Metchosin Firehall Building Assessment

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section 1.0 summary

1.0 summary

The purpose of the of this Feasibility study is to identify options for building a new firehall to replace the existing aged and outdated firehall in Metchosin, BC. The initial step includes providing a thorough review of the existing condition of the current facility. The following paragraphs will discuss in detail the various observations and conclusions of the building audit component of the Feasibility Study. The top 5 issues for concern are listed below in order of importance.

1. seismic upgrades to post disaster standards

The BC Building Code was amended in 2006 to require emergency services buildings to meet post-disaster standards with seismic importance factor of 1.5 Newly constructed or significantly renovated buildings must now comply with the current code, BCBC 2024. Since the original construction of the apparatus bay in 1996, seismic design loads have increased significantly - original design forces are approximately 43% of current Code requirement. Structural assessments have identified key areas for improvement, including the foundation, roof, and wall systems. Recommended upgrades include replacing roof trusses, strengthening wall connections, and adding seismic bracing to bring the building up to current standards.

2. BC Building Code infractions

The building complies with the code in effect at the time of construction but does not meet all current BCBC 2024 provisions. Fire separations, mezzanine safety features, and construction classifications differ from today's standards. While sprinkler systems are not currently required, future reclassification could affect this. These items are noted for alignment with modern code expectations. Any major renovations would trigger compliance with updated code requirements, including post-disaster standards

3. upgrade to meet current envelope and energy standard

The building envelope does not meet current BC Energy Step Code or ASHRAE 90.1 performance targets. Upgrades such as continuous exterior insulation, new cladding, and a higher-performing roof system are recommended. Electrical systems are expected to be less efficient than current standards and may benefit from modernization to meet energy targets. Future renovations should consider increasing energy efficiency to align with long-term Step Code goals, including net-zero readiness.

4. fire rescue related programmatic deficiencies

Apparatus bays are smaller than current standards, and support spaces such as gear storage, decontamination washrooms, and SCBA rooms are not currently separated or specialized. Providing dedicated, ventilated areas can enhance firefighter safety and operational efficiency. Aligning with NFPA 1500 and WorkSafeBC standards would support best practices in contaminant control and personnel flow. These updates are common in modern firehall design.

5. mechanical and electrical system upgrades

The building does not currently have a direct vehicle exhaust system, and HVAC systems may not meet current standards for air quality and energy efficiency. Lighting and electrical systems are aging and may fall short of current ASHRAE performance benchmarks. A full review by engineering consultants is recommended to identify cost-effective upgrades. Improvements can help meet modern safety, energy, and operational expectations.

section 2.0 existing building & site description

2.0 existing building & site description

"You can't manage what you don't measure."
W. Edwards Deming

1. introduction

The District of Metchosin is located on the southern end of Vancouver Island and is a rural farming community with a population surpassing 5000 residents. A single firehall provides emergency service response to the entire community including residential, agricultural, and commercial locations.

The current firehall was initially constructed in 1950, with additions in 1960, and again in 1996 when a new tilt-up concrete walled apparatus bay was added. Since the last major constructed component of the building was completed, almost 30 years ago, there have been numerous building code updates. One significant update is the requirement for firehalls to be designed to meet an "importance factor" of 1.5. This requirement necessitates that the building be designed to 1.5 times the structural capacity otherwise required by the Building Code. It should be noted the 2023 and 2025 structural reports reviewing the current apparatus bay structure identify the shortcomings of the existing building and the numerous upgrades needed to bring it in-line with current code. Also, in addition to code developments, there have been significant advancement and adoption of NFPA (National Fire Protection Association) standards by fire departments across North America and similar to the building code requirements, the Metchosin fire hall no longer complies with the life safety requirements of a modern firehall facility and does not meet many NFPA standards. The observed deficiencies are outlined in the building audit comments in part 1.0 of this report while the following provides an overview of the existing facility.

2. facility history and statistics

Location: 4440 Happy Valley Road, Victoria, BC

Site Size: 4 1/2 Acre Lot

Building Size:
- Existing apparatus bay - 4000 sq. ft
- Total building footprint - 8300 sq.ft
- Total buildinng area - 9700 sq.ft (including ground level, level 2, and mezzanine)

Building History:
- The District of Metchosin currently has one fire hall providing emergency service response to the citizens, businesses, and visitors of Metchosin.
- The firehall was constructed in 1950, and has recieved various upgrades and additions over the years
- New apparatus bay constructed in 1996

Construction:

Administration Building
- Unreinforced cinder block walls

Apparatus Bay
- 17' high 8" concrete tilt-up wall panels
- Engineered wood trusses spaced at 24" on centre and sheathed with 1/2" plywood with H-clips at unsupported panel edges
- OSB sheathing along the bottom chords and are toe-nailed to a top plat that is bolted to the walls of the building with 3/4" anchor bolts
- wood frame mezzanine structure

Function: Services provided include:
- Fire suppression
- Rescue Operations
- First responder medical response
- Fire Inspection
- Public Education
- Response to Hazardous Materials Incidents (HazMat)
- Fundraising and other community service and charitable work

Apparatus Bays: 3 double ended drive through bays at approximately 14'-5" wide and 56'-8" long
- 2x Type 1 Engines
- 1x Boc FR/Rescue Truck
- 1x 1500 gal tender
- 1x 250 gal Quick Response Engines (250gal)
- 1x Tech Trailer for Rope & Water Rescue
- 1x ATV Rescue/ Trailers
- 1x Duty Vehicle Pickup

Other:
- supported by back-up generator
- Metchosin Fire Hall is staffed 5 days a week with two full time staff – a maintenance support/firefighter, and fire chief

section 3.0 needs analysis

3.0 needs analysis

This section aims to compare existing conditions to best practices using the following three categories.

1. existing building condition vs. best practice
1. building code & standard issues
2. building systems

1. general condition

The description below summarizes the major spatial deficiencies found at the Metchosin Firehall apparatus bay.

i. operational area

- Apparatus Bays – the existing firehall has 3 drive through tandem bays. The bays measure approximately 17.3m (56'-8") long x 4.4m (14' -5") wide
  - The current bays themselves are too small to accommodate the current standard for emergency vehicle sizes. Width and length of the bays being the most crucial deficiency
  - inadequate circulation around vehicles
  - Typical firehall design in today's standards would create apparatus bays between 26.0m to 27.0m (85' to 90') in length for tandem bays and 16.0m to 17.0m (52' to 56') to for side by side bays. These lengths are crucial in order to accommodate two average engines 10.5m (33'-0") in length with space in front, between and behind in order for personnel to safely get out the door to a call
  - Widths of 5.2m (17.0') for internal bays and 5.6m (18.5') for exterior bay for clear inside space, with overhead doors being a minimum of 14' wide to accommodate larger vehicles and reduce the need for custom vehicles to be purchased
  - This will also allow for vehicles to be seamlessly relocated between various bays and staged without restriction

- Apparatus bay doors just barely allow for vehicle entry into the bays as their widths are 12' wide
  - Typical firehall doors in today's standards would be 14' wide by 14' high

- Gear storage, workshop, and general storage are all currently exposed to the general apparatus bays mixing clean and dirty spaces which allows for contaminates to spread from operational areas into living quarters and home with volunteerse
  - Unsafe storage platform built on top of gear storage area
  - **WorkSafeBC Occupational Health and Safety Regulation (OHSR)**
    - Section 4.2: The employer must ensure that all buildings and structures in the workplace, including temporary or permanent platforms, are capable of withstanding any stresses likely to be imposed on them.
    - Section 4.43.1 (3)(a–c): If the shelf qualifies as a "storage rack," it must be engineered, installed, and used in accordance with good engineering practice and manufacturer or engineer specifications.
    - Section 4.43.1 (6–9): The rated capacity of the rack must be clearly posted, regular inspections must be completed by a qualified person, and maintenance must be performed to prevent unsafe conditions.
    - Section 4.57: If workers are elevated above the floor and guardrails are inadequate in height or strength, additional guardrails or fall protection systems must be provided.
    - Section 4.58 & 4.58.1: Guardrails must be capable of withstanding required loads and may not be temporarily removed without fall protection systems in place.

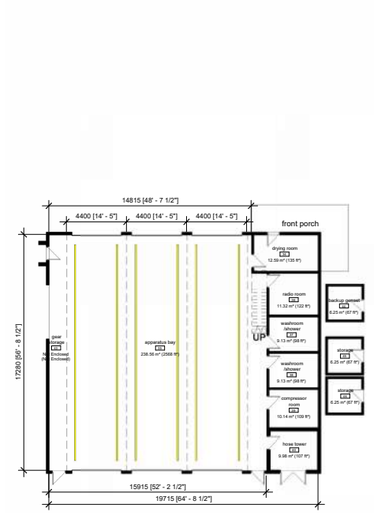
- Admin office on the mezzanine level are directly exposed to the Apparatus Bays with limited headroom

- The IT/Radio Room is directly accessed from the apparatus bays and has doors which are directly connected to the bays. The Apparatus Bays are classified as "dirty or hot" zones, as they possess toxins and contaminants from vehicles and contaminated turn-out gear returning from calls

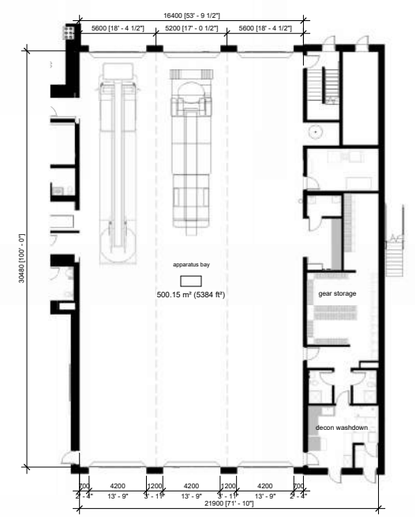
- The current standards of best practice for decontamination are not able to be followed due to the current building design. BC Building Code Standards have changed since the design of the current firehall and these could be costly to address; in some cases, the issues are simply unable to be achieved with the current building design.
  - There is no definite separation of clean and dirty spaces – creating an approach which does not limit exposure to crews and all that visit the hall to contaminants
  - There are no decontamination washrooms located on the dirty side of the hall, but one must enter and exit from the "dirty/red" side at all time
    - Decontamination washrooms help ensure that contaminants stay out of the clean areas reducing the risk of the spread of these carcinogens. There is no option to exit into a "yellow" transition zone, before entering "clean/green" zones
  - Gear washing facilities: there are limited gear washing available in the hall. This item would be better located within its own room for control of cleaning and within a space allocated explicitly for this purpose
  - Turnout gear (Personal Protective Equipment, or PPE) is currently stored in a designated, exposed area within the Apparatus Bays. However, it lacks the proper drying capabilities found in modern firehall Gear Storage Rooms. The space is deficient in drying, ventilation, and storage capacity. A separate Gear Storage Room is required, equipped with a dedicated ventilation system that includes HEPA filters, a minimum of 12 air changes per hour, 100% outdoor air supply, and direct exhaust discharge to the outdoors, with no recirculation
    - Additionally, there is no sink in this area for the washdown of contaminated equipment upon its return from a call. This includes masks, cylinders, and SCBA equipment

ii. hose / training tower

- Current hose tower is used for hose storage with a ladder access to the top platform
  - WorkSafeBC Occupational Health and Safety Regulation (OHSR) - Section 13.6(2): A worker must not carry up or down a ladder, heavy or bulky objects or any other objects which may make ascent or descent unsafe.
- A hose tower provides the space for hose drying as well as training opportunities and is still used in many modern, multifunctional towers



1/111 existing app bay
scale - 1 : 200



2/111 example app bay
scale - 1 : 200

2. building code issues

The building code requirements under the 2024 British Columbia Building Code (BCBC) have different requirements from previous versions of the BC Building Code which have been updated many times since the building was built. As a result, it is not unusual for buildings in this situation to not comply with current code nor is it always necessary that the existing building issues be upgraded; however, as part of this report we have outlined the current deficiencies in order to give a full picture of the gaps between existing conditions and current standards.

- Seismic Concerns: In British Columbia, firehalls are designated to be constructed to meet post-disaster design standards which technically means the buildings are designed to withstand 1.5 times the seismic force of conventional buildings during an earthquake. This is required so essential services maintain operations during these types of emergencies. In general, the building does not meet seismic standards of the current BC Building Code for the following general requirements:
  - The structure is a Post-Disaster building and must be evaluated based on the associated factors, which may not have been considered at the time of it's design. Refer to Appendix 1 for a detailed investigation and structural analysis of both the lateral and gravity structural components
  - There have been 9 updates/adaptations of the NBC and to the BCBC since the design was completed and built. The post disaster standards for structural systems have greatly changed since this time.

- BCBC Classification: The current Firehall is classified under BCBC 2024 3.2.2.87, Group F, Division 3 up to 2 storeys - non sprinklered.
  - The building is 2 storeys, facing one street which allows for a maximum building area of 800 sm unsprinklered.
  - The building is permitted to be non-sprinklered and built of non-combustible or combustible construction.
  - Floor assemblies are required to have a fire separation of not less than 45 minutes.
  - Load bearing walls must be rated to 45 minutes or built out of non combustible construction.

- Sprinklers: under BCBC 3.2.2.87 sprinklers are not required. The building is permitted to be non sprinklered and constructed of both/ either combustible and non-combustible construction.

3. site evaluation

The current proximity of the firehall apron to the adjacent roadway is inadequate for operational needs. The limited setback does not allow sufficient space for fire apparatus to be fully pulled out of the bay without encroaching onto the roadway. This creates potential safety risks during staging, maintenance, or emergency response and may obstruct traffic or delay departure times. A larger apron setback is recommended to allow full clearance for apparatus and ensure safe, unobstructed operation.

4. seismic evaluation

Refer to Appendix 8.1 for the structural review and evaluation of the existing structure

5. mechanical

Vehicle Exhaust System: There is no standardized direct vehicle exhaust system located within the apparatus bays (ie. Nederman System). This omission is a significant safety concern, as it impacts both WorkSafe compliance and the overall safety of the firefighter's gear within the hall. The installation of such systems has become a key element in current industry standards for designing apparatus bays.

6. electrical

Modern firehalls require a sizable electrical service in the 600-800 amp range. This number does not include amperage to cover electric vehicle charging or the potential for future electrical fire service vehicles, both of which would be a significant addition to an electrical service. Rough-in for future connection for electric vehicles is recommended for a new facility.

7. environmental concerns

Under the 2024 British Columbia Building Code (BCBC), new buildings are required to meet updated energy performance standards, primarily through compliance with the BC Energy Step Code. The Step Code establishes performance-based energy efficiency targets for architectural, mechanical, and electrical systems, with increasing levels of stringency depending on the building type and occupancy.

Compliance with these standards may involve meeting or exceeding the energy performance benchmarks outlined in ASHRAE 90.1 (2019) or the National Energy Code for Buildings (NECB) 2020, depending on the applicable pathway selected by the authority having jurisdiction.

1. Building Envelope: a high performance building envelope is to be designed to equal the R values as required by the BCBC and outlined below.
2. From limited review of the existing conditions only, it appears as if the building envelope has limited insulation in the walls and roof, leaving the building exterior with low energy performance. As a result, the building would not likely meet the R-values as summarized below.
   i. R Value definition: the capacity of an insulating material to resist heat flow. The higher the R-value, the greater the insulating power.
   ii. Each building material has an established insulating power and together the items which make up the roof, walls and floors must meet the following requirements as outlined be ASHRAE 90.1 (2010).
   iii. Walls = R11.4 - R16.8 (varies with construction type)
   iv. Roofs = R40 + floors = R10 - R30 (varies with construction type)
   v. Slab on Grade (Heated) R-15.

3. Electrical: The revised ASHRAE standards will require that the electrical systems be approximately 27% more efficient than the previous Code requirements. This includes lighting and power. The current Firehall would not meet this code requirement simply due to the age of the system and its delivery methods.

Furthermore, energy performance requirements are expected to increase as municipalities adopt higher steps of the BC Energy Step Code, moving toward net-zero ready buildings by 2032. Any renovation or replacement of this facility must consider both present and future energy compliance targets.

9. existing building design and layout

This section is an initial evaluation of the content of the project from a building stand point. The following points are general to the overall building and apply for most scenarios.

- Security:
  - Headquarter offices are not directly accessible from the main entry door where there is unsupervised space.

- Personnel Flow:
  - Flow between the operation quarters on the main floor is reasonably acceptable from space to space directly off the bays.
  - The current **NFPA 1710 and 1720** standards set separate benchmark times for Fire and EMS responses with the same compliance criteria for Turnout. Turnout time represents the elapsed time from the moment a call is dispatched, until the assigned Emergency Response Unit(s) is physically en route.
  - **NFPA 1720** standard states:
  - 80% (Suburban) - 90% (urban) of all emergency responses to fire calls must turnout within 80 seconds or less.
  - 80% (Suburban) - 90% (urban) of all emergency responses to EMS calls must turnout within 60 seconds or less.
  - Current firehall design standards would keep this access to PPE gear separate from any other rooms in order to provide an unimpeded route to the emergency vehicles improving response times.

- Equipment:
  - Gear storage drying system, SCBA room and equipment in clean room, (fill station and compressor), AV training systems are all areas of deficiency from a contemporary typical firehall design.
  - Emergency genset (Current best practice would be to power the entire building, minus any cooling systems for a minimum of 72 hours. This would require fuel storage to support this operation on site as well as the generator)

- Systems:
    - Environmentally, low flow fixtures, LED lighting and a high efficiency mechanical system would be some of the usual areas where older buildings do not match current design and BCBC standards.
    - Roof does not have to be rated.
    - The building is primarily constructed out of tilt up concrete wall panels, concrete masonry block in-fill walls and wood stud infill walls. Many of the walls in the original design should meet the requirements of a standard 1 hour separation; however, the current code asks for a 1.5 hour separation and it is unlikely that this would have been achieved under the current construction. It can not be confirmed through the existing drawing review, if the wall between the apparatus bays and the remainder of the hall will meet the more stringent requirements.

- BCBC 2024: fire separations between the living quarters and the apparatus bays / operation spaces are to be 1.5 hours meaning that spaces such as the SCBA / workshop /apparatus bays / gear storage should all be separated from the living / training / office

10. current industry standards

The current hall does not meet best practice industry standards in terms of flow, decontamination, security and building code. The MFH has made the best of the situation but as technology, equipment and training needs of the Fire Services changes, so do the requirements for facilities which house them. This issue pertains to those spaces which are considered to be standard practice for today's firefighter.

Some examples are as follows:

- Fire fighters are exposed to micro carcinogenic particles during an event which need to be kept from contaminating other equipment or being dragged into the clean portions of the hall.

- Decontamination Washroom: a washroom should be positioned directly off the apparatus bays, or directly off a vestibule adjacent to the apparatus bays, to allow for the fire fighters to perform a first stage decontamination when returning from a fire. This room allows them to shower and bag their soiled uniforms before entering the remainder of the hall which limits the spread of contaminants which are potentially harmful.
    - Currently the existing hall does not have a decontamination washroom.

- Personal Protective Gear (Turnout Gear) is required to be worn by firefighters to every emergency. Currently the firehall has PPE Gear stored in the apparatus bays which is no longer ideal - a dedicated room should have the following considerations:
    - PPE is exposed to vehicle exhaust, grease, oil, fuel and other similar pollutants.
    - Cleaned and ready-to-wear PPE Gear which is stored in the apparatus bays are exposed to contaminants from other dirty gear + equipment. Storing this equipment in a separate room meets today's industry standards.
    - There should be provisions for an on site official gear washer to ensure that gear is able to be cleaned to limit the spread and exposure of contaminants.
        - Currently the gear washer is located at the basement level. It is unknown if this lower level has adequate ventilation meeting current standards.
        - A separate room for PPE also allows for the gear to dry effectively and in a timely manner; if located in a large, open space such as the bays, slow drying can deteriorate it over time and requires the storage of additional gear incase there is another call before the gear is dry.
    - The gear clutters the apparatus bays making quick access to vehicles slower and works against NFPA 1710 and 1720 standards.
    - Current industry standards dictate a dedicated and environmentally controlled room, designed to store and dry PPE Gear is required for a new firehall.

- SCBA room: industry standards for Firehall design requires a SCBA room which is limited to this function only. The SCBA area houses the filling station and usually located adjacent to the SCBA compressor to maintain the breathing apparatus and masks essential to fighting fires. This equipment should be washed, dried and maintained in a clean environment as this equipment plays a crucial role in protection of fire fighters in the field.
    - The compressor should be located in its own room due to the noise and its impact on crews when they would be working in the room.

- NFPA 1500 specifies the minimum requirements for an occupational safety and health program for fire departments or organizations that provide rescue, fire suppression, emergency medical services, hazardous materials mitigation, special operations, and other emergency services.

- WorkSafe BC has recognized 10 presumptive cancers associated with Fire fighting. Under the Workers Compensation Act of BC, when a firefighter who was regularly exposed to the hazards of a fire scene contracts a prescribed occupational disease, the disease must be presumed to be due to the nature of the worker's employment as a firefighter. The Firefighters' Occupational Disease Regulation lists the following ten cancers as prescribed occupational diseases that are causally related to the occupation of fire fighting:

    1. Primary leukemia
    2. Primary non-Hodgkin's lymphoma
    3. Primary site bladder cancer
    4. Primary site brain cancer
    5. Primary site colorectal cancer
    6. Primary site kidney cancer
    7. Primary site lung cancer
    8. Primary site testicular cancer
    9. Primary site ureter cancer
    10. Primary site esophageal cancer

- Provision of current industry standard Decontamination Washrooms, PPE Gear Washing and Storage Rooms and SCBA Rooms are required to comply with current the NFPA 1500 Standard and assist with the mitigation of presumptive cancers associated with fire fighting.

11. gender neutrality

The fire department "family" is a much different entity in 2025 compared to when the current firehall was built 51 years ago and to the addition apparatus bay 28 years ago. In the 1960s and 1990s, departments were primarily made-up of male dominated crews who would work and live together in the firehall. Dorms and washrooms were designed in an open style, with beds or cots all contained within one large room and male only washrooms with gang-type shower facilities.

Over the years, women firefighters on suppression crews have become more and more prevalent. In addition, privacy is equally important regardless of gender so the old days of group dorms and single gender washrooms are being quickly phased out.

The general approach today dictates that all Fire Department members be treated equally and with dignity. The simple fact before us is that the current building does not have enough or appropriate accommodations to address crew changes now or into the future. There is a need to provide the opportunity to accommodate women, men, trans gender and non-binary crew members under one roof as a unified team. These issues have a level of complexity which flows between encouraging camaraderie, personal privacy, and cost.

metchosin firehall — R1

Space Program

ITEM	Areas	OFF #	WS #	Existing Firehall AREA SF	Existing Firehall NET AREA SM	Proposed Program NET AREA SF	Proposed Program NET AREA SM	Spatial Comments	Functional Comments
	PUBLIC AREAS								
P-1	Front entry			0.00	0.00	215.20	20.00	Not much of defined entry currently - location has inherant conflicts with fire department vehicle response.	
P-2	Weather Vestibule			0.00	0.00	107.60	10.00		Benficial for energy efficiency.
P-4	Public Accessible Washroom			0.00	0.00	43.04	4.00	Accessible washroom	Located directly of the entry.
P-3	Community meeting room			0.00	0.00	322.80	30.00	Accessed directly from the entry and possibly in front of the secure point.	16 people
	Sub Total	**0**	**0**	**0.00**	**0.00**	**688.64**	**64.00**		
	EOC								
E-1	**Radio Room / Office**			0.00	0.00	107.60	10.00		
E-1	**ESS Director Office**			0.00	0.00	107.60	10.00		
	Radio Room Equip/Storage			0.00	0.00	107.60	10.00		
	Sub Total	**0**	**0**	**0.00**	**0.00**	**322.80**	**30.00**		
	FH - ADMIN								
A-1	Fire Chief Office			274.38	25.50	193.68	18.00	Desk space plus meeting table.	
A-2	Officer's Office			109.75	10.20	129.12	12.00		
A-3	Library			138.80	12.90	0.00	0.00		
A-4	Misc. Office			0.00	0.00	161.40	15.00		Deputy Chief, FPO, Training Officer, Captain/Shift Officer
A-6	Administrator Assist./Front Desk			0.00	0.00	204.44	19.00		
A-7	Washrooms			27.98	2.60	32.28	3.00	Washrooms a single occupant without showers.	Gender neutral washrooms. Numbers are estimated but will need to be reviewed with BCBC review.
A-8	Washroom			0.00	0.00	32.28	3.00	NEW: as noted above.	
A-9	General Admin Office Space			0.00	0.00	150.64	14.00	4 Workstations for crew - 36sf per person. (6 x 6 station)	"Computer Room" as noted on Firehall needs review. Dueal purpose with admin assistant/front desk - could have counter to lobby.
A-10	Office Supplies / Copy Room			0.00	0.00	64.56	6.00		
A-11	File Storage Room			0.00	0.00	86.08	8.00		Could combine with Office Supplies / Copy
	Sub Total	**0**	**0**	**550.91**	**51.20**	**1,054.48**	**98.00**		
	FH - OPERATIONAL AREAS								
O-1	Apparatus Bays			3,077.36	286.00	0.00	0.00	NEW: Inside dimensions shown. Narrower bays are to designate inside bays. Based on overall size of 21.6m wide X 27.5m long inside clear.	
O-2	2 tandem drive through bays @ 5.6 (18.4') W x 26m(85.3') L = 313.6sm			0.00	0.00	3,133.31	291.20		
O-3	1 tandem drive through bays @ 5.2 (17.1')w x 26m (85.3') L = 291.2sm			0.00	0.00	1,454.75	135.20		
O-4	SCBA Room			0.00	0.00	161.40	15.00	NEW: this space is allocated to SCBA repair and filling only - Filling Station to be accommodated. Washdown and Drying is accounted for in the spaces as noted below.	
O-5	Compressor Room			0.00	0.00	107.60	10.00	Compressor Room to be separate from SCBA Room to manage the noise.	This room should be within reasonable access to the exterior for outside air and close to the SCBA Room.
O-6	DeconWashdown			0.00	0.00	215.20	20.00	Common washdown area for cleaning of SCBA equipment, gear and uniforms when contaminated.	The room can accommodate gear washer, gear dryer, washdown counter, and SCBA Ultrasonic cleaning equipement.
O-7	Rip and Run Area			0.00	0.00	107.60	10.00		Discuss location and purpose of the rip and run room to limit travel time and proper flow. Alternately is there dispatch at this location?
O-8	General Storage			0.00	0.00	107.60	10.00		
O-11	Gear Storage Room (40 units)			0.00	0.00	699.40	65.00	**40 gear lockers + 5**. 24" x 30". Locker spacing counted 1.5 sm per locker to accommodate circulation. (1.2sm per 24" wide locker)	Is it required to allow for enough room for Turnouts plus the Wildlands/rescue bags as well? - Note that Ready Rack has max. 24" width and Gear Grid has max 30" width.
O-12	Decon Washroom			0.00	0.00	322.80	30.00	Washroom with shower on the dirty side of the hall 4 total.	
O-14	Utility / Janitor's Room (dirty)			0.00	0.00	80.70	7.50		Mop stroage and drip drain.
O-15	Workshop			602.56	56.00	215.20	20.00	Separate workshop so we do not mix clean and dirty with SCBA.	if additional space is needed the open mezzanine may be available
O-16	Fist Aid Storage			0.00	0.00	53.80	5.00	Separate dedicated storage room/closet.	
O-17	Hose Tower (footprint)			120.51	11.20	355.08	33.00	Hose Drying + Training Tower.	racks (6'x3' - 3 total) to be stored at base of hose tower.
O-19	Secure Storage			0.00	0.00	107.60	10.00	Restricted access	
O-20	Mezzanine Storage			0.00	0.00	161.40	15.00	To Be Determined.	
O-22	Gear Dry/Wash Room			0.00	0.00	269.00	25.00	Gear Dryer(s) Gear Washer	
O-24	HazMat Gear			0.00	0.00	215.20	20.00	FD confirmed that space is required.	yes for storage of Hazmat equipment and training suites
O-25	Second Set of Gear + Wildland / Rope Rescue Storage			0.00	0.00	0.00	0.00	24"x 32" gear storage lockers. Each locker stores 5 bags for second set of gear x 2 for circ = 7sm	Stored in Turnout gear room as long as enough space in each individual locker. Or separate room adjacent to for fast access - Wildland gear accommodated with 30" gear locker.
O-9	Hose Storage			0.00	0.00	0.00	0.00	Main Floor storage (example for discussion) 12 lengths 1.75"(600ft) 20 lengths 2.5" (1000 ft) 13 lengths of 4" (1000 ft) Estimate of racks only at this stage. MFD to confirm number of hose racks for mobile storage.	client preffers for hose storage racks to be located at/in base of hose tower - otherwise require 10sm.
	Sub Total	**0**	**0**	**3,800.43**	**353.20**	**7,283.44**	**676.90**		

Metchosin Firehall
programming

metchosin firehall — R1

Space Program

ITEM	Areas	OFF #	WS #	Existing Firehall AREA SF	Existing Firehall NET AREA SM	Proposed Program NET AREA SF	Proposed Program NET AREA SM	Spatial Comments	Functional Comments
	FH - QUARTERS								
Q-1	Kitchen / Dining			309.89	28.80	667.12	62.00	Seating for 10+ required. + events	Need to be able to accomodate all dayshift staff including non-firefighter staff.. See list above. To be located on main floor and to accommdate public events/engagements. (incorporates role of existing Great. Rm.
Q-2	Exercise Room / Health and Wellness			677.88	63.00	645.60	60.00	Accommodate 4 people + equipment.	Includes small closet for storage.
Q-3	Training Room			419.64	39.00	860.80	80.00	To seat 36 minimum in a classroom layout.	
Q-4	Existing Sleeping Quarters			500.34	46.50	0.00	0.00	Existing Dorms	
Q-5	Dormitories (Multi Bed/Lockers - 4 dorms)			0.00	0.00	355.08	33.00	NEW: 4 Gender Neutral Individual Dorms each 9sm which accommodate 6 - 2'x2' lockers. (6 shifts of 4)	
Q-6	Men and Women's Showers			200.14	18.60	0.00	0.00	Changed to gender neutral washrooms as noted below.	
Q-7	Washrooms (Gender Neutral)			0.00	0.00	161.40	15.00	NEW: 2 Single use, gender neutral, washrooms with showers. Each washroom is at 7.5sm.	
Q-8	Day Room			0.00	0.00	215.20	20.00	To accommodate single shift of 4.	
Q-9	Training Room Storage			0.00	0.00	32.28	3.00	Primarily for storage of tables and chairs.	Located directly off of training room.
Q-10	Utility Rm / Laundry			173.24	16.10	75.32	7.00	Residential washer and dryer + standing height counter with storage. Room also has mop sink.	This is needed on the clean side of the hall to help maintain lack of cross over of contaminated uniforms and bedding. To be located on main floor.
Q-11	Great Room			932.89	86.70	0.00	0.00		
Q-12	Society			570.28	53.00	0.00	0.00		
	Sub Total	**0**	**0**	**3,784.29**	**351.70**	**3,012.80**	**280.00**		
	CIRCULATION								
C-1	Stair #1			107.60	10.00	322.80	30.00		
C-2	Stair #2			0.00	0.00	322.80	30.00		
C-3	Stair #3 - Storage Stair (Apparatus Bay Mezzanine)			81.16	7.54	59.18	5.50	to mezzanine	
C-4	Corridor (Main Floor)			131.27	12.20	0.00	0.00	Included in Mark-Up	
C-5	Corridors (Second Floor)			0.00	0.00	0.00	0.00	Included in Mark-Upm (current is included in 500sf)	
	Sub Total	**0**	**0**	**320.03**	**29.74**	**704.78**	**65.50**		
	SERVICE SPACES								
SS-1	Mechanical Room			0.00	0.00	269.00	25.00	currently in main floor janitors room	
SS-2	Electrical Room			0.00	0.00	161.40	15.00	currently panels on wall in chief's office	
SS-3	Storage Closet (Second Floor)			0.00	0.00	75.32	7.00		
SS-4	Janitor room (Main Floor)			27.98	2.60	53.80	5.00		
SS-5	Janitor room (Second Floor)			0.00	0.00	53.80	5.00		
SS-6	Storage Closet (Main Floor)			96.84	9.00	86.08	8.00		
SS-7	Com Room (Services Demark)			0.00	0.00	75.32	7.00		
SS-8	Water Entry Room			0.00	0.00	75.32	7.00		
SS-9	IT / Data Closet			0.00	0.00	21.52	2.00	Data Closet for FH does not include server room functions.	
SS-10	Backup Server Room			0.00	0.00	0.00	0.00		
	Sub Total	**0**	**0**	**124.82**	**11.60**	**871.56**	**81.00**		
	Building Total (Pre Mark-up) sm			**8,580.49**	**797.44**	**13,938.50**	**1,295.40**		
	Mark-up 25%			1,716.10	159.49	2,787.70	321.98		
	Mark-up 10% (Apparatus Bays)			429.02	28.60	0.00	0.00		
	TOTAL FIREHALL	**0**	**0**	**10,725.61**	**985.53**	**16,726.20**	**1,617.38**		

black text	**Functional Program Requirements** - Items that are critical to the successful delivery and operation of the new Fire Hall. The Project will not be successful without these items.
red text	**Secondary Requirements** - Items not identified in the RFP but are deemed necessary as part of the client discussions or to meet the operational requirements.
blue text	**To Be discussed** - Items deemed important, but not essential. These items do not have areas noted yet in scope, but are for discussion .
blue text	**Added comments from FD** - Items deemed important and added or adjusted as needed to meet FD comments.

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feasibility study

District of Metchosin

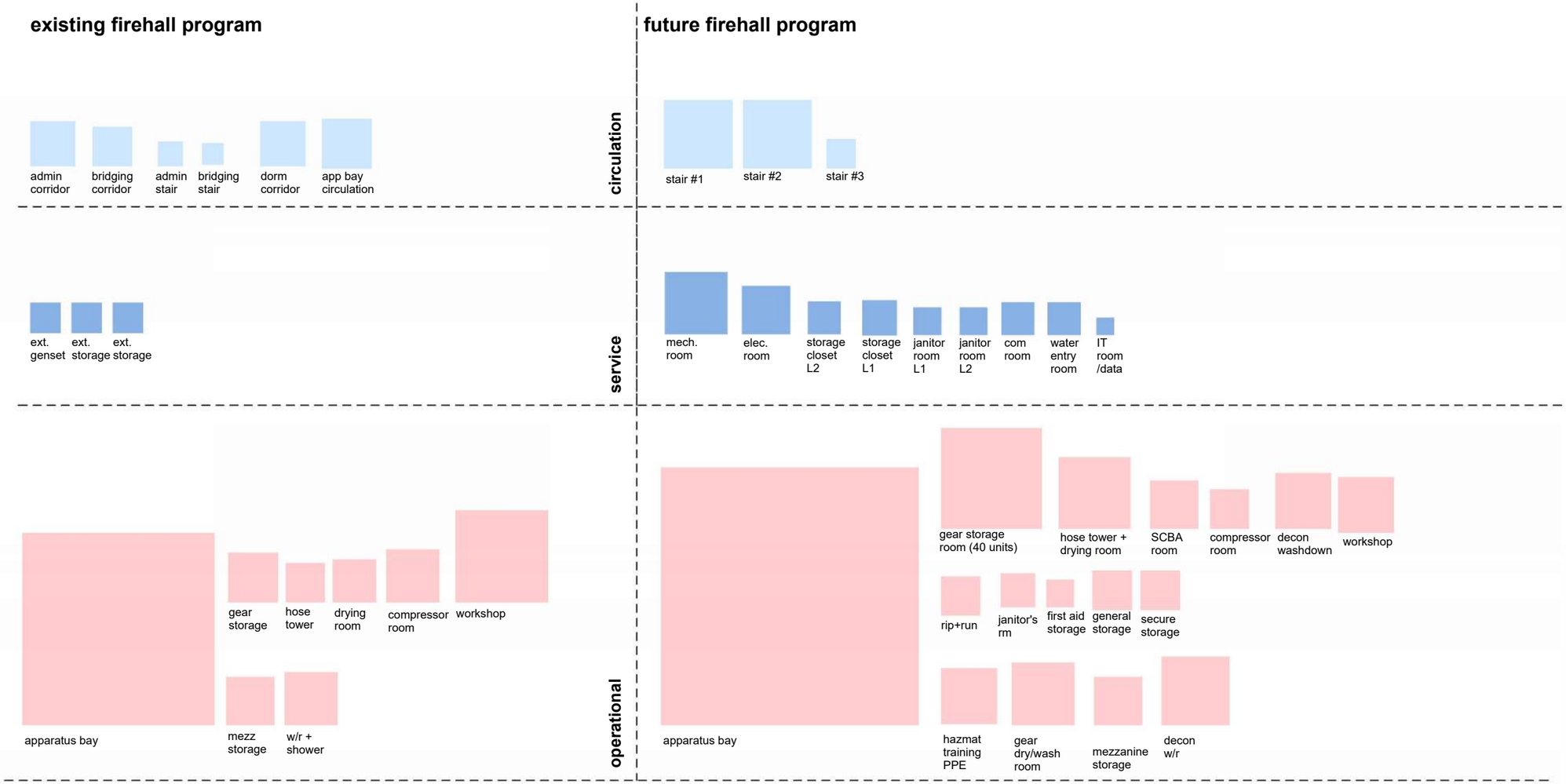
Metchosin Firehall

gap diagram

nts

25-feb-19

107



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Metchosin Firehall

gap diagram

nts

25-feb-19

108

section 4.0 program deficiencies

4.0 program deficiencies

1. specific deficiencies

i. apparatus bay size & layout:

- Existing tandem bays (17.3m x 4.4m) are significantly undersized compared to best practices (26–27m length and 5.1–5.6m width).
- **Bay length is inadequate** for modern emergency vehicle sizes.
- **Inadequate circulation** around vehicles limits safe movement and operations.
- **Overhead doors are too small**, currently 12’ wide by 14’ high. Best practice requires 14’ wide doors for safe, flexible access.

ii. proximity to road:

- The firehall is set **too close to the road,** preventing trucks from fully exiting the bays without encroaching on traffic. This creates safety hazards during staging and emergency responses.

iii. gear storage & contamination:

- **Gear storage is located in the apparatus bay,** exposing it to exhaust and contaminants. This violates best practices for clean/dirty separation.
- **Lack of decontamination washrooms with showers** makes it impossible to contain carcinogens and hazardous materials brought back from calls.

iv. structural & life safety concerns:

- The **mezzanine level has limited headroom** and is **potentially unrated,** raising structural and fire safety concerns.
- The building is **not sprinklered,** though current codes and best practices for critical infrastructure recommend or require sprinkler systems for enhanced safetlls.

v. admin & support spaces:

- Mezzanine offices are exposed to operational zones, lacking necessary separation for air quality and acoustics.
- IT/Radio room opens directly to contaminated apparatus bay zones, undermining cleanliness and operational efficiency.

vi. building envelope & systems:

- Outdated insulation and HVAC systems result in poor energy performance. The building does not meet BC Energy Step Code or ASHRAE standards.

2. workplace safety

The evaluation of workplace safety for the Metchosin Firehall is guided by current industry best practices and regulatory standards, with a focus on firefighter health, operational efficiency, and contamination control. Key references include:

i. NFPA 1500 – Standard on Fire Department Occupational Safety, Health, and Wellness Program

- Establishes requirements for safe practices, exposure control, personal protective equipment (PPE), and facility design, including designated clean/dirty zones and decontamination procedures.

ii. NFPA 1581 – Standard on Fire Department Infection Control Program

- Addresses contamination control in fire stations, requiring physical separation of contaminated gear, decontamination showers, and proper gear handling to reduce health risks to personnel.

iii. NFPA 1710 / 1720 – Standards for the Organization and Deployment of Fire Suppression Operations

- Defines emergency response times and layout strategies that support rapid and unimpeded personnel movement from gear storage to apparatus, aiding in compliance with turnout time benchmarks.
- BCBC2024 A-3.2.3.1.(8) references Clause 4.1.2.1 of NFPA 1710

iv. WorkSafeBC Occupational Health and Safety Regulation (OHSR)

- Regulates safe design and structural integrity of platforms, storage racks, fall protection systems, and air quality within work environments. Relevant sections include platform load ratings, guardrail protection, and safe access provisions.

v. BC Building Code 2024 (BCBC 2024)

- Current provincial building requirements including post-disaster design, fire separations, and energy performance standards for essential service buildings

section 5.0 cost analysis

5.0 cost analysis

This cost analysis exercise includes upgrades to key architectural, structural, mechanical, and electrical systems necessary to meet current Building Code requirements—specifically those applicable to post-disaster facilities under BCBC 2024. Note that this section identifies these areas but further detailed design from architectural, structural, mechanical, electrical and civil engineers would be required to provide accurate costing.

1. proposed upgrades to existing apparatus bay

i. upgrade to meet post disaster building code requirements

- BCBC2024 4.1.8.5.-A – designed for a seismic importance factor of 1.5 (post disaster level)

- Seismic design forces have increased significantly since 1992
  - 2022: Seismic forces increased by ~70% from original.
  - 2024 BCBC: Further 40% increase from 2022 values.
  - Original design forces now ~43% of current code requirement

- Structural engineer review assessment include the following:
  - Foundation – footing size, depth and reinforcing
    - Foundations likely inadequate for upgraded loads
  - Walls (concrete tilt-up panels) – thickness, connections, and reinforcing
    - Existing concrete tilt-up walls are seismically inadequate
  - Overhead door openings – potentially require reinforcing or additional bracing
    - North and south elevations (with overhead and access doors) have minimal lateral resistance
  - Roof structure – roof joists, connections, and bracings
    - Roof-to-wall connection capacity is only ~10% of current Code requirements
    - Wood roof trusses likely cannot support increased snow and seismic loads for post-disaster use
    - Roof diaphragm cannot resist current lateral loads
  - Mezzanine – wood structure

- General upgrades recommendation:
  - Strengthen roof diaphragm with horizontal steel cross bracing
  - Improve roof-to-wall connections
  - Upgrade concrete tilt-up walls with:
    - New panel connections
    - Supplemental seismic reinforcement
    - Potential new external cast-in-place concrete shear walls
  - Upgrade foundations to support seismic loads and any new walls

- Roof structure upgrade recommendation:
  - New roof required for reuse and repurpose options
  - Replace existing wood trusses with new steel trusses
  - Add horizontal bracing at tops of walls

- For Reuse Options upgrade recommendation (Options 2 and 3.1 – Existing Bay + New Adjacent Bays):
  - Include seismic gap between existing and new building
  - Existing building to be upgraded independently
    - New app bay unlikely to be able to accommodate additional seismic load from existing bay as the north and south walls would have overhead door openings
  - Likely require four external buttress walls
    - May affect site layout and property lines

- For Repurposing Options (Options 4, 5, 6 – Convert to Admin/Quarters):
  - Remove overhead doors
    - Allows new north/south walls to resist seismic forces Existing building to be upgraded independently
  - Extend wall height to create two-story space
    - Add concrete at top of tilt-up walls
  - New second floor structure:
    - Likely steel beams and joists + metal deck + concrete topping
    - Or wood framing, with seismic separation from concrete walls to reduce design loads
    - New foundation for interior columns and floor structure

ii. programmatic recommendations

- Turnout gear should not be stored within the apparatus bay, but in a separate room with dedicated HVAC system
  - 700sm for 40 gear lockers
- Mezzanine head room height limited due to overall building roof structure height
- Existing storage above existing turnout gear location open to apparatus bay not recommended
- Decontaminated washroom and showers updated to reflect need for single occupant use
- Dedicated drying space for hoses needed
- Dedicated room for mechanical gear dryer and washer

iii. building envelope

- Exterior wall upgrades
  - Recommended approach would be to add a rain-screen design exterior insulation and metal cladding (or other) system. Wall build-up would include:
    - continuous P&S barrier (air/vapour barrier)
    - metal z-girt sub framing
    - 75mm (min) rigid insulation
    - 25mm air gap
    - 25mm metal cladding system
- Roof upgrades
  - New roof assembly required (structure addressed in previous commentary) basic components would include the following:
    - Flat roof
      - continuous air/vapour barrier
      - insulation (R40) + slope package
      - roof board
      - 2 ply SBS membrane
    - Sloped roof
      - continuous air/vapour barrier
      - insulation (R40)
      - metal z-girt framing system
      - breathable membrane
      - standing seam metal roof

iv. dedicated vehicle exhaust system (Nederman)

- Direct attached vehicle ventilation system with attachments to exhaust pipe at each vehicle. These systems are rail mounted and travel with vehicle until exit from apparatus bay; connectivity to vehicle is magnetic
- 3 bays; 2 trucks per bay

v. general HVAC upgrades

- General review of existing apparatus bay and redesign in its entirety of the HVAC system by a mechanical engineer

vi. sprinkler system

- Currently no sprinkler system – may be required dependent on new building classification under building code

vii. lighting upgrades

- General review of existing apparatus bay lighting system required by an engineer

section 6.0 pros & cons

6.0 pros & cons

evaluation on keeping existing app bay

pros

- keeps firehall operational during construction
- avoid construction of temporary hall
- avoid necessity of requiring a new temporary site
- potential reduced cost by retaining structure
- enhance sustainability due to less waste and less new materials
- less disruption to overall site area
- flexibility in how existing apparatus bay is used - storage for smaller vehicles and trailers or administrative/quarter uses

cons

- substantial structural upgrades may introduce additional complications and are unlikely to result in overall cost savings
- existing structure does not adequately accommodate modern firefighting equipment
    - to expand existing undersized apparatus bay doors would require substantial structural reworking of exterior wall
- existing building would need to be upgraded to post disaster requirements as mandated in current/new building code
    - Upgrade concrete tilt-up walls with:
        - New panel connections
        - Supplemental seismic reinforcement
        - Potential new external cast-in-place concrete shear walls
    - require foundations upgrades to support seismic loads and any new walls
    - height of structure is inadequate to accommodate two stories and therefore building would need to be increased in height
        - additional structure required to add a second floor
        - interior footing upgrades required
        - substantial demolition of existing slab-on-grade to accommodate plumbing and additional floor modification to accommodate new exterior glazing
    - additional two storey expansion would be required to meet the programming needs as outlined in the space program
    - replace existing wood trusses with new steel trusses
        - add horizontal bracing at tops of walls
    - roof replacement required
    - existing concrete tilt-up panel walls do not meet minimum envelope code requirements and would need upgrading
    - specialized detailing needed at connections of new building to old

section 7.0 design documents

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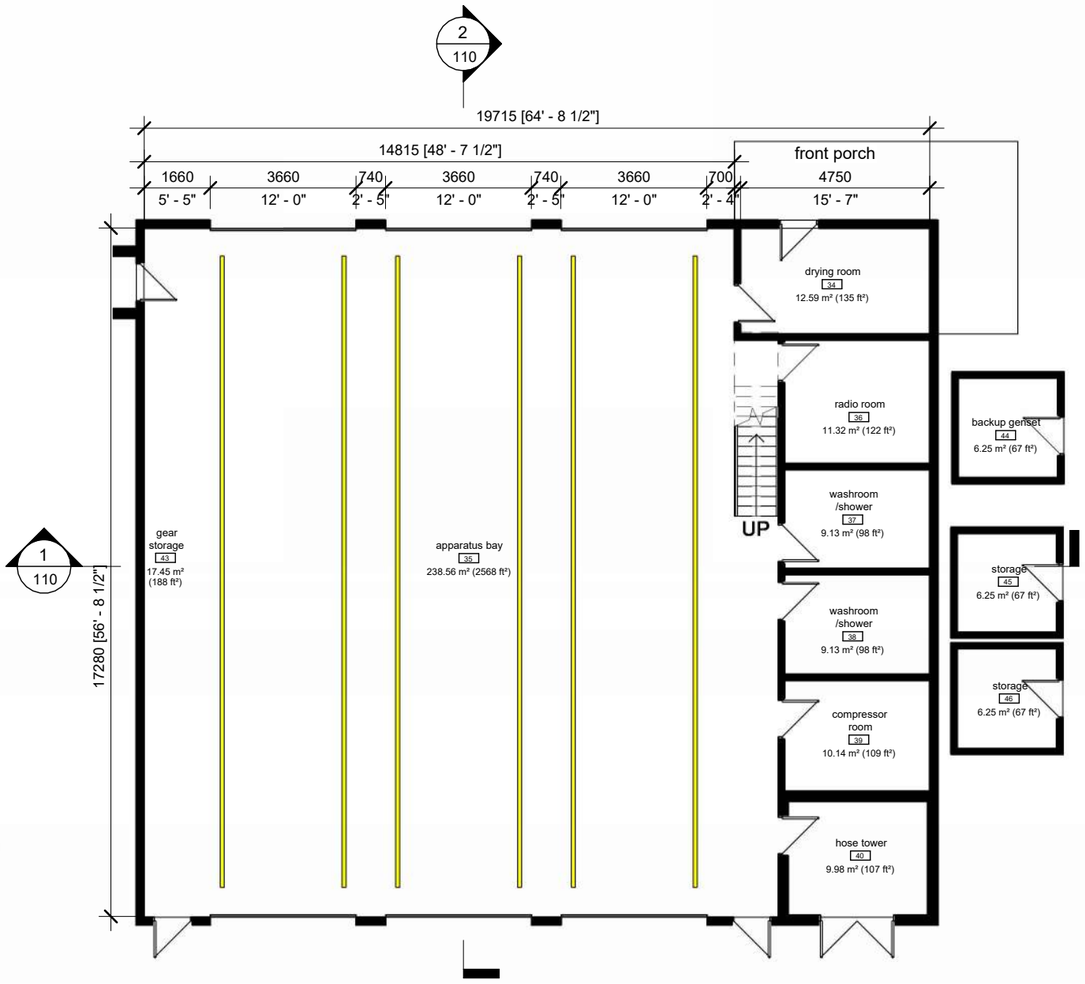
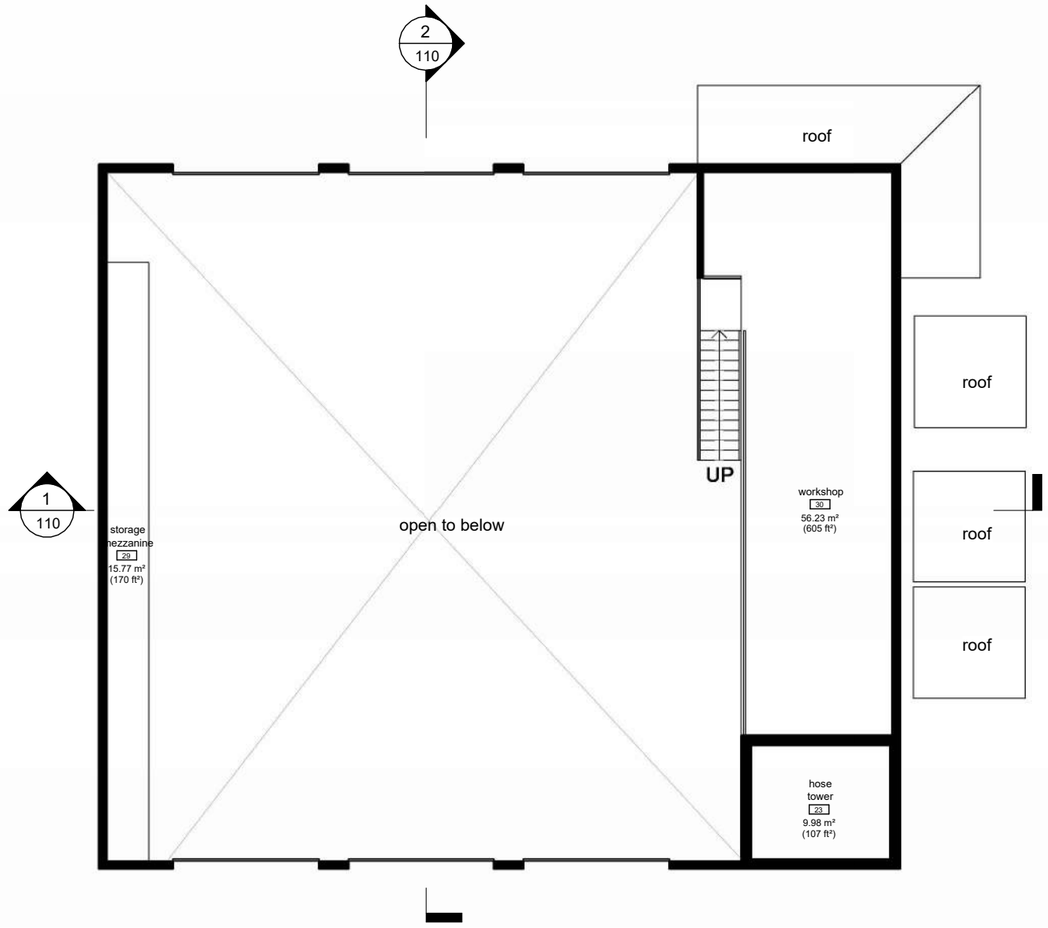
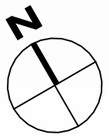






feasibility study

District of Metchosin

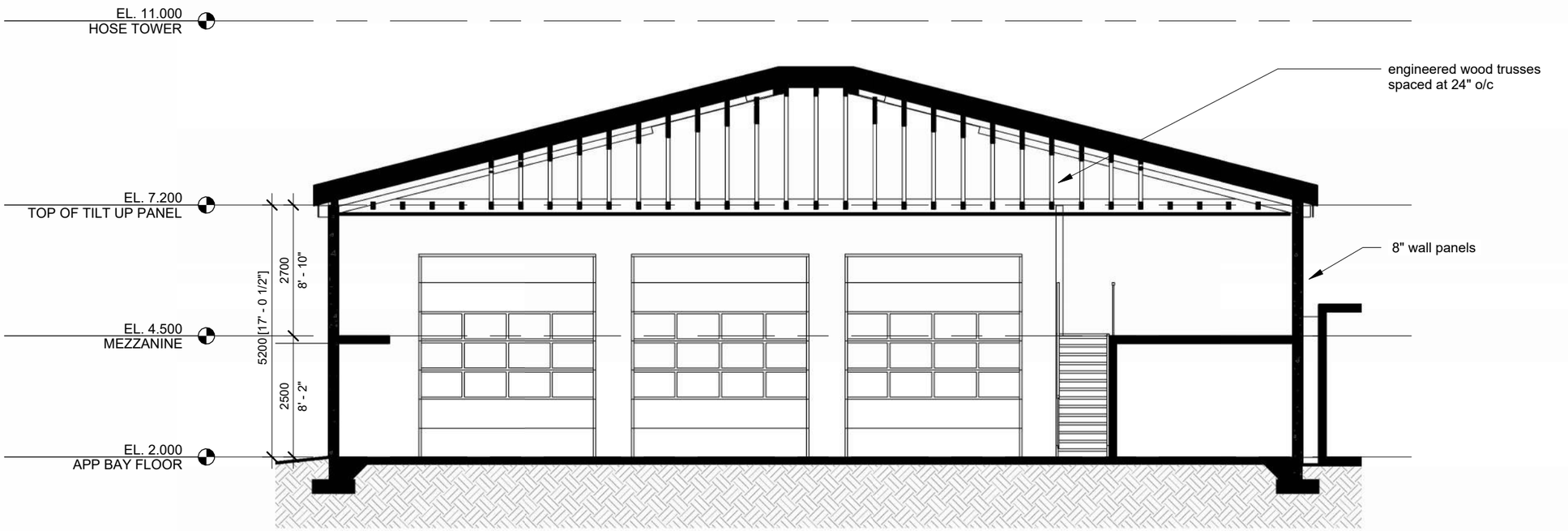
Metchosin Firehall

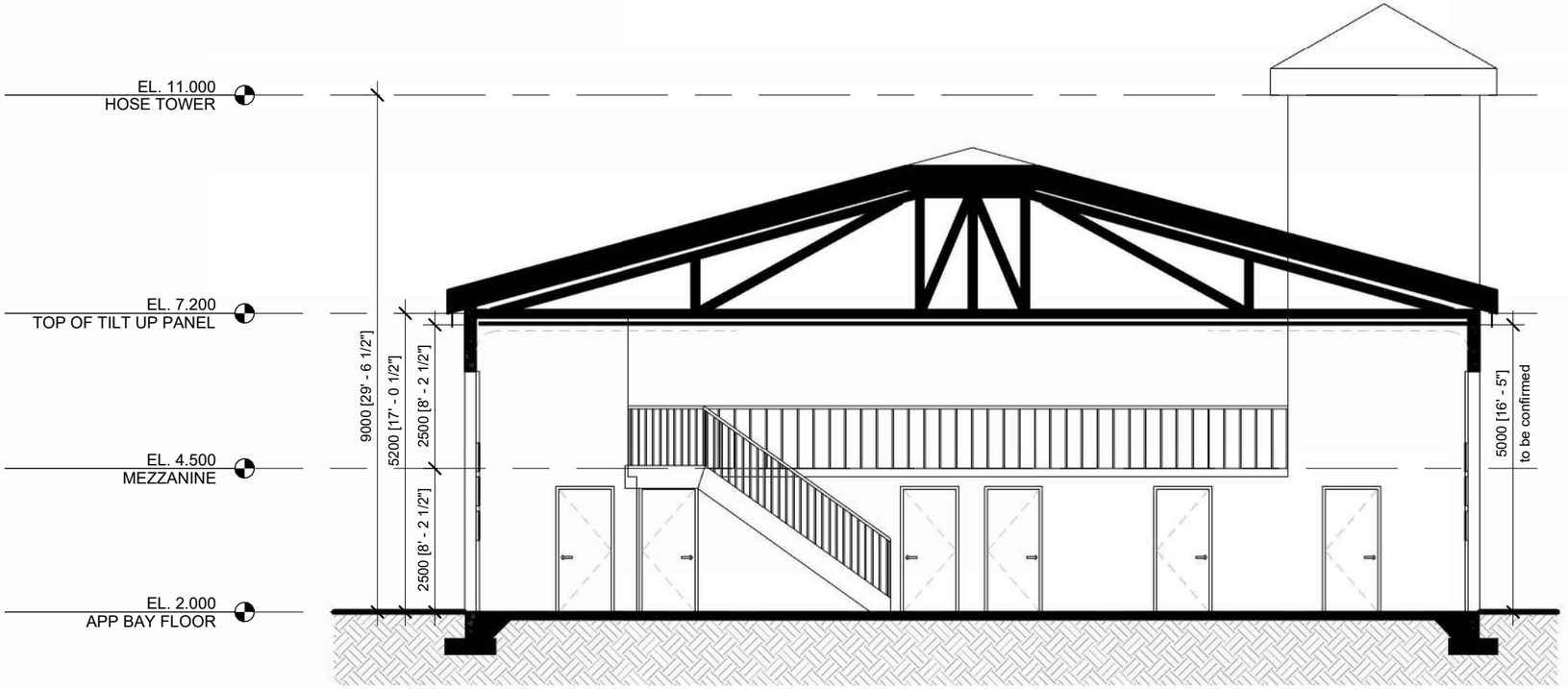
existing fh - app bay floor plans

1:150
25-feb-05

109

Autodesk Docs://2412 - Metchosin Firehall/2412 - MFH_2023.rvt





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feasibility study

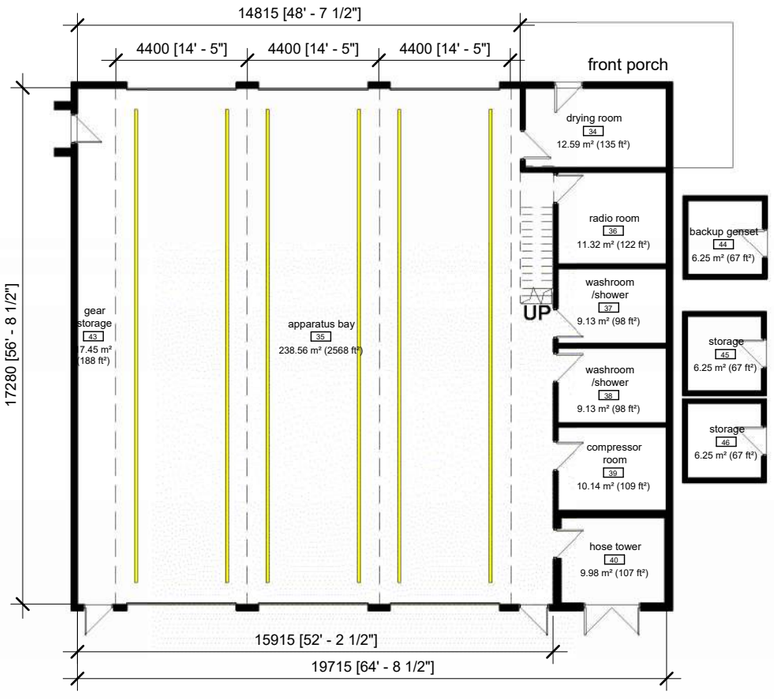
District of Metchosin

Metchosin Firehall

existing fh - app bay sections

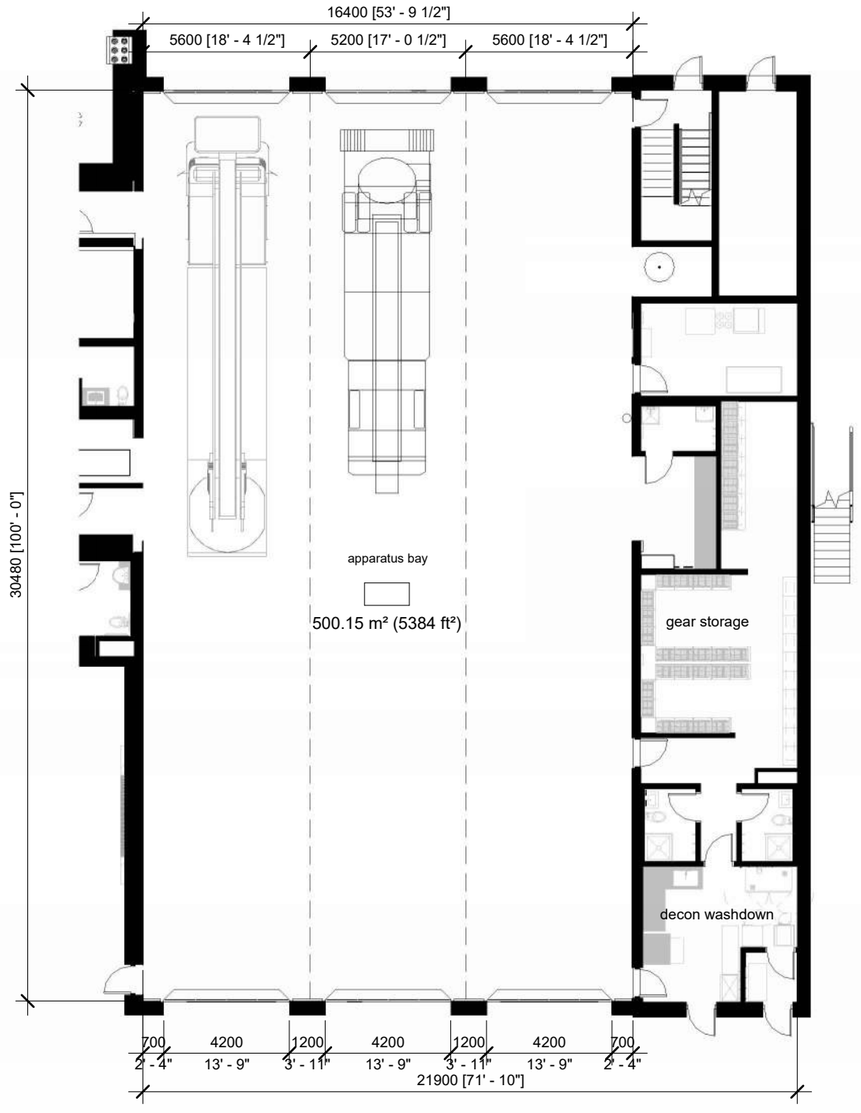
1:100
25-feb-05

110



1/111 existing app bay

scale - 1 : 200



2/111 example app bay

scale - 1 : 200

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feasibility study

District of Metchosin

Metchosin Firehall

app bay study - size comparison

1:200
25-feb-05

111

SITE LEGEND

- PROPERTY LINE
- CURRENT SETBACK LINE
- EXISTING FIREHALL BUILDING
- EXISTING PROGRAM AREA OFF SITE
- BEST PRACTICE FIREHALL APP BAY + SPINE
- DEVELOPABLE AREA
- POTENTIAL DEVELOPABLE AREA

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feasibility study

District of Metchosin

Metchosin Firehall

developable area

1:2000
25-jan-22

102

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SITE LEGEND

- PROPERTY LINE
- CURRENT SETBACK LINE
- EXISTING FIREHALL BUILDING
- EXISTING PROGRAM AREA OFF SITE
- BEST PRACTICE FIREHALL APP BAY + SPINE
- DEVELOPABLE AREA
- POTENTIAL DEVELOPABLE AREA

N

feasibility study

District of Metchosin

Metchosin Firehall

developable area 1.500

1:500
25-feb-05

112

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reuse of existing app bay with new additions

PROGRAM LEGEND

- property line
- current setback line
- apparatus bay
- spine
- admin/quarters
- parking zone
- genset fuel zone
- concrete apron
- landscaping
- renovated existing building
- vehicle circulation

N

feasibility study

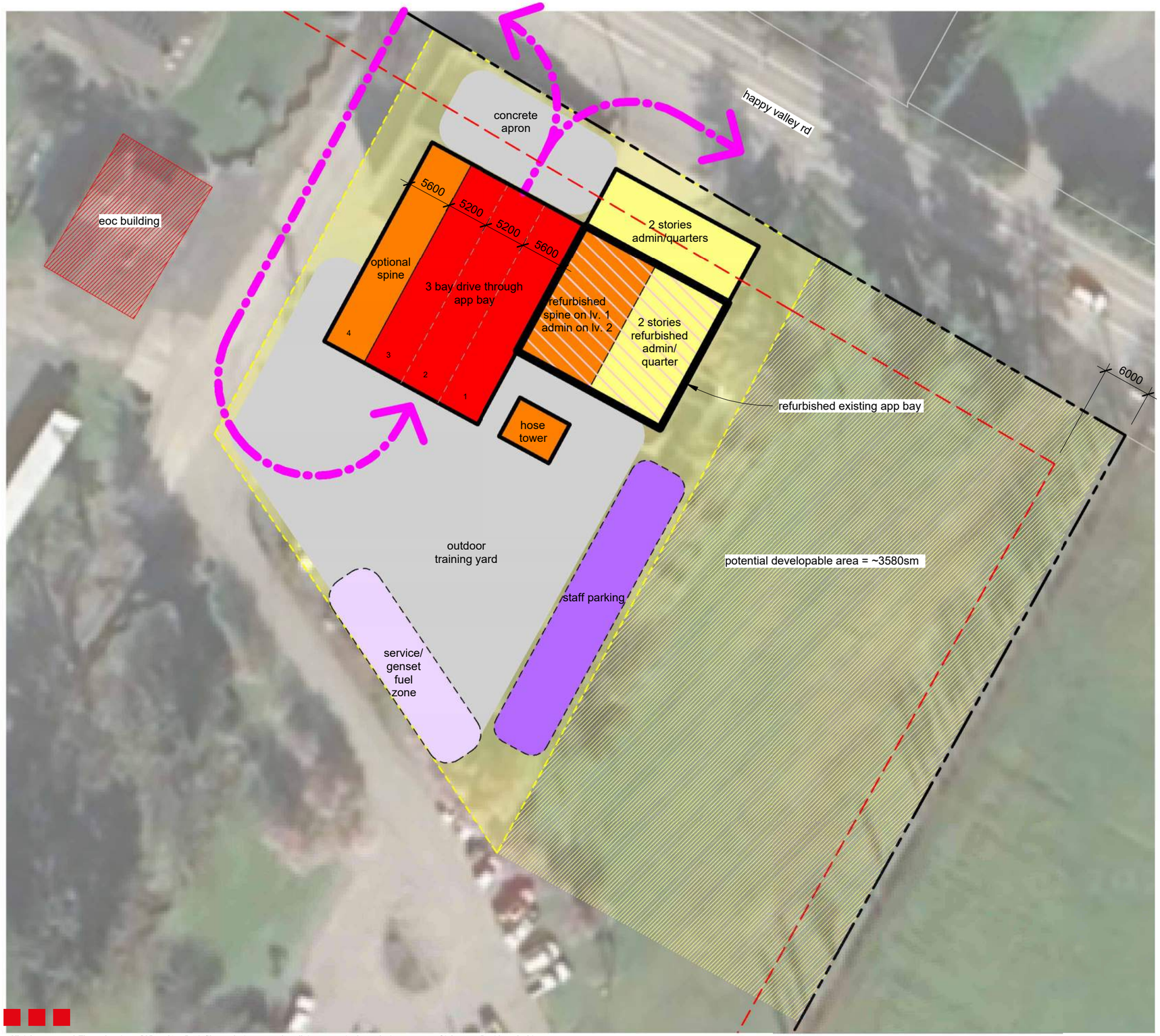
District of Metchosin

Metchosin Firehall

program layout option 3.1

1:500
25-mar-10

121



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reuse of existing app bay with new additions

PROGRAM LEGEND

- property line
- current setback line
- apparatus bay
- spine
- admin/quarters
- parking zone
- genset fuel zone
- concrete apron
- landscaping
- renovated existing building
- vehicle circulation

N

feasibility study

District of Metchosin

Metchosin Firehall

program layout option 6

1:500
25-mar-10

122

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entirely new construction
(two stories admin/quarter)

PROGRAM LEGEND

- property line
- current setback line
- apparatus bay
- spine
- admin/quarters
- parking zone
- genset fuel zone
- concrete apron
- landscaping
- renovated existing building
- vehicle circulation

N

feasibility study

District of Metchosin

Metchosin Firehall

program layout option 1

1:500
25-feb-18

113

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entirely new construction (single storey admin/quarter)

PROGRAM LEGEND

- property line
- current setback line
- apparatus bay
- spine
- admin/quarters
- parking zone
- genset fuel zone
- concrete apron
- landscaping
- renovated existing building
- vehicle circulation

N

feasibility study

District of Metchosin

Metchosin Firehall

program layout option 2

1:500
25-feb-18

114

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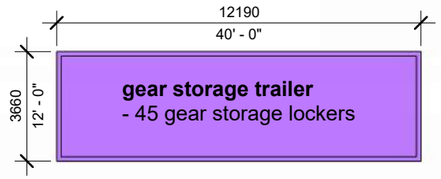
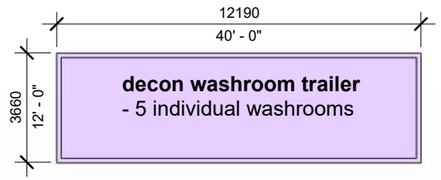
trailer size and uses

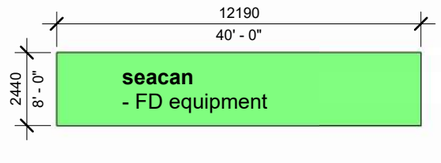
trailer 2
dorms, kitchen, dayroom
triple wide
size: 36'x60' (2,160sf)

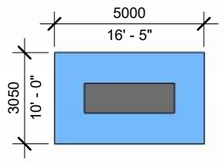


trailer 3
gear storage
size: 12'x40' (480sf)



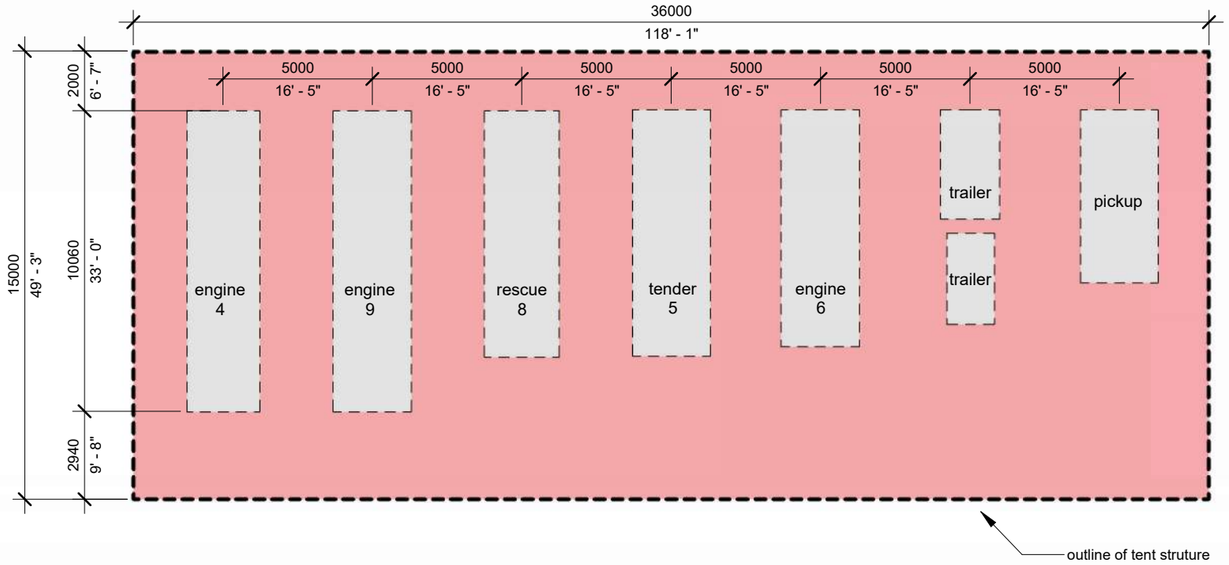
trailer 4
decon washroom
size: 12'x40' (480sf)





generator (existing)

vehicles



fire department vehicle storage - tent structure

- 2x type 1 engines
- 1x BOC FR/Rescue Truck
- 1x 1500 gal tender
- 1x 250 gal Quick Response Engines
- 1x tech trailer for rope & water rescue
- 1x ATV Rescue Trailers
- 1x Duty Vehicle Pickup

- Engine 4 - 2003 E-One Typhoon / Superior (1050/1000/25A/25B) (SN#SE 2922) (E-One SN#126045)
- Engine 9 - 2023 International WorkStar HV507 4x4 / Rosenbauer (1250/1000/20F/FP1600)
- Rescue 8 - 2013 Ford F-550 / Rosenbauer walk-around (SN#41632)
- Tender 5 - 2010 Freightliner M2 106 / Rosenbauer (420/1700)
- Engine 6 - 2010 GMC C5500 4x4 / Rosenbauer (420/300/?F)
- Technical Rescue Trailer - Pace American cargo trailer
- ATR 2 - Polaris Ranger
- 2021 Ford F-150 STX 4x4 w/ canopy

tent structure 1
8 vehicles - fire department
size: 36m x 15m (540sm)
118'-1" x 49'-3" (5812sf)

feasibility study

District of Metchosin

Metchosin Firehall

temporary site - building compound

1:500
25-may-12

300

JDa

Johnston Davidson Architecture

301 - 877 East Hastings Street
Vancouver, BC, Canada, V6A 3Y1

Phone: 604 684 3338
info@jdarch.ca

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TEMPORARY PROGRAM LEGEND

- property line
- current setback line
- vehicle storage tent
- gear storage trailer
- decon w/r trailer
- quarters trailer
- genset fuel zone
- concrete apron
- seacan fire department equipment
- vehicle circulation

N

feasibility study

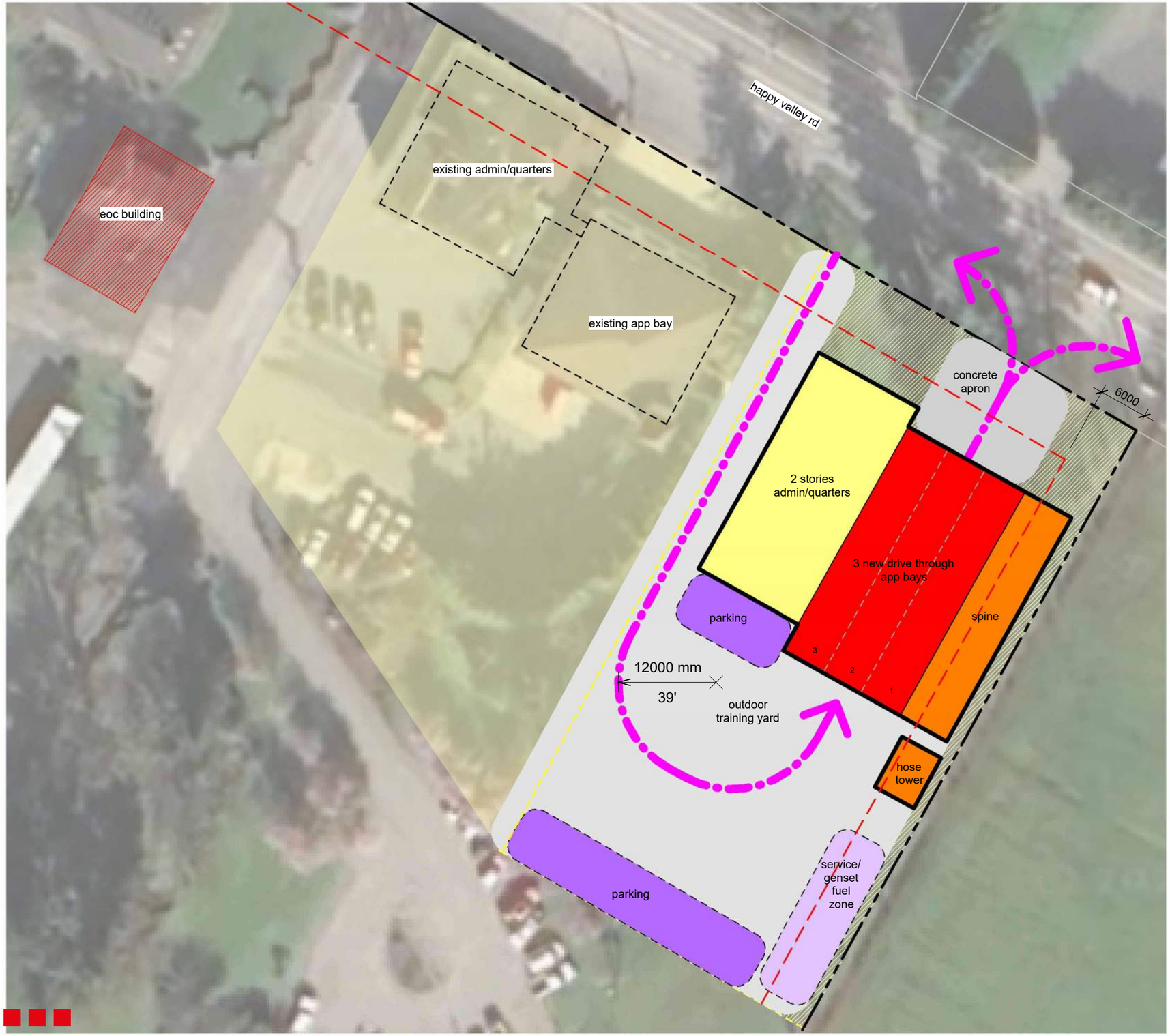
District of Metchosin

Metchosin Firehall

temporary site layout

1:500
25-may-12

301



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reuse of existing app bay with new additions

PROGRAM LEGEND

- property line
- current setback line
- apparatus bay
- spine
- admin/quarters
- parking zone
- genset fuel zone
- concrete apron
- landscaping
- existing building
- renovated existing building
- vehicle circulation

N

feasibility study

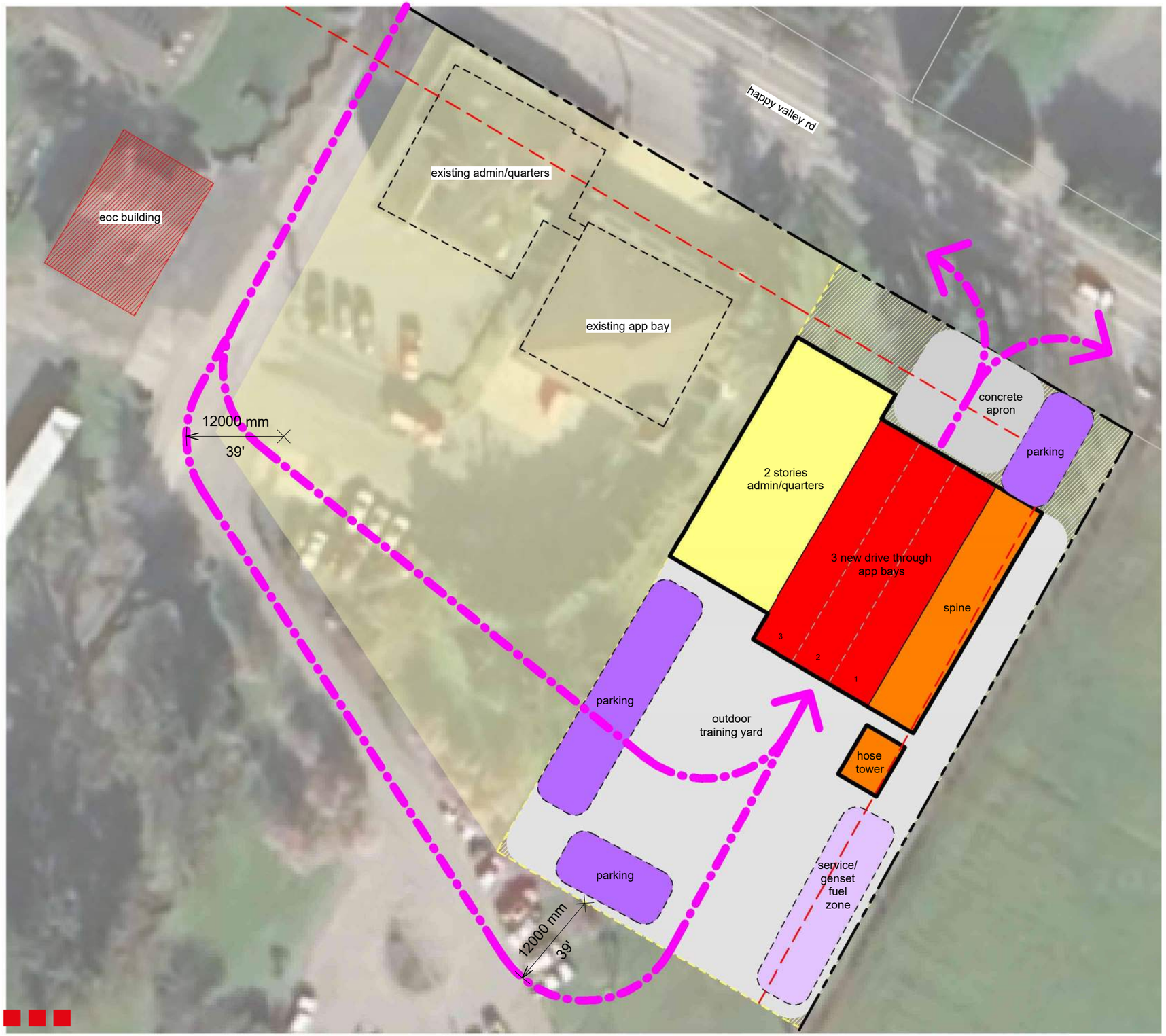
District of Metchosin

Metchosin Firehall

program layout new site op. 1a

1:500
25-mar-19

201



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reuse of existing app bay with new additions

PROGRAM LEGEND

- property line
- current setback line
- apparatus bay
- spine
- admin/quarters
- parking zone
- genset fuel zone
- concrete apron
- landscaping
- existing building
- renovated existing building
- vehicle circulation

N

feasibility study

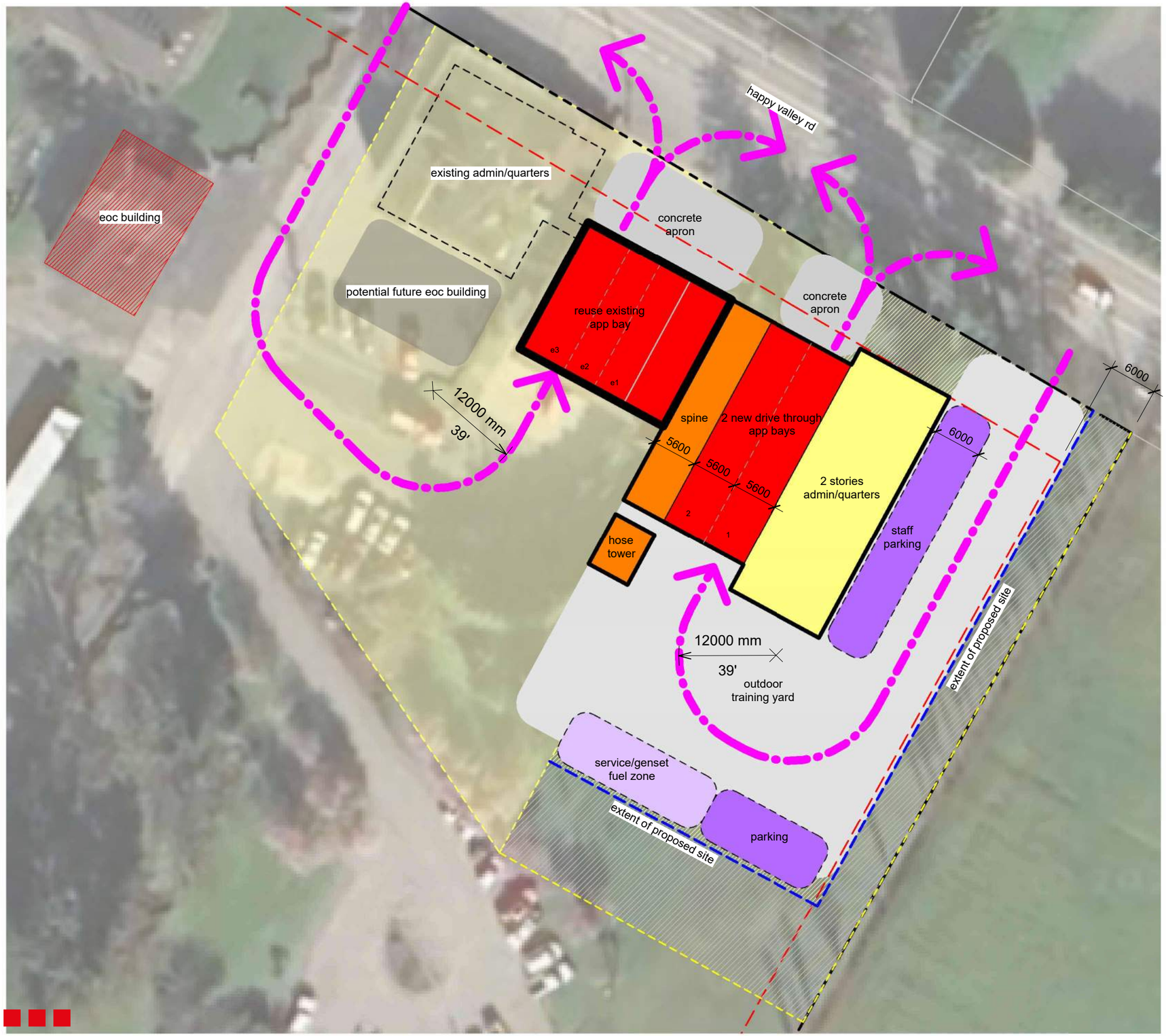
District of Metchosin

Metchosin Firehall

program layout new site op. 1b

1:500
25-mar-19

202



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reuse of existing app bay with new additions

PROGRAM LEGEND

- property line
- current setback line
- apparatus bay
- spine
- admin/quarters
- parking zone
- genset fuel zone
- concrete apron
- landscaping
- existing building
- renovated existing building
- vehicle circulation

N

feasibility study

District of Metchosin

Metchosin Firehall

program layout new site op. 2

1:500
25-mar-19

203

section 8.0 preferred option

8.0 preferred option

program layout new site option 1a (sheet 201)

Preliminary site options were prepared and provided within this report. These layouts focused on four general approaches:

- New build on existing site with full demolition of existing facility.
- New build on existing site with retention of existing apparatus bay (built in 1996).
- New build on adjacent ALR site.
- Newe build on adjacent ALR site with retention of existing apparatus bay (built 1996).

Layouts are located in Section 7.0 of this report.

Consideration was given to retaining the existing apparatus bay structure due to its potential for reuse. It should be noted though, that there are considerable costs associate with the reuse and/or repurposing of the existing apparatus bay as meeting current code involves the upgrade of the structure to post-disaster levels as outlined in the BC Building Code 2024.

Program Layout New Site Option 1a is the preferred site option. This recommendation has been made through the process of comparison which weighed the merrits of each option against one another and considered project elements such as site access, efficiency of layout, disruption to fire service operations during construction, programatic compliance and potential cost.

Significan features of the preferred opton, Program Layout New Site Ooption 1a, include the following:

- Uninterrupted operation during construction - existing facility remains operational while new facility is constructed ensuring uninterupted fire protection service.
- 3 drive through tandem bays - this is the preferred operational model as vehicles are not required to back into apparatus bays.
- Vehicle return from Happy Valley Road or through existing site - the adjacent ALR designated property is wide enough to accommodate returning vehicles and on-call staff without interrupting exiting from the proposed apparatus bay location .
- Large private training yard - the depth of the site provides enough space for training and other activities in the rear of the facility.
- Compact footprint – two storey admin/quarters would be required with the development of this ALR property but there is more than adequate width to accommodate a two-storey design.
- Operating training hose tower - the depth and width of this site, although compact, does permit the inclusion of a hose tower/training tower.
- Full depth concrete apron - aprons are recommended to be sized to park the largest vehicles entirely within the property. The depth of this site permits this placement of vehicles in this manner.
- Potential for public parking at front - there is adequate width to this site to allow limited parking in front of the building and facing Happy Valley Road without interfearing with firehall operation.
- Potential reuse of exiting apparatus bay - developting the adjacent ALR site would permit the reuse/ repurpose of the existing apparatus bay for district use without the need to upgrade to the “post disaster” standard required of a firehall use by the BC Building Code.

section 9.0 appendices

9.0 appendices

1. structural report

i. May 24, 2022

SKYLINE
ENGINEERING

METCHOSIN FIRE HALL

STRUCTURAL ENGINEERING SERVICES

Stephanie Dunlop – Fire Chief

Metchosin Fire Department

Project: 12044.01

May 24, 2022

Skyline Contact: Jonathan Reiter, MIStructE., P.Eng., Struct.Eng., LEED AP, Principal

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skylineengineering.ca

INTRODUCTION

At the request of Mike Hornick, Skyline Engineering Ltd. recently visited the truck bay building of the Metchosin Fire Hall located at 4440 Happy Valley Road, to review the existing structure and available historical documents in order to provide a preliminary structural review of the building.

We performed a visual inspection only, and did not remove any finishes to observe the structure. The inspection was performed on a random basis; we did not review or inspect every element or portion of the building. The intent of the inspection was to determine the general structural composition of the building and provide comment on the existing seismic capacity of the structure. We understand that the other portions of the fire hall are planned to be replaced with new structure in the near future, and that the possibility of retaining (and potentially seismically upgrading) the newer truck bay portion of the facility is under consideration.

At the time of our site visit, we reviewed the available historical documents for the Fire Hall facility. There was little information related to the truck bay portion of the facility - a partial set of Architectural drawings by Keystone Architecture & Planning Ltd. dated Sept. 27, 1990 were available, however these drawings did not have any description of the reason for issue, and the floor plans did not correspond to the layout of the building on site.

There was a letter from C.N. Ryzuk & Associates Ltd. dated November 4, 1993, that documented a field review performed to comment on foundation bearing support conditions for the proposed new building. This letter referenced structural engineering drawings completed by Siefken Engineering, dated September 10, 1993 describing the proposed footings which would consist of "conventional rectangular strip footings" with a "maximum allowable bearing capacity of 3000 psf" noted on those drawings. Copies of the Siefken Engineering structural drawings were not available for our review.

STRUCTURE DESCRIPTION

The truck bay building is a single storey building approximately 64' wide by 60' deep, with a training "hose tower" located in the southeast corner. The roof consists of engineered wood trusses that span the depth of the building, spaced at 24" on centre and is sheathed with ½" plywood with H-clips at unsupported panel edges. The trusses appear to have OSB sheathing along the bottom chords (the ceiling of the truck

bay) and are toe-nailed to a top plate that is bolted to the walls of the building with ¾" anchor bolts at approximately 24" on centre.

The walls are of concrete "tilt-up" construction, with 8" wall panels approximately 17' high. The side walls do not have any openings through the walls, but the front and back walls of the truck bay have multiple overhead doors and convenience doors, with minimal wall sections.

There is a wood frame mezzanine structure along the east side of the building with ancillary rooms supporting the truck bay operations.

DISCUSSION

Seismic design requirements were first introduced in the National Building Code of Canada in 1965, and those requirements have evolved considerably over time as Codes developed, through research and observation of structure performance of buildings around the world that were exposed to earthquakes. The truck bay building was originally constructed in 1993 and would have been designed to meet the requirements of the Building Code in effect at that time (the 1992 BC Building Code, which was based on the 1990 National Building Code of Canada). As noted, seismic design requirements have increased since the time of original construction, and the current design forces for this building are higher than at the time of original design (and are anticipated to increase again with the next iteration of the BC Building Code, expected to be released sometime in the next year). As such the building does not currently have the capacity to resist current Code level design forces.

As part of the fire hall building complex, the truck bay should be designed for a seismic importance factor of 1.5 (post-disaster level). In addition to the design seismic loads on the main structure, there are other minimum requirements for components of the structure that must be met for post-disaster design.

The Metchosin Fire Hall has engaged Ryzuk Geotechnical to provide a geotechnical report for the replacement Fire Hall project, and our seismic analysis has been based on the parameters outlined in their report dated April 19, 2022, which recommended a site class "C" along with the site specific seismic hazard values / accelerations to be used for seismic design of the new building.

Without having access to the original design drawings, we can not confirm the level of ductility included in the design of the tilt-up concrete wall panels. A new concrete tilt-up structure requires a minimum level of ductility to meet post-disaster requirements. Presuming the original construction had a similar level of detailing, we compared the design forces at the time of construction to the current code (2018 BCBC) which has increased by approximately 70%. While the two side walls of the building may have adequate capacity to resist current Code level forces (we note that the interconnection of tilt-up panels may be a limiting factor) there are other components of the building that have much less capacity and affect the overall seismic resistance of the building.

The roof diaphragm and connections to the concrete walls of the building are particularly deficient. The level of connection between the OSB sheathing and the underside of the roof trusses is unknown. Assuming a minimal level of connection (no blocking at panel edges, nominal nailing to the trusses) its capacity is estimated to be in the order of 14% of current Code requirements. Diaphragm design forces are sufficiently high that fully blocking and nailing the ceiling diaphragm would still not meet current requirements, and horizontal steel cross bracing is likely required to meet those forces. Similarly, the toe-nailed connections of the roof trusses to the top plates are insufficient, and the anchor bolts to the concrete walls have approximately 65% of the required capacity to transfer seismic forces to the concrete elements. Structural upgrades are also likely required along the tops of the walls to ensure connections to the trusses are able to accommodate out-of-plane seismic forces on the concrete walls.

The north and south walls of the building have minimal walls available to resist seismic forces due to the overhead doors and other access doors that are required for the truck bay to operate. In order to meet current Code level seismic forces, new structural elements would need to be added to supplement the existing building. It appears feasible to add external cast-in-place concrete walls at the east side of the building to increase the seismic resistance in the east-west direction. Due to the magnitude of seismic design force, it appears that it will require 4 walls to resist these forces without significantly encroaching on the adjacent property, with the foundation design anticipated to be a limiting factor. Depending on the layout and relative location of the new adjacent building, it may be feasible to add walls to the west side of the truck bay as well, or potentially incorporate new reinforcing walls as part of the design of the new adjacent fire hall structure.

The wood frame mezzanine may require seismic upgrades to meet current Code requirements as well. Such upgrades are anticipated to include connections of the mezzanine to the concrete side wall, as well as potential new (or upgraded) plywood shear walls along with connections to the concrete slab/foundation structure at the main level.

Summary

In general, the original building structure appears in reasonable condition, and it will likely be able to withstand smaller earthquakes and still remain operational. However, in order to meet current Code level seismic design forces at a post-disaster level of operations, the building will require supplemental external structural elements as well as upgrades to existing internal components to meet those requirements.

These upgrades may be able to be incorporated into the overall design of the new adjacent fire hall structure, or they may be considered as a stand-alone upgrade project to the existing building. You may wish to have a more detailed schematic seismic upgrade plan prepared with sufficient detail that a qualified general contractor or a quantity surveyor could provide order-of-magnitude costs, to help better inform a decision on how best to proceed with the truck bay building, in consideration of the overall fire hall replacement project.

We note that extensive seismic upgrades are necessary to increase the resistance level of the existing building to meet current Code design level forces. While some of the proposed upgrades may be able to be completed at the outside of the existing structure, it is anticipated that operations of the existing truck bay building will be disrupted for significant periods of time during a seismic upgrade project. Such disruptions to the normal operation of the truck bay building will need to be considered when determining whether to keep and seismically upgrade the building or incorporate a new truck bay into an overall new Fire Hall complex.

We trust the above information is satisfactory. We remain available to assist with developing a schematic seismic upgrade plan for the truck bay building, if desired. If you have any questions or would like to discuss our findings in more detail, please contact the undersigned.

Yours truly,

Skyline Engineering Ltd.

Jonathan Reiter, P.Eng., Struct.Eng., LEED AP
Principal

Reviewed by:

Cord MacLean, P.Eng., LEED AP
Principal

1. structural report

ii. April 22, 2025

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SKYLINE ENGINEERING

METCHOSIN FIRE HALL

STRUCTURAL ENGINEERING SERVICES

Bob Payette

District of Metchosin

Project: 12044.02

April 22, 2025

Skyline Contact: Jonathan Reiter, MIStructE., P.Eng., Struct.Eng., LEED AP, Principal

250-590-4133 ext. 102

jreiter@seng.ca

Introduction

Skyline Engineering Ltd. visited the truck bay building of the Metchosin Fire Hall located at 4440 Happy Valley Road in the spring of 2022, to review the existing structure and available historical documents in order to provide a preliminary structural review of the building and comment on its existing seismic capacity. Our results were provided in our report dated May 24, 2022, and one is referred to that report for a more complete description of the structure and discussion on our findings.

Since the time of our initial review, the District of Metchosin has engaged Johnston Davidson Architecture (JDa) to provide a program study of current and future needs for the Metchosin Fire Hall, and JDa has presented several options ranging from full replacement of facilities on the adjacent site, along with several plans that involve retaining the existing apparatus bay. In those plans, the apparatus bay is either retained and continues to operate as a truck bay, or is repurposed to provide two levels of administration, ancillary space and sleeping quarters.

Skyline Engineering has been engaged to review the various plans and provide high level feedback on the structural implications of each, including a discussion on the seismic upgrade requirements of the existing structure.

Structure Description

The existing truck bay building is a single storey building with a training "hose tower" located in the southeast corner. The roof consists of engineered wood trusses sheathed with ½" plywood roof with OSB sheathing along the bottom chords (the ceiling of the truck bay).

The walls are of concrete "tilt-up" construction, with 8" wall panels approximately 17' high. The side walls do not have any openings through the walls, but the front and back walls of the truck bay have multiple overhead doors and convenience doors, with minimal wall sections.

There is a wood frame mezzanine structure along the east side of the building with ancillary rooms supporting the truck bay operations.

Discussion

Our review in 2022 compared the existing structure to the British Columbia Building Code (BCBC) in effect at the time of our report, which was the 2018 BCBC. The truck bay building was originally constructed in 1996 and would have been designed to meet the requirements of the Building Code in effect at that time (the 1992 BC Building Code, which was based on the 1990 National Building Code of Canada). Seismic design requirements have increased significantly since the time of original construction, and design forces for this region have increased again since our 2022 review. The current design forces for this building are much higher than at the time of original design, and the building does not currently have the capacity to resist these current Code level design forces.

Our previous review identified and discussed the structural elements that were seismically deficient and would require upgrading to meet current Code requirements for a post-disaster facility. These include the concrete tilt-up wall panels and the roof diaphragm and connections to the concrete walls of the building. Our previous review determined that design seismic forces on the building had increased by approximately 70% - these design forces have since increased another 40% with the 2024 BC Building Code, and the original design forces are now approximately 43% of current Code level design.

The north and south elevations of the building have minimal walls available to resist seismic forces due to the overhead doors and other access doors that are required for the truck bay to operate and are the weakest portion of the main building. The roof diaphragm and connections to the concrete walls of the building are particularly deficient, however. The capacity of the connections between the roof and ceiling to the walls is now estimated to be in the order of 10% of current Code requirements.

Diaphragm design forces are sufficiently high that horizontal steel cross bracing is likely required to meet those forces. Similarly, the concrete tilt-up walls require upgrades, which may include increased connections between concrete panels and supplemental seismic reinforcing of the building in the east-west direction, possibly with new external cast-in-place concrete walls at one or both sides of the building. Upgrades to concrete foundations will also most likely be required. The wood roof trusses are required to resist higher snow loads as a designated post-disaster facility, and their existing capacity to resist these higher loads is doubtful. It is likely that any re-use of the building will require a new roof designed to meet increased snow loads as well as higher seismic forces on the diaphragm and connections.

The two JDa options that re-use the existing apparatus bay as part of the new complex (options 2 and 3.1) place new drive through apparatus bays immediately adjacent. As there will be openings for overhead doors required at both ends of the new building, it is unlikely that the new building will have the ability to accommodate additional seismic loads from the existing apparatus bay. This scenario should include a seismic gap between the old and new structures, and the existing building will have to be upgraded separately, most likely with four external concrete buttress walls along the opposite wall. The impact of these new buttress walls on the overall site should be taken into account (area use and proximity to property lines for example). As noted, the roof structure would also need to be upgraded – most likely consisting of new structural steel trusses with horizontal bracing provided at the tops of the concrete walls.

JDa program layout options 4, 5 and 6 include re-purposing the existing apparatus bay as a two-storey building to provide administration, ancillary space and sleeping quarters. In these options, new apparatus bays would be constructed along the west side of the existing building. It is likely that sufficient new walls (and supplemental foundations) may be added on the north and south elevations of the existing building to provide the required seismic resistance, as the existing drive through doors would be eliminated. The current building is not tall enough to provide two levels of occupiable space however, so the existing concrete tilt-up walls would require the addition of new concrete elements along the top. As noted above, the roof structure will require upgrades (designed for higher forces due to the additional height of the building and the introduction of the second floor within the space). This second floor will require all new structure and interior foundations and is likely to consist of structural steel beams and joists that support metal deck and concrete topping, with interior steel columns and the exterior concrete walls providing vertical support. Alternately, the second floor could be constructed from wood framing, with consideration given to providing a seismic gap between the new wood framing and the existing concrete walls. This would allow the wood framing to be designed for reduced forces, and upgrades to the existing concrete walls would not have to consider added seismic loads from the interior second floor. As with options 2 and 3.1, there should be a seismic gap provided between the new and the existing building.

JDa has also provided program options that include building an entire new facility on the adjacent site or demolishing the existing buildings and constructing a new facility on the existing property.

SUMMARY

The District of Metchosin is considering several options for modernizing the existing Fire Hall to meet new standards. In some of the options, re-using the original apparatus bay building is included in the plans. These options will require significant upgrades for the existing building to meet current Code level seismic design forces at a post-disaster level. The various options provided by Johnston Davidson Architecture that include keeping the existing apparatus bay building have pros and cons associated with this choice, including the structural implications discussed above, as well as other non-structural implications (such as the need for building envelope, mechanical and electrical upgrades). The cost for all upgrades as well as the impact on the existing services provided by the operating fire hall during construction need to be considered in conjunction with the potential benefits of retaining the existing structure in the overall design.

The extent of structural upgrades to keep the existing apparatus bay as part of the redeveloped Fire Hall will be extensive due to the increased seismic requirements under the current 2024 BC Building Code. The cost of these upgrades is anticipated to be significant and could very well approach the cost of a new (replacement) building serving the same purpose. We note that one JDa option includes maintaining the existing facility in operation while a new Fire Hall is constructed on the adjacent property. This may prove to be the most economical solution, in addition to providing seamless services to the community during construction of the new facility.

You may wish to have a more detailed schematic seismic upgrade plan prepared with sufficient detail such that a qualified general contractor or a quantity surveyor could provide order-of-magnitude costs, to help better inform a decision on how best to proceed with the existing apparatus building, in consideration of the overall fire hall replacement project.

We trust the above information is satisfactory. We remain available to assist with developing a schematic seismic upgrade plan for the truck bay building, if desired. If you have any questions or would like to discuss our findings in more detail, please contact the undersigned.

Yours truly,

Skyline Engineering Ltd.

Jonathan Reiter, P.Eng., Struct.Eng., LEED AP
Principal

SKYLINE ENGINEERING LTD.
PERMIT TO PRACTICE
NO. 1001308
PROVINCE OF BRITISH COLUMBIA
J. P. REITER
PROFESSIONAL ENGINEER
25340
DESIGNATED STRUCTURAL ENGINEER
2025-04-22

Reviewed by:

Cord MacLean, P.Eng., LEED AP
Principal

2. hazardous material report

i. April 22, 2022

Hazardous Materials Survey Report
4440 Valley Rd.
Victoria, BC

Project - 22645

AREC Environmental Group

AREC Environmental Group, Ltd.
6825 A Veyaness Rd.
Victoria, BC, V8M 2A7
778-351-1966
ARECEnvironmental.com

HAZARDOUS MATERIAL SURVEY REPORT

Firehall Located at 4440 Valley Rd., Victoria, BC

*WorkSafeBC regulation section 20.112(b) requires that this report be on site during any work or demolition.

April 22, 2022

Attention: Mike Hornick
True Line Contracting
250-812-7236
mhornick@truelinecontracting.ca

Reference: Hazardous Materials Survey of 4440 Valley Rd., Victoria, BC

AREC Environmental Group, Ltd. has completed a pre-demolition survey of the firehall located at 4440 Valley Rd., Victoria, BC. The purpose of this survey was to document the presence of hazardous materials, including asbestos, silica, hantavirus, lead, or other heavy metal or toxic, flammable or explosive materials that may be handled, disturbed or removed throughout the building for the purpose of future demolition, as required per *WorkSafeBC OHS Regulation Part 20*. The site investigation was conducted on April 13, 2022, and we report the following:

SITE DESCRIPTION

This is a two-storey firehall; **the truck bay is not included in this investigation**. The interior walls are drywall, concrete block, and wood panel. Ceilings are drywall, ceiling tile, and concrete. Floors are carpet, laminate, concrete, vinyl floor tile, and sheet vinyl flooring. Heat is provided by natural gas HVAC; no suspect asbestos containing duct tape or vent felt was observed. The building does not contain an attic. The exterior of the building is painted block and Hardie siding, with composite shingle, torchon tar membrane, and tar & gravel roofing. Torchon membrane roofing was not sampled to maintain the integrity of the roof – sampling of this material must be completed prior to demolition. Vermiculite was not observed but may be present within block walls.

SCOPE OF PROJECT

The survey conducted by AREC Environmental on April 13, 2022, was limited to materials suspected to be hazardous that will be disturbed or removed during the proposed demolition, including:

Hazardous Materials Survey Report
4440 Valley Rd., Victoria, BC

Project – 22645

ASBESTOS

Methodology

A total of thirty-four (34) bulk samples (including layers) suspected of containing asbestos were collected. These samples were analyzed at AREC Laboratories in accordance with the following method:

-Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency; **and/or**

-Vermiculite insulation that would be determined to contain **any** asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation EPA/600/R-04/004, dated January 2004

Results

NO asbestos was detected in the materials tested for this report.

Detailed sampling analyses are attached at the end of this report.

WHAT IS ASBESTOS?

Asbestos is a fibrous material used in many products because it adds strength, heat-resistance, and chemical-resistance. Despite its many uses, asbestos is a hazardous material. Three types of asbestos have been used commercially:

- Chrysotile (white asbestos) is the most commonly used form of asbestos.
- Amosite (brown asbestos) has been used in sprayed coatings, in heat insulation products, and in asbestos cement products where greater structural strength is required.
- Crocidolite (blue asbestos) is no longer used in B.C. and is rarely found. Before 1973 it was commonly used in sprayed coatings on structural steelwork for fire protection and for heat or noise insulation. It was also used in gasket materials and asbestos cement pipe.

Other types of asbestos are actinolite, anthophyllite, and tremolite. These usually have had little commercial value or use.

Asbestos Containing Materials (ACM) is often referred to as friable and non-friable. Friable materials are materials that, when dry, can be easily crumbled or powdered by hand. This term may also refer to materials that are already crumbled and powdered. Some non-friable materials, such as vinyl-asbestos floor tile or asbestos cement products have the potential to become friable if they are disturbed and/or handled in an aggressive manner (for example, sanded with a power sander).

POTENTIAL HEALTH EFFECTS OF ASBESTOS

Asbestos has been recognized as a health hazard for people employed in its production and processing for centuries. However, it was not until the late nineteenth century and the onset of the Industrial Revolution that its use became widespread, and it was not until the early part of the twentieth century that the relationship between the use of asbestos and a variety of health effects became a source of concern to the medical profession.

Many serious, debilitating and often fatal diseases have been linked to the inhalation of asbestos fibers. Although the mechanism of asbestos related diseases is still not fully understood, it is known that there is normally a significant latency period between the time of exposure and the occurrence of disease. This latency period can typically be between ten to over forty years.

Asbestosis, mesothelioma and lung cancer are the diseases most commonly associated with asbestos exposure, although several other diseases have also been linked to asbestos exposure. Asbestosis is a chronic lung disease resulting from prolonged exposure to asbestos dust. The fibers gradually cause the lung to become scarred and stiff, making breathing difficult. Asbestosis is a progressive disease, meaning that scars keep forming in the lungs after the exposure to asbestos has stopped.

Lung cancer may be caused by asbestos fibers in the lung. No one knows exactly how asbestos causes lung cancer. Researchers have shown, however, that the combination of smoking tobacco and inhaling asbestos fibers greatly increases the risk of lung cancer. Again, asbestos may be one of many causes of lung cancer.

Mesothelioma is a rare but very malignant form of cancer affecting the lining of the chest or the abdominal cavity. This cancer spreads rapidly and is always fatal. The exact mechanism of the disease is unknown. There is a confirmed link between asbestos exposure and mesothelioma.

LEAD PAINT

Methodology

A total of two (2) paint samples suspected of containing lead were collected by scraping the indicated surfaces. These samples were analyzed at International Asbestos Testing Laboratories (IATL) in accordance with the following method:

-Test Method for the determination of lead in paint by weight (Paint by AAS: ASTM D3335-85A, 2009)

Results

A summary of lead in paint results is given in Table 1.

Table 1: Lead Paint Results

Sample No.	Location	Material	wt%	ppm
LP-1	Interior Walls & Trim	Multi-Coloured Paint	<0.0077	<77
LP-2	Exterior Stucco & Trim	Multi-Coloured Paint	**1.7**	**17,000**

One (1) of the paint samples contains enough lead to be considered a lead-based surface coating.

In Canada, under the *Hazardous Products Act*, a paint or similar material that dries to a solid film and contains greater than 90 mg/kg or 0.009% dry weight of lead is considered to be a lead-containing surfacing coating material. WorkSafeBC cites that the improper removal of lead paint containing 600 mg/kg or 0.06% lead results in airborne concentrations that exceed half of the exposure limit. Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children.

Hazardous Materials Survey Report
4440 Valley Rd., Victoria, BC

Project – 22645

WorkSafeBC requires that worker exposure to airborne lead be kept below 0.05 mg/m^3. Lead is also likely present as solder on plumbing systems and may be present on other fixtures such as flashings or roof vents. Precautions must be put in place during demolition and renovation activities to ensure that workers are not exposed to lead containing dust and debris. Flashings can be removed and recycled.

RISK ASSESSMENT FOR HANDLING LEAD PAINT

Procedures will vary depending on the nature of the work and may be dictated by the pending lead leachability results (see highlighted section below), but in general terms:

Operating an excavator (within the cab) during demolition of the house is considered **a low risk activity.**

Employers are required to have an exposure control plan if their employees will be working with lead containing materials. In order to control worker exposure to lead paint particulate, any cutting, burning, grinding, sanding or other disturbance of identified lead painted surfaces should be conducted following appropriate safe work procedures. Procedures will vary depending on the nature of the work but should consider the following:

- NOP for work involving significant disturbance of lead containing paint submitted to WorkSafeBC a minimum of 48 hours prior to commencement of the work
- Half-face respirator with NIOSH P100 Series filters, protective clothing, gloves, and laceless rubber boots or other appropriate footwear designed to be easily decontaminated
- Isolation of the work area with warning signs and warning tape
- Use of drop sheets and tarps to prevent spread of lead-containing dust
- Use of a power tool with an effective dust collection system and HEPA filter
- Use of HEPA filter equipped vacuum cleaner
- Use wet methods (amended water saturation of the material being disturbed)
- Thorough washing before eating, drinking or smoking

LEACHABILITY

Under the BC Hazardous Waste Regulation materials with lead paint concentrations over 0.01 wt% (100ppm) destined for disposal at a licensed landfill facility must be tested for leachability to determine if they should be handled as a hazardous waste. Consult the waste disposal facility for disposal requirements prior to disposal. Prior to demolition it is the responsibility of the client or the contractor to have samples collected by a qualified person and analyzed using the toxicity characteristic leachate procedure (TCLP).

POTENTIAL HEALTH EFFECTS OF LEAD

Workers can be exposed to lead through inhalation of fumes and dusts, as well as through ingestion as a result of lead-contaminated hands, food, drinks, cosmetics, tobacco products, and clothing. Furthermore, workers can take lead home on their clothes, skin, hair, tools, and in their vehicles, potentially exposing their families to harmful health effects.

It does not matter if a person breathes in, swallows, or absorbs lead particles, the health effects are the same; however, the body absorbs higher levels of lead when it is breathed in. Within our bodies, lead is absorbed and stored in our bones, blood, and tissues.

Lead poisoning can happen if a person is exposed to very high levels of lead over a short period of time. When this happens, a person may feel:

- Abdominal pain
- Constipated
- Excessively tired
- Headache
- Irritable
- Loss of appetite
- Memory loss
- Pain or tingling in the hands and/or feet
- Weak

Because these symptoms may occur slowly or may be caused by other things, lead poisoning can be easily overlooked as their cause. Being exposed to high levels of lead may cause anemia, weakness, and kidney and brain damage. Very high lead exposure can cause death.

People with prolonged exposure to lead may also be at risk for high blood pressure, heart disease, kidney disease, and reduced fertility.

Most houses and buildings built before 1950 have had lead-based paint applied to the interior or exterior surfaces. In most cases, lead paint of this era contained up to 40% lead by weight. Paints made between 1950 and 1978 typically contained smaller quantities of lead.

POLYCHLORINATED BIPHENYLS (PCBs)

Fluorescent light ballasts were observed (see photos). These fixtures may contain PCB ballasts.

There are several methods that can be used to determine if ballasts contain PCBs:

- Ballasts that were manufactured without PCBs will have a very obvious "No PCBs" mark on the manufacturer's label.
- Many manufacturers will imprint a manufacturing date on the ballast case. Any ballast with a manufacturing date prior to 1979 should be assumed to contain PCBs. This may lead to false positives, but it would eliminate the risk of downstream contamination. Date codes after July 1, 1980, can be considered to not contain PCBs.
- If the building was erected after July 1, 1980, there is a good chance that the light fixtures were manufactured after the legislative cut off for PCBs and therefore be PCB-free.

Unfortunately, after many years of exposure to heat, dust and other elements, the labels on old ballasts become illegible or are missing altogether. If PCBs cannot be ruled out based on the age of the building or lighting system as a whole, the prudent response would be to treat suspect ballasts as if they did contain PCBs. This is especially true if PCB ballasts have already been found in the facility.

Prior to disposal, ballasts should be stored in a safe and secure location for inspection to determine the presence or absence of PCB's. Any PCB containing ballasts determined to be present must be stored in an approved storage facility or disposed of by a certified company that will accept ownership of the ballasts.

Hazardous Materials Survey Report
4440 Valley Rd., Victoria, BC

Project – 22645

MERCURY

Fluorescent tube lights were observed (see photos). Fluorescent bulbs are known to contain mercury.

OZONE DEPLETING SUBSTANCES (ODS)

A refrigerator and freezer were observed (see photos) – refrigerators made before 2005 may contain ODSs. ODSs such as chlorinated fluorocarbons (CFCs) were used in chemical fire suppression systems and refrigeration and air conditioning units. In the case of demolition, these ODSs will require proper recovery and disposal by a licenced contractor, in accordance with the BC Ozone-Depleting Substances Regulation.

RADIOACTIVE MATERIALS / SMOKE DETECTORS

Smoke detectors were observed (see photos). Smoke detectors often contain the radioactive material americium. These must be handled and disposed of in accordance with Canadian Nuclear Safety Commission (CNSC) regulations.

ABOVEGROUND / UNDERGROUND STORAGE TANKS

No aboveground oil storage tank was observed.

Should a tank be discovered, it must be safely moved prior to demolition, ensuring there are no spills. Evidence of leaks must be investigated and any potential contamination remediated. The Canadian Council of Ministers of the Environment (CCME) publishes a Code of Practise for the safe management of aboveground and underground storage tanks.

SILICA

Silica is the primary component of many construction materials, such as drywall, plasters, stuccos, mortars, grout, concrete and other similar materials. Silica is the second most common mineral on earth and makes up nearly all of what we call "sand" and "rock." Silica exists in many forms – one of these, "crystalline" silica (including quartz) is the most abundant and poses the greatest concern for human health. Exposure to silica dust can cause a disabling, sometimes fatal disease called silicosis, after fine particles deposit in the lungs and cause permanent damage to lung tissue. Symptoms from exposure may not appear for many years.

Silica dust is created when silica containing materials are disturbed by cutting, grinding, blasting, sanding, drilling, chipping and/or other methods. Exposure Control Plans MUST be implemented when:

Situation 1.

Exposure monitoring indicates that a worker is or may be exposed to an air contaminant in excess of 50% of its exposure limit,

Situation 2.

Measurement is not possible at 50% of the applicable exposure limit

Situation 3.

Required by regulation

Situation 4.

If a material has been identified with any of the following Notations and it can not be eliminated from the workplace:

(a) ACGIH A1 or A2, or IARC 1, 2A or 2B carcinogen

(b) ACGIH reproductive toxin – ACGIH uses the abbreviation "repro" in the "TLV Basis" column to identify these substances (WorkSafeBC identifies these substances with the letter "R")

(c) ACGIH sensitizer – ACGIH uses the notations, DSEN, RSEN and SEN (WorkSafeBC identifies these substances with the letter "S")

(d) ACGIH L endnote - The "L" endnote appears for some substances in the "TWA" column. "L" is defined as "exposure by all routes should be carefully controlled to levels as low as possible." This notation is primarily for substances considered highly toxic, and which have not been assigned a TLV. Examples of substances in this category include benzo(α)pyrene, chrysene, and rosin core solder thermal decomposition products (colophony).

Part of this exposure control plan includes training for workers on the hazards of silica, respiratory protection, personal protective equipment, and methods to control silica dust such as dust suppression ("wet methods"), local exhaust ventilation, HEPA equipped tools or other controls that should be used to control silica dust.

FLAMMABLE / CHEMICAL MATERIALS

Ensure all flammable & chemical materials are removed from the site prior to demolition.

HANTAVIRUS

In Canada, the hantavirus is found only in wild mice, specifically the deer mouse (*Peromyscus maniculatus*). The mice shed the virus in their urine, droppings and saliva. The virus is mainly transmitted to people when they breathe in air contaminated with the virus. No rodent feces were observed.

OTHER CONCERNS

There may be additional hazardous materials in concealed and other inaccessible areas that can be disturbed during deconstruction. If any suspect materials are discovered, all work must cease immediately at that location until the material has been identified.

Hazardous Materials Survey Report
4440 Valley Rd., Victoria, BC

Project – 22645

LIMITATIONS

AREC Environmental was retained to perform a survey of hazardous building materials establishing types and locations. Approximate quantities indicated herein are provided for Client information only, and are not intended to provide exact amounts for tendering purposes.

This report is intended for the exclusive use of the *CLIENT* in order to identify all accessible asbestos-containing materials and other specified hazardous materials in the surveyed property. The use of this document for any other purpose is at the sole risk of the user.

The contents of this report were based on a site survey conducted by AREC Environmental. Please note that this survey was intended to identify the asbestos-containing materials and other specified hazardous materials on the subject site only prior to the proposed renovation/demolition of the structure surveyed.

The scope of work was limited to an assessment of readily accessible materials at the subject building defined by the Client as being impacted by planned demolition/renovation. No major destructive investigation was performed in areas with solid covering, or where there was no absolute access point. Should suspect materials be encountered during demolition activity, work is to stop immediately and the material be tested for the presence or absence of the hazardous substance.

In certain instances visual identification of material was made based on similar homogeneous characteristics to analyzed samples (i.e. vent packing felt material may be considered typical to each other).

This report is **not** intended for use as a scope of work for removal or as a specification section for inclusion in Tender Documents. Any unauthorized use of this report in that fashion is at the sole discretion and liability of the Owner.

We trust this is the information you require. Should you have any additional questions please contact our office or the undersigned at your convenience. Thank you for having AREC Environmental conduct this work on your behalf.

Sincerely,

Scott Conrad, General Manager

Athena Hall, AHERA Certified Building Inspector
#3509-20-C16-25264

PHOTOS (sampled for asbestos)

Photo 1: Drywall Compound – Main Floor Stairs to Truck Bay (ND – none detected)

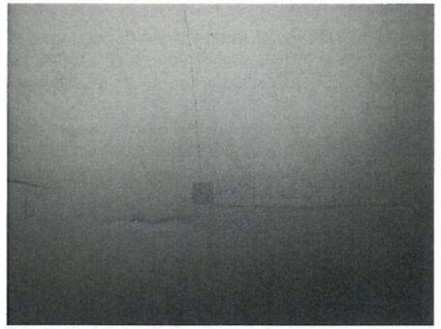


Photo 2: Drywall Compound – Gym (ND)

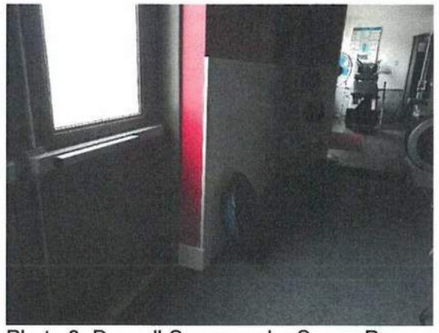


Photo 3: Drywall Compound – Sauna Room (ND)

Photo 4: Drywall Compound – Reception Hallway (ND)

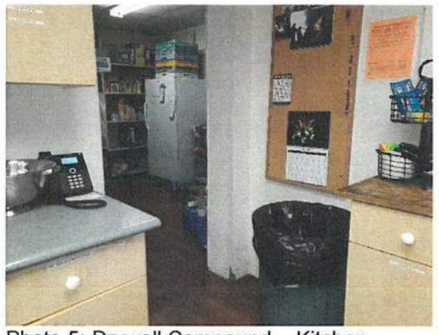


Photo 5: Drywall Compound – Kitchen (ND)

Photo 6: Drywall Compound – Stairs To 2nd (ND)

Photo 7: Drywall Compound – Cleaning Closet (ND)

Photo 8: Drywall Compound – Training Room (ND)

Photo 9: Drywall Compound – Storage/Training Room (ND)

Photo 10: Drywall Compound – Chief Office (ND)

Photo 11: Vinyl Floor Tile – Banquet Hall Below Laminate (ND)

Photo 12: Vinyl Floor Tile – Kitchen Storage (ND)

Photo 13: Sheet Vinyl Flooring – Washroom (ND)

Photo 14: Sheet Vinyl Flooring – Cleaning Closet (ND)

Photo 15: Ceiling Tile – Throughout Main Floor (ND)

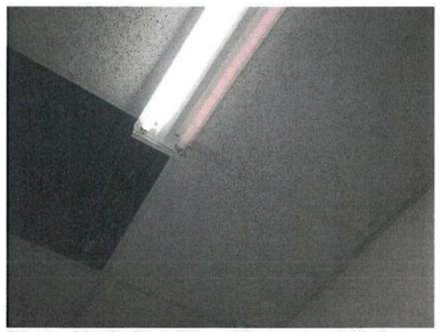


Photo 16: Ceiling Tile – Throughout Main Floor (ND)

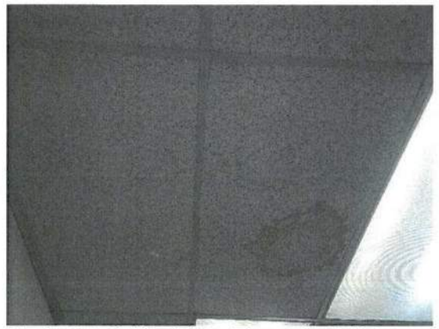


Photo 17: Ceiling Tile – Throughout Main Floor (ND)

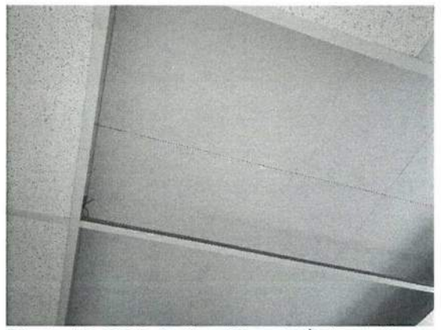


Photo 18: OSB Ceiling Tile – 2nd Floor Above Ceiling Tile (ND)

Photo 19: Mastic – HVAC (ND)

Photo 20: Caulking – Roof on Vent (ND)

Photo 21: Tar – Roof on Vent (ND)

Photo 22: Caulking – Roof on Vent (ND)

Photo 23: Torchon Membrane Roofing – Gym Awning (ND)

Photo 24: Composite Shingle – Gym Addition (ND)

Photo 25: Stucco – Exterior Front
(ND)

Photo 26: Stucco – Exterior Front
(ND)

Photo 27: Stucco – Exterior Side
(ND)

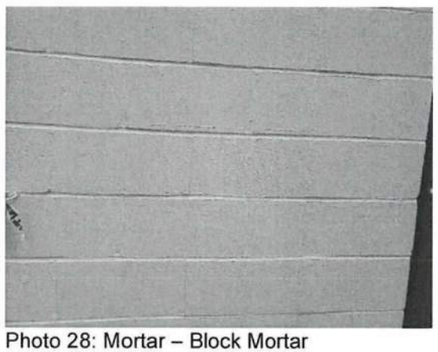


Photo 28: Mortar – Block Mortar
(ND)

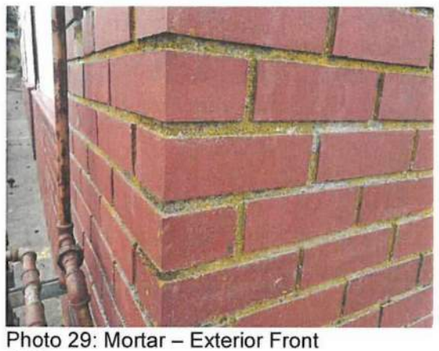


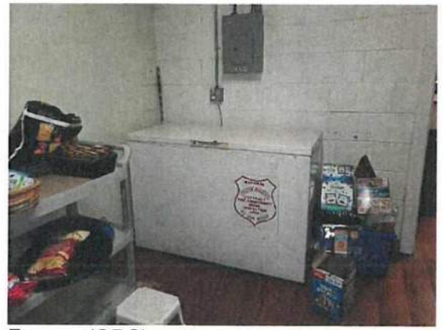
Photo 29: Mortar – Exterior Front
(ND)

PHOTOS (other potential hazards)

Fluorescent Light Ballast; Fluorescent Tube Lights (PCB; Mercury)

Fluorescent Light Ballast; Fluorescent Tube Lights (PCB; Mercury)

Refrigerator (ODS)



Freezer (ODS)

Smoke Detector (Americium)

Asbestos Analyses Results
4440 Happy Valley Rd.
Victoria, BC

AREC
Environmental Group
778-351-1966
info@arecenvironmental.com

AREC Environmental Group, Ltd.
6825 Suite A, Veyaness Rd.
Saanichton, BC, V8M 2A7

ARECEnvironmental.com

Asbestos Analyses Results			
Project Number:	N/A	Date of Analysis:	April 20, 2022
Site Address:	4440 Happy Valley Road	Client:	
Description:	N/A	Analyst:	C. Nordin
Lab Analysis Method:	EPA 600/R-93/116 (July 1993)	Notes:	

Sample Number	Lab Number	Material Description - Sample Location	Asbestos Type	Non-Asbestos Fibrous Material	Non-Fibrous Material
01	PLM-58681	Drywall Joint Compound – Main Floor Stairs Truck Bay	**None detected**	0%	100%
02	PLM-58682	Drywall Joint Compound – Main Floor Gym	**None detected**	0%	100%
03	PLM-58683	Drywall Joint Compound – Main Floor Sauna Room	**None detected**	0%	100%
04	PLM-58684	Drywall Joint Compound – Main Floor Reception Hall	**None detected**	0%	100%
05	PLM-58685	Drywall Joint Compound – Main Floor Kitchen	**None detected**	0%	100%
06	PLM-58686	Drywall Joint Compound – Main Floor Stairs to 2nd Floor	**None detected**	0%	100%
07	PLM-58687	Drywall Joint Compound – Main Floor Cleaning Closet	**None detected**	0%	100%
08	PLM-58688	Drywall Joint Compound – Main Floor Training Room	**None detected**	0%	100%
09	PLM-58689	Drywall Joint Compound – Main Floor Storage/Training	**None detected**	0%	100%

AREC Environmental participates in the ChemScope proficiency analytical testing program as part of its quality assurance.

10	PLM-58690	Drywall Joint Compound – Main Floor Chief Office	**None detected**	0%	100%
11a	PLM-58691	Vinyl Floor Tile – Banquet Hall (Below Laminate)	**None detected**	0%	100%
11b	PLM-58692	Vinyl Floor Tile Mastic – Banquet Hall (Below Laminate)	**None detected**	1% cellulose	99%
12a	PLM-58693	Vinyl Floor Tile – Kitchen Storage	**None detected**	0%	100%
12b	PLM-58694	Vinyl Floor Tile Mastic – Kitchen Storage	**None detected**	1% cellulose	99%
13a	PLM-58695	Sheet Vinyl Flooring – Washroom	**None detected**	20% cellulose	75%
13b	PLM-58696	Sheet Vinyl Flooring Mastic – Washroom	**None detected**	2% cellulose	98%
14a	PLM-58697	Sheet Vinyl Flooring – Cleaning Closet	**None detected**	25% cellulose, 5% fibrous glass	70%
14b	PLM-58698	Sheet Vinyl Flooring Mastic – Cleaning Closet	**None detected**	5% cellulose	95%
15	PLM-58699	Ceiling Tile – Main Floor Throughout	**None detected**	80% cellulose, 10% fibrous glass	10%
16	PLM-58700	Ceiling Tile – Main Floor Throughout	**None detected**	80% cellulose, 10% fibrous glass	10%
17	PLM-58701	Ceiling Tile – Main Floor Throughout	**None detected**	80% cellulose, 10% fibrous glass	10%
18	PLM-58702	Ceiling Tile – Kitchen	**None detected**	98% cellulose	2%
19	PLM-58703	Mastic – HVAC	**None detected**	0%	100%
20	PLM-58704	Caulking – Roof Vent	**None detected**	0%	100%
21	PLM-58705	Tar – Roof Vent	**None detected**	0%	100%
22	PLM-58706	Caulking – Roof Vent	**None detected**	0%	100%

Asbestos Analyses Results
4440 Happy Valley Rd.
Victoria, BC

AREC
Environmental Group

23	PLM-58707	Torch-On – Gym Awning	**None detected**	5% synthetic fiber	95%
24	PLM-58708	Tar Shingle – Gym Addition	**None detected**	10% fibrous glass	90%
25	PLM-58709	Stucco – Exterior Front	**None detected**	0%	100%
26	PLM-58710	Stucco – Exterior Front	**None detected**	0%	100%
27a	PLM-58711	Stucco Skim Coat – Exterior Side	**None detected**	0%	100%
27b	PLM-58712	Stucco Base Coat – Exterior Side	**None detected**	0%	100%
28	PLM-58713	Mortar – Block	**None detected**	0%	100%
29	PLM-58714	Mortar – Exterior Front	**None detected**	0%	100%

***WorkSafeBC defines materials containing 0.5% asbestos or greater as an asbestos-containing material (ACM).**

9000 Commerce Parkway Suite B
Mt. Laurel, New Jersey 08054
Telephone: 856-231-9449
Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: AREC Environmental
6825A Veyaness
Saanichton BC V8M 2A7

Client: ARE792

Report Date: 4/20/2022
Report No.: 658574 - Lead Paint
Project: 4440 Happy Valley Rd
Project No.:

LEAD PAINT SAMPLE ANALYSIS SUMMARY

Lab No.: 7407868
Client No.: LP-1
Description: Multi Coloured Paint
Location: Int Walls And Trim
Result (% by Weight): <0.0077
Result (ppm): <77
Comments: ***

Lab No.: 7407869
Client No.: LP-2
Description: Multi Coloured Paint
Location: Ext Stucco And Trim
Result (% by Weight): 1.7
Result (ppm): 17000
Comments:

Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/15/2022
Date Analyzed: 04/20/2022
Signature: Stephen Colis
Analyst: Stephen Colis

Approved By: Frank E. Ehrenfeld, III
Laboratory Director

9000 Commerce Parkway Suite B
Mt. Laurel, New Jersey 08054
Telephone: 856-231-9449
Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: AREC Environmental
6825A Veyaness
Saanichton BC V8M 2A7

Client: ARE792

Report Date: 4/20/2022
Report No.: 658574 - Lead Paint
Project: 4440 Happy Valley Rd
Project No.:

Appendix to Analytical Report:

Customer Contact: Send Results
Method: ASTM D3335-85a, US EPA SW846 3050B:7000B

This appendix seeks to promote greater understanding of any observations, exceptions, special instructions, or circumstances that the laboratory needs to communicate to the client concerning the above samples. The information below is used to help promote your ability to make the most informed decisions for you and your customers. Please note the following points of contact for any questions you may have.

iATL Customer Service: customerservice@iatl.com
iATL Office Manager: wchampion@iatl.com
iATL Account Representative: Kelly Klippel
Sample Login Notes: See Batch Sheet Attached
Sample Matrix: Paint
Exceptions Noted: See Following Pages

General Terms, Warrants, Limits, Qualifiers:

General information about iATL capabilities and client/laboratory relationships and responsibilities are spelled out in iATL policies that are listed at www.iATL.com and in our Quality Assurance Manual per ISO 17025 standard requirements. The information therein is a representation of iATL definitions and policies for turnaround times, sample submittal, collection media, blank definitions, quantification issues and limit of detection, analytical methods and procedures, sub-contracting policies, results reporting options, fees, terms, and discounts, confidentiality, sample archival and disposal, and data interpretation.

iATL warrants the test results to be of a precision normal for the type and methodology employed for each sample submitted. iATL disclaims any other warrants, expressed or implied, including warranty of fitness for a particular purpose and warranty of merchantability. iATL accepts no legal responsibility for the purpose for which the client uses test results. Any analytical work performed must be governed by our Standard Terms and Conditions. Prices, methods and detection limits may be changed without notification. Please contact your Customer Service Representative for the most current information.

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA LAP LLC, or any agency of local, state or province governments nor of any agency of the U.S. government.

This report shall not be reproduced except in full, without written approval of the laboratory.

Information Pertinent to this Report:

Analysis by ASTM D3335-85a by AAS

Certification:
- National Lead Laboratory Program (NLLAP): AIHA-LAP, LLC No. 100188
- NYSDOH-ELAP No. 11021

This report meets the standards set forth in the EPA's National Lead Laboratory Accreditation Program (NLLAP) through the Laboratory Quality System Requirements (LQSR) Revision 3.0 November 5, 2007. All Environmental Lead Proficiency Analytical Testing (ELPAT) is through the AIHA-PAT established program.

Regulatory limit is 0.5% lead by weight (EPA/HUD guidelines). Recommend multiple sampling for all samples less than regulatory limit for confirmation.
All results are based on the samples as received at the lab. iATL assumes that appropriate sampling methods have been used and that the data upon which these results are based have been accurately supplied by the client.
Method Detection Limit (MDL) per EPA Method 40CFR Part 136 Apendix B.
Reporting Limit (RL) based upon Lowest Standard Determined (LSD) in accordance with AIHA-ELLAP policies.
LSD=0.2 ppm MDL=0.006% by weight. RL= 0.010% by weight (based upon 100 mg sampled).

Disclaimers / Qualifiers:

There may be some samples in this project that have a "NOTE:" associated with a sample result. We use added disclaimers or qualifiers to inform the client about something that requires further explanation. Here is a complete list with highlighted disclaimers pertinent to this project. For a full explanation of these and other disclaimers, please inquire at **customerservice@iatl.com.**

iATL INTERNATIONAL
ASBESTOS TESTING LABORATORIES

9000 Commerce Parkway Suite B
Mt. Laurel, New Jersey 08054
Telephone: 856-231-9449
Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client:	AREC Environmental	Report Date:	4/20/2022
	6825A Veyaness	Report No.:	658574 - Lead Paint
	Saanichton BC V8M 2A7	Project:	4440 Happy Valley Rd
Client:	ARE792	Project No.:	

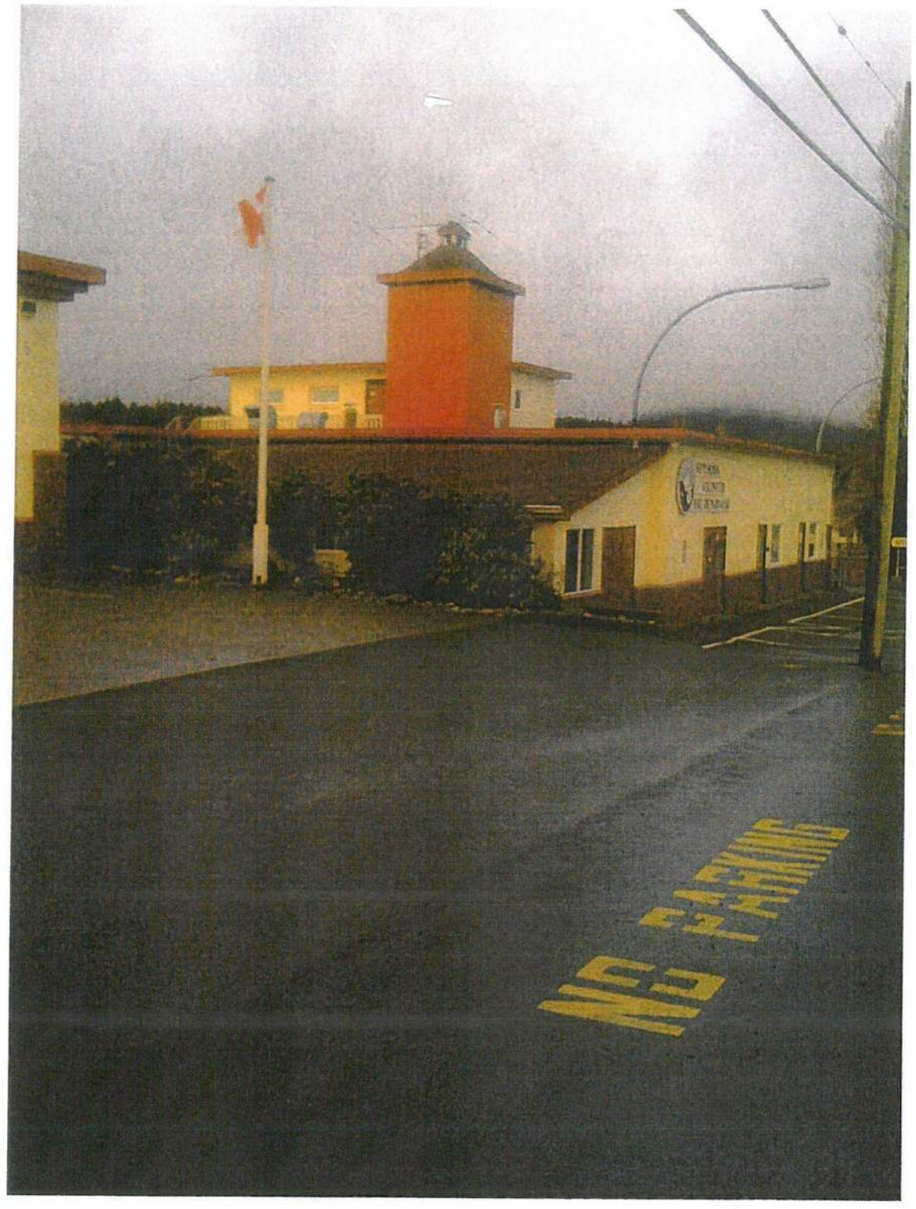
* Insufficient sample provided to perform QC reanalysis (<200 mg)
** Not enough sample provided to analyze (<50 mg)
*** Matrix / substrate interference possible.

< less than sign, signifies none-detected below the empirical value based upon sub-sampled mass. This is often below the Reporting Limit (see above).

2. hazardous material report

i. January 30, 2013

Roof Condition Report



Metchosin Fire Hall

30 January 2013

Metchosin Fire Hall

4440 Happy Valley Road

Victoria, BC V9C 3Z3

Attn: Chief Dunlop

Roof Condition – Metchosin Fire Hall

Refs: a. Herold Engineering Report (enclosed)

b. Aerial Roofing Quote (enclosed)

c. Universal Roofing (enclosed)

Chief Dunlop,

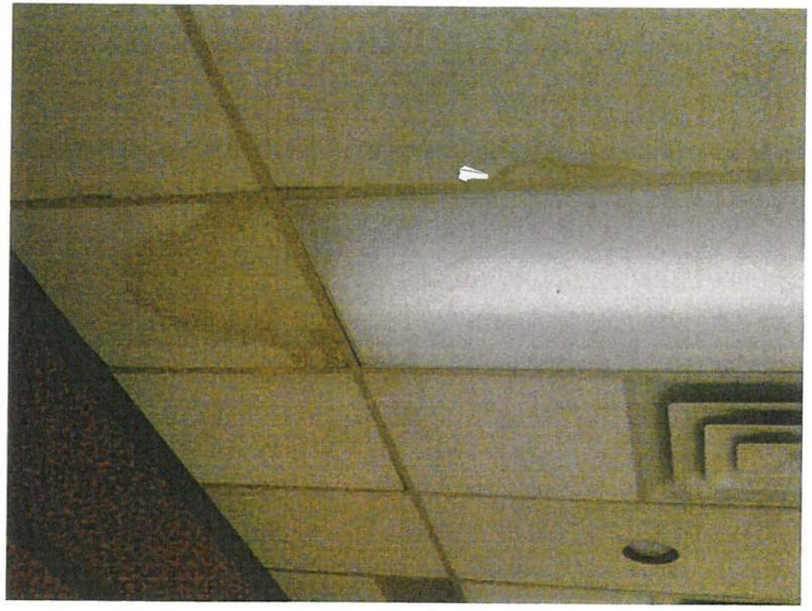
Due to the ongoing water leaks and damage to the interior of Metchosin Fire hall lounge area, I am obligated to forward this report to you. Enclosed in this report is an engineering report as well as two roofing quotes. Several attempts have been made to repair the existing roof which has been sufficient for a period of times, however these are bandage repairs. The problems have been increasing and are becoming a hazard.

According to ref a, the subject building was constructed in the 1960s with additions added during the same time frame. There was a significant repair done in the late 1990s with the siren blew off from its perch and on the roof. The age of the whole roof cannot be exactly determined due to the many repairs done in sections according to previous employees. Metchosin Fire Hall is a resourceful asset of Metchosin, the situation behoves us to take some kind of action, failure to act will have negative impact on this establishment and the community as a whole.

Roof Condition

The following will be pictures of my findings and descriptions:

Interior



Above is a picture in the lounge by the back entrance, as our facility is not only occupied with volunteer firefighters, the scouts, the seniors, SAR and EOC personal and other local municipal and Westshore organizations. Many events such as Halloween, School Expo, Auto Ex Competions and many forms of training, the public perception portrays a negative effect on our hall and community.

Interior hallway towards offices.

Roof interior inside the Fire Support personnel's office.

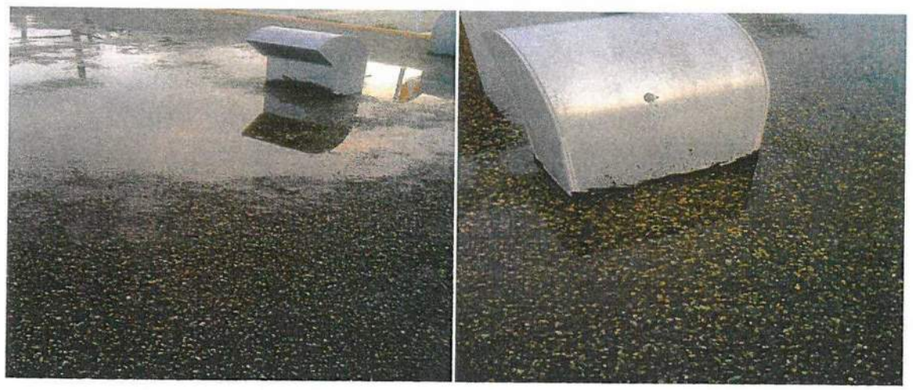
Exterior:

The pooling you see here is called "pondling", location here is outside the upper training room classroom. One of the issues here is the added weight of water on our structure, also improper location of drains.

From the last photo, turning 90 degrees, facing flag pole, more pondling, added weight and improper drainage.

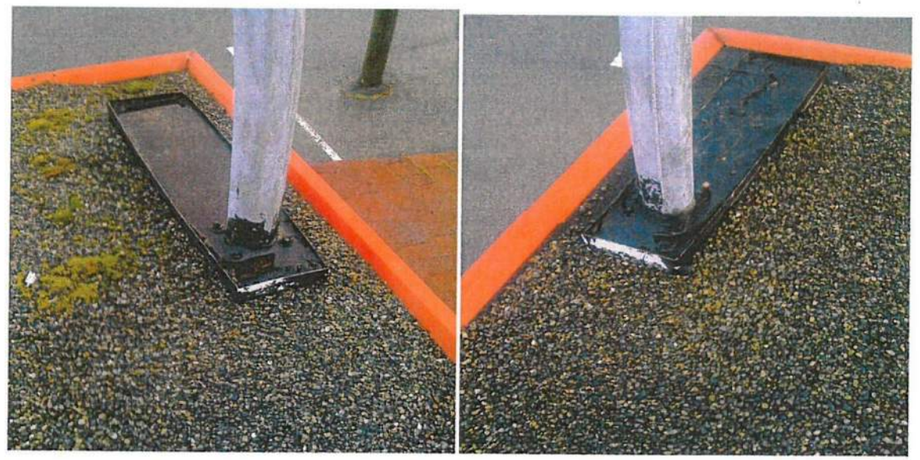
Location upper training room door, part of cinderblock is missing, and flashing not adhere to building.

Roof adjoining old hose tower, more pondling, weight, pondling at seem of structure.



More pondling, the issue here the pondling is around HVAC outlets, which has possible egress to interior.

Pondling at old hose tower structure front side at roof.



Light standards mounted front of hall on roof, improper installion, pan had been inadequately filled with tar, thus pans are filled with water. Should be filled and with concave topping to allow water to run off.

Exposed tar, no gravel to protect, cracks which make good egress of water to interior.

Roof venting, there are many fixes here with different types of methods, due to age, birds are making egress easily for nesting, etc..

Some roof vents are need of repair or replacement.

Quotes:

After my inspection and observation of the Metchosin Fire Hall roof, also due to the amount of genuine concerns I had, I called three subject matter experts for their recommendations and quotes. All roofing reps displayed a genuine concern of the weight of the material of the roof (gravel and tar) not including added weight of water or snow load. All roof reps recommended we replace the roof with a torch on membrane vice the gravel and tar. Due to the above pictures and shortcomings of our roof, it also recommends replace than repair. One of the roofing companies walked away from our situation. As previously mentioned, enclosed are two existing quotes. After spending a considerable time with the two roofing reps separately, I am leaning toward Universal Sheet metal. My reasoning is the rep's experience, reputation and customer service feedback. Also he is willing to educate myself with our other Metchosin assets in care and maintenance, especially moss removal.

Conclusion:

As your employee, I am forwarding this report to you. Roof systems can deteriorate from normal wear, severe weather, improper design, construction and maintenance. Any roof repairs not dealt with after signs of failure can and will result in increased damage to this Metchosin asset as in building interiors, loss of occupant occupancy, interruption of services and possibly endanger occupant safety.

Eric Meredith

Fire Support and Maintenance

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