

July 31, 2025

0005-040

Via email: bpayette@metchosin.ca

Metchosin Firehall
4440 Happy Valley Rd,
Victoria, BC
V9C 3Z3

Attn: Bob Payette, CAO

**Re: Metchosin Firehall Costing Review
Final Report**

Introduction

Herold Engineering Limited has been retained by the District of Metchosin to provide a seismic assessment of the existing apparatus bay structure located at 4440 Happy Valley Road in Metchosin, BC. The purpose of the assessment is to determine structural seismic upgrades that would be required to meet current code requirements and to provide an opinion of probable cost for implementing the upgrade work. To carry out this assignment, Herold has reviewed existing reports, performed a visual on-site investigation of the structure, and conducted an analysis of the current code requirements and the probable capacity of the existing structural system.

Existing Structure

Information on the existing building structure was gathered from a visual examination of the exposed structure during a site visit in June 2025 and a review of previous reports. Existing structural drawings were not available at the time of this review.

Originally constructed in 1996, the apparatus bay is a 340m² single storey structure with a partial mezzanine and training tower. The roof is constructed of wood sheathing on pitched wood trusses that bear on 190mm thick tilt-up concrete wall panels. It is assumed that the walls bear on conventional strip footings based on the favourable geotechnical conditions at the site noted in a previous report, however the configuration of the footings cannot be confirmed by Herold Engineering.

Seismic Code Analysis

The apparatus bay would have been designed to comply with the 1992 BC Building Code (BCBC 1992). Seismic requirements under the 1992 code were notably less stringent than the current BCBC 2024 provisions, especially for post-disaster buildings. As noted in the table below, the BCBC 1992 seismic requirements were 40% of the current code requirements.

Design Building Code	Seismic Base Shear, V	% of Current BCBC 2024 Seismic Design Load
BCBC 2024	0.99 x w	100%
BCBC 1992	0.40 x w	40%

w = building weight

Gravity Load Code Analysis

The apparatus bay roof structure would have been designed to comply with the 1992 BC Building Code (BCBC 1992). Design values for ground snow load under the 1992 code were typically 1.5kPa in Greater Victoria, however it is unknown if the District of Metchosin had any specific bylaw requirements for snow load design at the time. Under the current code, design snow load values for Metchosin are 1.88kPa. The current code also includes a requirement to increase design snow loads by an additional 25% for post-disaster buildings which results in a total increase of 56% over the 1992 code requirements. Given that the existing roof structure is comprised of wood trusses, it would require an in-depth investigation of the geometry, connection configuration, and material properties of the wood species to accurately determine the capacity of the trusses to resist the current post-disaster snow load requirements and this specific analysis is beyond the scope of this report.

Existing Structure Deficiencies and Proposed Seismic Upgrades

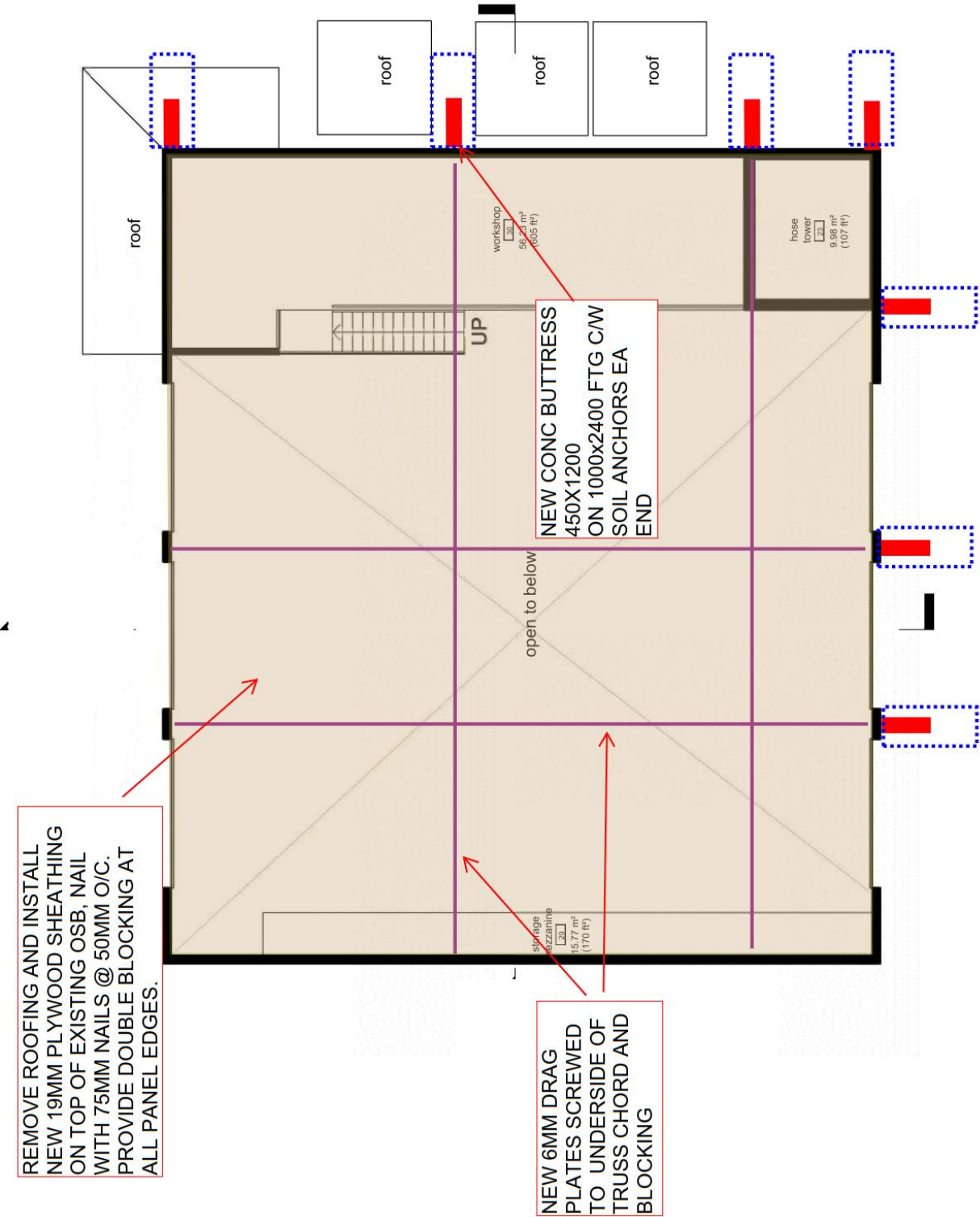
The existing building has two primary weaknesses governing the seismic capacity of the structure: the lack of stiffness in the east-west direction due to the large overhead door openings for trucks, and a low-capacity, poorly connected wood roof diaphragm supporting heavy concrete walls. To address these weaknesses, Herold has developed a schematic design to illustrate the scope of work anticipated to bring the building in compliance with current code seismic requirements.

The proposed seismic upgrade work includes new lateral elements to address the weakness in the east-west direction and to reduce the diaphragm loads in both directions to a level that can be accommodated by wood construction as well as work to upgrade the existing wood diaphragm to meet current demand. The structural scope of work is as follows and as shown on page 4:

- Construction of seven new reinforced concrete buttresses around the exterior of the building. Buttresses to be 450mm wide x 1200mm long x 5200mm tall on new 1000mm wide x 2400mm long x 750mm thick footings. Soil anchors are needed to resist the buttress overturning loads at each end of the footing.
- Remove existing roofing and install new 19mm plywood sheathing over the existing OSB sheathing and install new double wide wood blocking around all panel edges. Blocking can be installed from either the attic space or by locally cutting out strips of the existing OSB sheathing. Add new steel tie plates connecting the roof diaphragm to the new buttress walls and install new roofing.

- Provide new steel strap connection plates between the upgraded roof diaphragm and the existing tilt-up concrete walls.

The above noted scope of work will have some mechanical, electrical, and architectural impacts and these items would need to be considered when locating the new buttress walls and developing a comprehensive project budget.



Opinion of Probable Cost of Structural Seismic Upgrades

Based on the schematic upgrade design shown and our experience with similar upgrade projects, the estimated probable costs for the structural upgrades is **\$900,000.00***. This figure does not include associated removal and reinstatement (re and re) work for mechanical, electrical, or architectural items and we recommend that these items be investigated to determine if any additional upgrades should be undertaken coincident to the structural upgrade work. Additional exclusions include design fees, permit costs, escalation, phased implementation, and owner's administration.

**Herold Engineering cannot control the cost of labour and materials, the general contractor or any subcontractors' methods of determining prices, or competitive bidding and market conditions. Therefore, the opinion of probable cost included in this Report is based on the experience, qualifications, and best judgement of Herold Engineering and our knowledge of the construction industry. Herold Engineering cannot and does not warranty that proposals or actual construction costs will not vary from this estimate.*

We trust that the information contained within this report satisfies your current requirements. Should you have any comments or questions, please do not hesitate to contact the undersigned.

Yours truly,

HEROLD ENGINEERING LIMITED

Prepared By

Kate Ulmer, P.Eng.
Principal

