported by 4'-0" deep custom wood beams constructed of sheathed studs. Refer to Photo 5. The beams are built above the ceiling framing.

Through the depth of the beams, threaded rod was installed with heavy-duty washers, top and bottom, to hang the ceiling joists (refer to Photos 5 and 6). The "washers" are sections of 3" steel channel. The bulkheads observed in the hall covered the bottom washers and rod ends.

It was observed that the second beam has slipped relative to the main beam at the connection point and ceiling finishes along the length of the main beam were buckled.



Photo 5: Beams viewed from the attic space. Note the black roofing tar visible on the floor still present on the original school roof area. Some rod locations have been indicated with arrows.



Photo 6: One rod and heavy-duty washer.

4. The north ceiling joists appeared to have a significant sag as did the roof above (when viewed from the exterior of the building). Refer to Photo 7.



Photo 7: The north face of the building.

4.0 CONCLUSIONS AND RECOMMENDATIONS

On September 7, 2018 personnel from Tall Pines Engineering Ltd. visited the Argyle Community Centre at 10812 Hwy 522 to perform a visual structural review of two ceiling framing beams.

The building is approximately 50' x 65' and houses a large open hall, bathrooms, a kitchen, mechanical room, etc. The added sloped roof is framed with rough cut timber and finished with sheet metal roofing. The load-bearing walls are of unknown construction. It was reported that the floor is constructed of wood joists over a slab-on-grade and load-bearing walls have foundations walls below. Foundations were not accessible for review.

The beams in question are located over the hall area. Upon removal of interior finishes and review of the attic space, it was evident that the beams are custom wood sections of unknown design and strength. The ceiling joists are hung from these beams via threaded rod and heavy-duty washers. The secondary beam is intended to be supported by the main beam, however it was observed that the secondary beam appears to have slipped at the connection. This is due to either a failure of the connection or lack of proper connection during original construction. **The capacity of these beams cannot be determined without significant destructive investigation and investment.** While analysis of the structure may be possible, the results of the analysis may determine the beams do not have the required capacities.

Further, it was observed that the roof rafters are supported by mid-span struts bearing on the ceiling joists. It is likely that this is the cause of sagging of the ceiling joists on the north side of the building. With the roof supported by the joists and the joists hung from the beams, it can be concluded that the beams support all roof and ceiling loading via the hanging connection. **This is not a common form of construction and without significant destructive investigation, the capacity of the roof, ceiling joists, and their connections cannot be determined.** It should be noted that in our experience ceiling joists do not typically have sufficient capacity to safely support roof loading in this manner.

In consideration of the observed framing configuration, and the sagging in the roof, ceiling, and beams, it must be concluded that the beams do not have sufficient capacity to support the loads or they have failed in some way so as to cause the sagging. **Therefore, it is the opinion of Tall Pines Engineering Ltd. that the building is not safe for occupancy.**

Temporary use of the building may be possible if shoring is erected to support the beams. However, until the capacity of the roof and ceiling is confirmed as discussed above, the building cannot be safely occupied during the winter months due to increased loading on the roof from snow.

With respect to the existing HVAC supply system located in the sub-floor area, one of the floor registers was removed during our investigation to view the floor framing. While outside of the scope of this report, it must be noted that the plenum below the floor was found to be quite dirty and full of dust and other material. It is highly recommended that consideration be given to consultation with an environmental testing firm to verify the air quality in the building prior to opening the building to the public again.

5.0 BASIS OF USE AND RELIANCE

This report has been prepared for Mr. Steve Martile, of Patrick Sprack Limited (PSL), for the stated purpose with respect to the structural condition of the Argyle Community Centre at 10812 Hwy 522 in Arnstein, Ontario. Its discussions and conclusions are summary in nature and cannot properly be used, interpreted, or extended to other purposes without a detailed understanding of discussions with Mr. Martile as to its mandated purpose, scope, and limitations. The report was prepared for the sole benefit and use of PSL and may not be used or relied on by any other party without the express written consent of Tall Pines Engineering Ltd. The report is copyright protected and may not be reproduced or used, other than by Mr. Martile for the stated purpose, without the express written consent of Tall Pines Engineering Ltd.