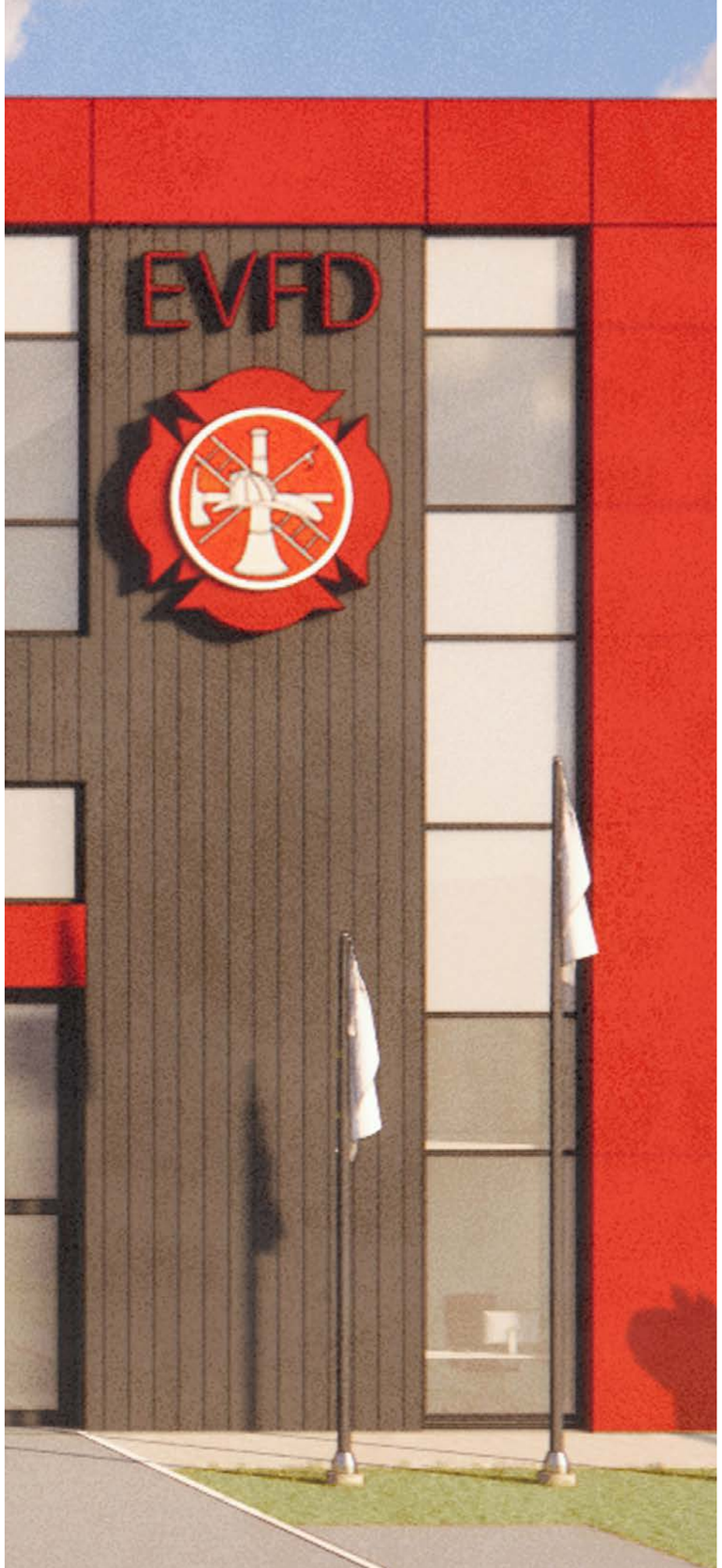
SCHEMATIC DESIGN REPORT

ENFIELD FIRE STATION

Enfield, Nova Scotia

ARCHITECTURE 49

DATE: FEBRUARY 5, 2025


EVFD

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1 DESIGN INTENT NARRATIVE

OVERVIEW

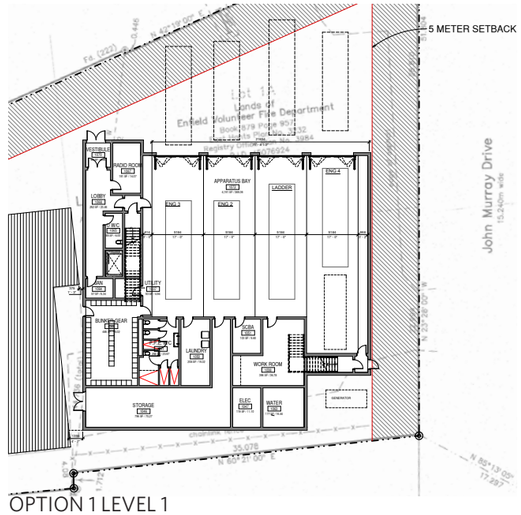
The following is a Schematic Design report for the Enfield Fire Station. This report will start with an overview of the initial design process. At project outset it was understood that the requested building program and the client budget of $6,870,000.00 were not aligned. After client discussion, it was agreed to provide a programming and design study to try and get the project as close to the budget as possible, keeping the most essential portions of the project within the design to ensure an operating Fire Station. Our team went through several iterations of this reduced program layout, in an effort to meet the needs of the Stakeholder Group.

Located in Enfield, Nova Scotia just off the intersection of Highway 2 and John Murray Drive, the building will serve as the new Fire Station for the local Fire Department and the local community. The new building will be situated in the current Fire Station parking lot and will be constructed while the current Fire Station is operational. The land area available for the new building is limited, and awkwardly shaped. The building requires a four bay Apparatus Bay and needs to provide room for the fire trucks to pull in and out from Highway 2. This need for a four bay garage, the limited land area, compounded with the need to keep the existing Fire Station operational during construction creates a challenging site.

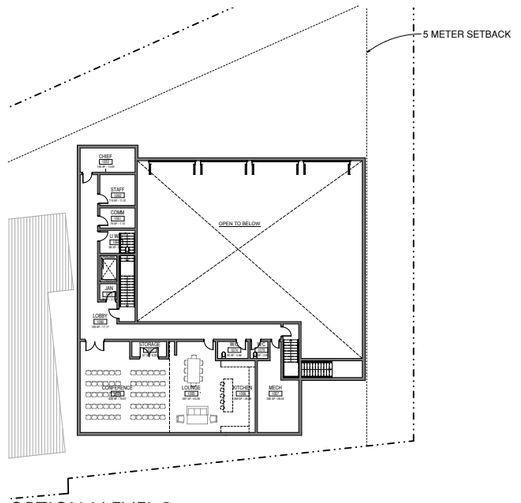
The following is a summary of the initial design process, illustrating the initial design schemes explored by the A49 Team.

DESIGN OPTION 1

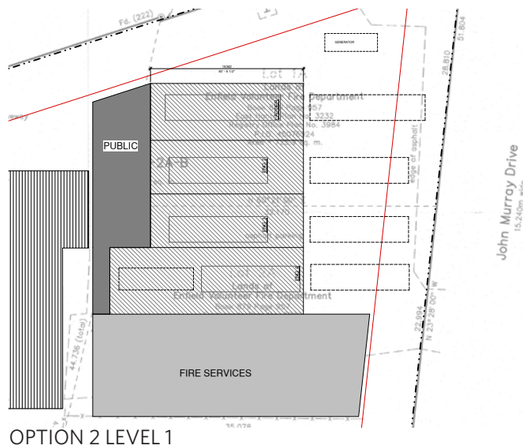
This Design Option stacks the Bay's to the far right of the site. The service spaces associated with the Apparatus Bay are positioned at the back of the Bays to allow access to the Trucks. This arrangement of services at the rear of the App Bay remains consistent through all the design options. Building support and second floor access had to be positioned to the left of the site due to the angle of Highway 2 and the need to provide a tarmac in front of the building. The building form is kept rectilinear to minimize costs and the larger program spaces, such as the large Multi-Purpose Room and Dorm are left out of the project. During this submission, we also illustrated Option 2 and 3, which were both unsuccessful studies. Option 2 in which the Bays exited onto John Murray Drive would not work due to site grading. Option 3 illustrated the challenges in positioning support and second floor access on the far right side of the site, this was simply an illustrative example and is left out of the report.



OPTION 1 LEVEL 1



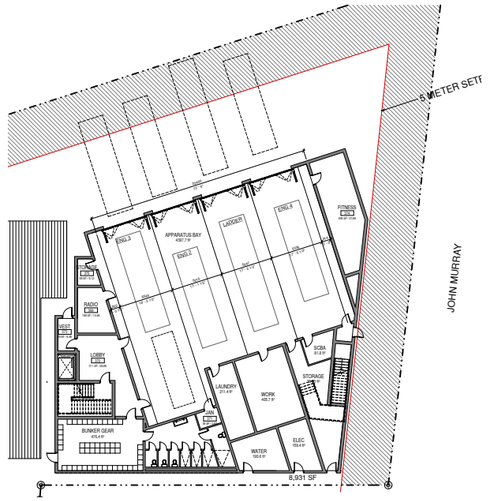
OPTION 1 LEVEL 2



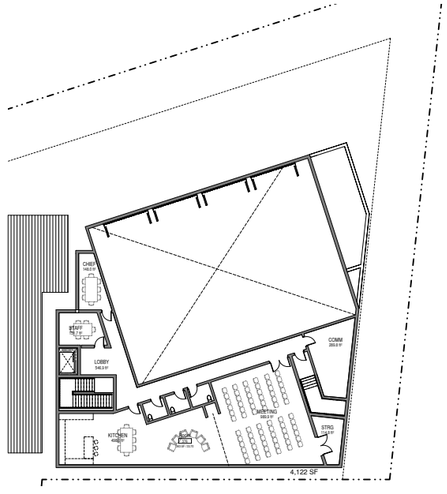
OPTION 2 LEVEL 1

DESIGN OPTION 4

Design Option 4 was a study in keeping the building aligned with Highway 2. This study was not successful, as it created awkward spaces in the plan and did not allow space for the Dorm Rooms. It also provided less storage for the facility.



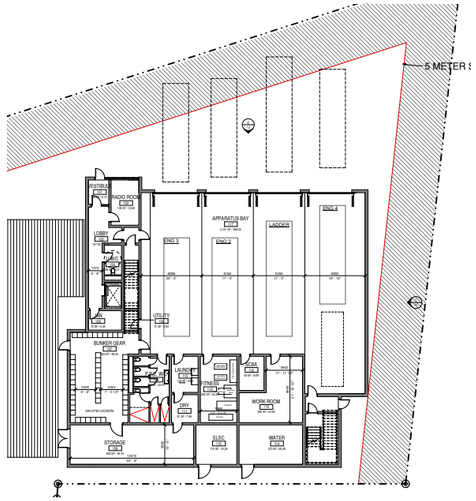
OPTION 4 LEVEL 1



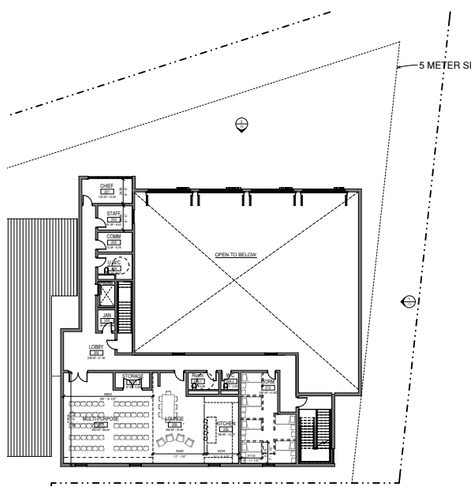
OPTION 4 LEVEL 2

DESIGN OPTION 5

Design Option 5 brought the Dorm Room back into the project. Project Design did not vary significantly from Option 1, however the Mechanical Room was taken over by the Dorm Room and the Stair was re-worked.



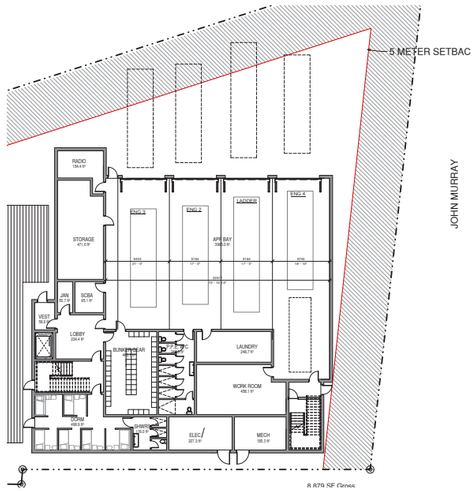
OPTION 5 LEVEL 1



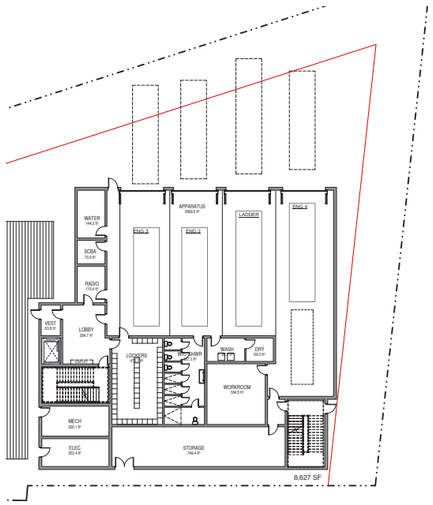
OPTION 5 LEVEL 2

DESIGN OPTION 6

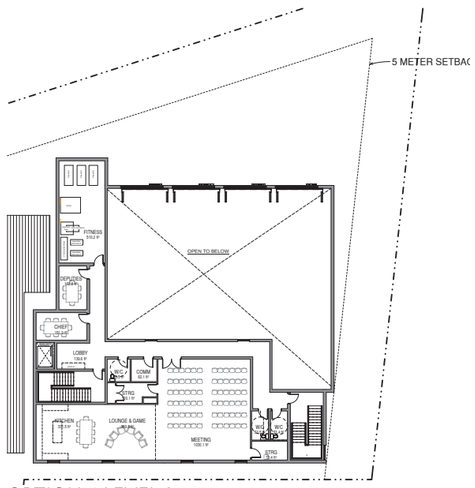
At this time the stakeholder team requested a Fitness Room to be added to the program as well as a better functioning Meeting Room and Kitchen/Lounge area. Option 6 provides these requests.



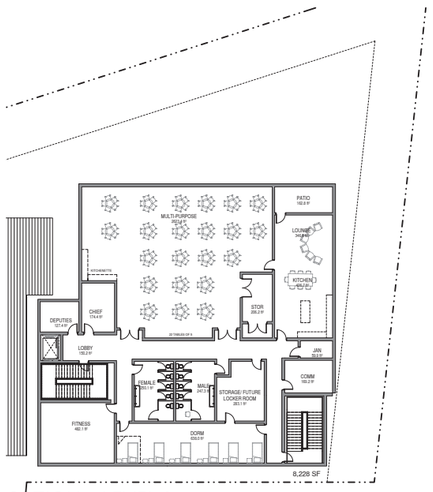
OPTION 6 LEVEL 1



OPTION 7 LEVEL 1



OPTION 6 LEVEL 2



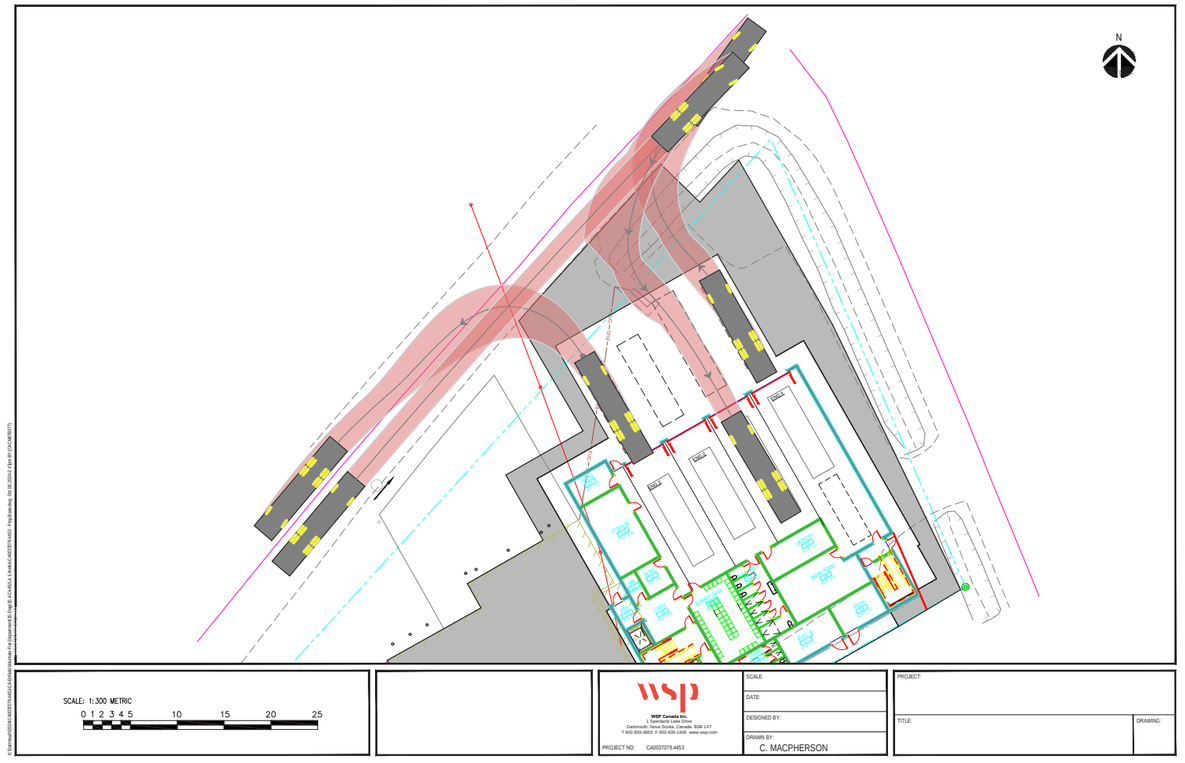
OPTION 7 LEVEL 2

DESIGN OPTION 7

Requested at the same time as Option 6. This Option explores providing all requested program from the RFP. Option 7 stacks the large Multi-Purpose Room, Dorms, Kitchen and Dayroom above the Apparatus Bay. Apparatus Bay Services are kept on the bottom floor. Building entrance was re-positioned off of the future parking lot, facing the existing building with the intent to access the building from the App Bay's during demolition of the existing building.

ACCESS ONTO HIGHWAY 2

During the Option 6 and 7 submission concern was voiced from the stakeholder team regarding the access from Highway 2 into the site. The project and client team wanted assurance that the largest of the trucks would be able to both turn onto the Highway as well as back into the bays without compromising safety. The below turning assessment was provided by the Civil Engineering team. It was concluded that using the ladder truck, the largest of the trucks in the App Bay, access both going from and returning to the station would be achievable.



COSTING

Throughout the early design process the Architecture49 team was keeping the client closely informed about the overall cost implications related to the ever evolving project. Early in the process the Architect was using a order of magnitude number of $744.00 per square foot attached to the program. This was based on previous project work, and was a safe estimate on the higher end of the spectrum.

OPTION 1- COMPARATIVE COST

After Option 1 was designed, the team decided to move forward with a Class D Cost Estimate from Hanscomb Limited, to better understand overall Cost Implications. Due to the disappointing knowledge that the original budget would not be met, the stakeholder group also requested a comparison in which the second floor remained un-developed. Keeping this area a shell to be later developed in the future.

The result of these estimates put the project above the original budget, even without developing the second floor of the facility. It became clear to the project group that additional funding would be necessary.

With this knowledge the stakeholder group eventually decided to move forward with designing to meet all program needs, with the hope of raising the money to allow the project to move forward. Eventually leading to Option 7, which would be further developed into the Current Design Option.

5. CONSTRUCTION COST ESTIMATE SUMMARY

OPTION 1

Description	Quantity	Rate	Amount
New Construction	1,206 m2	4,045.61	$4,879,000
Site Development	1 Sum		$661,600
Demolition & Alterations	1 Sum		$220,000
Sub-total	1,206 m2	4,776.62	$5,760,600
General Requirements	15.0%		$864,100
Fee	5.0%		$331,200
Sub-total	1,206 m2	5,767.74	$6,955,900
Design & Pricing Allowance	15.0%		$1,043,400
Escalation Allowance	5.0%		$400,000
Total expected tender cost	**1,206 m2**	**6,964.59**	**$8,399,300**
Construction Allowance	7.5%		$629,900
Total Construction Cost	1,206 m2	7,486.90	$9,029,200

OPTION 2

Description	Quantity	Rate	Amount
New Construction	1,206 m2	3,393.86	$4,093,000
Site Development	1 Sum		$661,600
Demolition & Alterations	1 Sum		$220,000
Sub-total	1,206 m2	4,124.88	$4,974,600
General Requirements	15.0%		$746,200
Fee	5.0%		$286,000
Sub-total	1,206 m2	4,980.76	$6,006,800
Design & Pricing Allowance	15.0%		$901,000
Escalation Allowance	5.0%		$345,400
Total expected tender cost	**1,206 m2**	**6,014.26**	**$7,253,200**
Construction Allowance	7.5%		$544,000
Total Construction Cost	1,206 m2	6,465.34	$7,797,200

OPTION 7- COST OF INCLUDING FULL PROGRAM

As noted previously Option 7 was a design that provided everything requested in the original RFP. By getting this option costed it allowed a comparison between Option 1 with an undeveloped second floor as the least ideal solution versus the complete package of Option 7.

The result is a cost significantly higher than the original budget from the RFP. After a review of this estimate with the Architectural team and Hanscomb it was noted that a Class D Estimate is not completely accurate, as it uses data from comparable projects for much of its calculations, specifically in the case of Mechanical and Electrical Systems. After this discussion it was decided to move forward in developing Option 7 further and having this costed again with a Class C estimate to have a more accurate number to proceed with into fundraising.

The following report investigates this further developed design, and will be used for the Class C Cost Estimate. The Class C will follow this report and is scheduled in the Draft Implementation Plan.

5. CONSTRUCTION COST ESTIMATE SUMMARY

Description	Quantity	Rate	Amount
New Construction	1,612 m2	4,069.48	$6,560,000
Site Development	1 Sum		$661,600
Demolition & Alterations	1 Sum		$220,000
Sub-total	1,612 m2	4,616.38	$7,441,600
General Requirements	15.0%		$1,116,200
Fee	5.0%		$427,900
Sub-total	1,612 m2	5,574.26	$8,985,700
Design & Pricing Allowance	15.0%		$1,347,900
Escalation Allowance	5.0%		$516,700
Total Construction Cost	**1,612 m2**	**6,730.96**	**$10,850,300**
Construction Allowance	7.5%		$813,800
Total + Construction Allowance	1,612 m2	7,235.79	$11,664,100

1 DESIGN INTENT NARRATIVE

CURRENT DESIGN

Building Access: The building entrance faces the future parking lot. This entrance will be largely inaccessible for the initial months of occupancy due to the necessity of keeping the existing building operational during construction. After occupancy of the new building is granted and the fire crew moves from the existing building, demolition of the existing building will begin. Depending on a further Environmental Assessment to better understand Hazardous Materials within the building, this process will take between one and two months.

The main entrance is marked by a double height glazed entrance vestibule, which houses the Deputy Offices on the second floor. This large glazed area will create a lantern like entrance, filled with activity. Also allowing the fire crew a visual of the parking lot to monitor visitors to the facility.

Public building entry will be into the Main Lobby space through the vestibule. This entrance will also be used by the Volunteer Fire fighters, allowing for immediate access from the building parking lot to the Bunker Gear Room, ensuring a rapid response time. A side entry into the Apparatus Bay is provided and will be used by employees during the demolition of the existing building. The Apparatus Bay is provided with four (x4) bi-fold fire doors, providing rapid opening, low maintenance exiting for the fire trucks. The Radio Room, is located directly off of the Apparatus Bay facing Highway 2, allowing easy access from the fire truck bays, and a large window to monitor the trucks as they deploy and return.

Offices: The Fire Chief and Deputies Offices are located on the second floor of the building with views to the parking lot. These Offices are directly adjacent to the main stair, allowing quick access to the Bunker Gear Room, and helping to improve response time.

Lobby: This area provides a front entry to the building. The Lobby is intended to feature a display wall to showcase memorabilia of the Enfield Fire Department. The Lobby at Level 2 is directly off the elevator at the front of the building and is smaller than the Main Lobby. This space will provide a transitional location for visitors to the Multi-Purpose Room.

Apparatus Bay: The Apparatus Bay provides a four-bay garage to house all required fire trucks, as well as a deeper fourth bay for storage of the Parade Truck.

Fire Station Support: Bunker Gear Lockers, Equipment storage, SCBA Filling Station are all located directly adjacent to the Apparatus Bay. A dedicated Laundry Room is provided for washing PPE Equipment. All “dirty” (contaminated) program zones are located on the first level. Creating a separation between program spaces that are exposed to equipment directly after a fire. Fire Fighters will be able to access the W/C shower room directly off of the Apparatus Bay, allowing four (x4) shower rooms and four (x4) toilets for getting clean and progressing into the second floor of the building.

Activity Spaces: The second level of the Fire Hall houses the social programs including the Meeting Room, Kitchen, Lounge, Multipurpose Room, and Fitness Room. As well as the Dorm Room. An elevator will provide barrier free access for retired Fire Personnel and the general public. The Firefighter’s Lounge and Kitchen are located on the East of the building and are completely separated from the Multi-Purpose Room. This area has easy access to the Dorm and Fitness Room, providing a slight separation between the public and Fire devoted services. It has been noted that the Dorm will not be immediately used by the Station, but is provided if and when the Station houses a career team. The dorm has the potential to be separated into separate compartments, and this could be done in a future renovation. The Fitness Room allows for a myriad of recreational pursuits and has two (x2) shower rooms adjacent.

Storage: Due to the height of the second floor stacking above the Apparatus Bay, an intermediary floor level has been added to allow for building storage. This room will be left largely unfinished, providing sealed concrete floors, lighting and gypsum walls for placement of fire related supplies.

Patio: Adjacent to the Lounge, the Outdoor Patio will provide an area for the fire crew to enjoy the outdoors.

Exterior Design: Discussions with EVFD have encouraged a modern and striking design approach. Inspiration around material selection and building massing came from the Pitt Meadows Fire Hall, Seattle Fire Station Number 10 and the Salt Lake City Fire Station Number 14.

- Black Aluminum Siding
- Red Accents
- Window Accent
- Importance of Public Entry
- Covered top patio space

It should be noted that the height of the current building will need approval from the Development Officer. The current bylaw notes the following for Village Core (Building Zone):

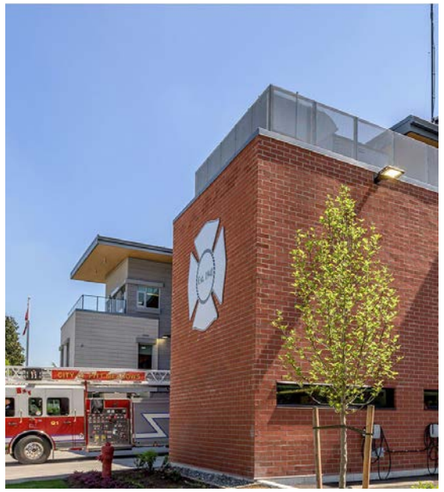
Salt Lake City Fire Station #14

Salt Lake City Fire Station #14

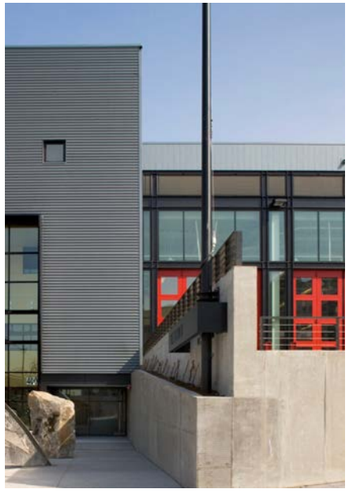
Maximum Building Height: 2.5 stories (4.3 m per storey) (3 stories are permitted if the third story is integrated into the roof design).

Our current building does not exceed the 3 story mark, but is taller than the 2.5 stories.

The Architecture49 team has reached out to East Hants Manager of Development Services. She has responded with the note that we should move forward with a requesting a Development Agreement to see if the project will meet the requirements.



Pitt Meadows Fire Hall



Seattle Fire Station #10

CURRENT: 1 - SPACE ALLOCATION PROGRAM

ENFIELD FIRE STATION- SCHEMATIC DESIGN SUBMISSION ARCHITECTURE 49

PROGRAM

SPACE REQUIREMENTS PER SECTOR

FIRE DEPARTMENT 2025.02.05

SPACES	NET AREA SF	NET AREA SM	QTY	TOTAL NET AREA SF	TOTAL NET AREA SM
Offices					
Fire Chief	242	22.5	1	242	22.5
2 Deputies (Shared)	159	14.8	1	159	14.8
Radio Room	126	11.7	1	126	11.7
Lobby			2		
Level 1	279	25.9	1	279	25.9
Level 2	151	14.0	1	151	14.0
Vestibule	62	5.8	1	62	5.8
Stair 1	299	27.8	1	299	27.8
Stair 2	295	27.4	1	295	27.4
Fire fighters Lounge & Game	715	66.4	1	715	66.4
Kitchen	430	39.9	1	430	39.9
Conference/Mpurp Room	2,160	200.7	1	2,160	200.7
Conference/Mpurp Room Storage	284	26.4	1	284	26.4
Patio	186	17.3	1	186	17.3
Dorm Room	714	66.3	1	714	66.3
Fitness	460	42.7	1	460	42.7
Apparatus Bay	3,985	370.2	1	3,985	370.2
Storage (Apparatus Bay)	540	50.2	1	540	50.2
Laundry	251	23.3	1	251	23.3
Future Laundry	57	5.3	1	57	5.3
Bunker Gear	410	38.1	1	500	38.1
SCBA Bottle Filling	99	9.2	1	99	9.2
Workroom	434	40.3	1	434	40.3
Fire W/C / Shower	367	34.1	1	300	34.1
Janitor	-				
Janitor Level 1	62	5.7	1	62	5.7
Janitor Level 2	74	6.9	1	74	6.9
Water	285	26.5	1	285	26.5
Storage Level	2,685	249.4	1	2,685	249.4
Female W/C	260	24.2	1	260	24.2
Male W/C	257	23.9	1	257	23.9
W/C Shower (Level 2)	65	6.0	2	130	12.1
Mechanical	234	21.7	1	234	21.7
Electrical	221	20.5	1	221	20.5
Data/Comm Room	162	15.1	1	162	15.1
				17,097	
				20,467	
			TOTAL GROSS AREA	**20,467**	

CURRENT: 2 - PROPOSED FLOOR PLANS

PROS:
1. Building fulfills all needs in the scope ladder.
2. Good clear access from future parking lot to Bunker Gear Room.
3. Large amount of storage. Accessible from Apparatus Bay and Parking Lot.
4. Large and accessible Mechanical and Electrical spaces.

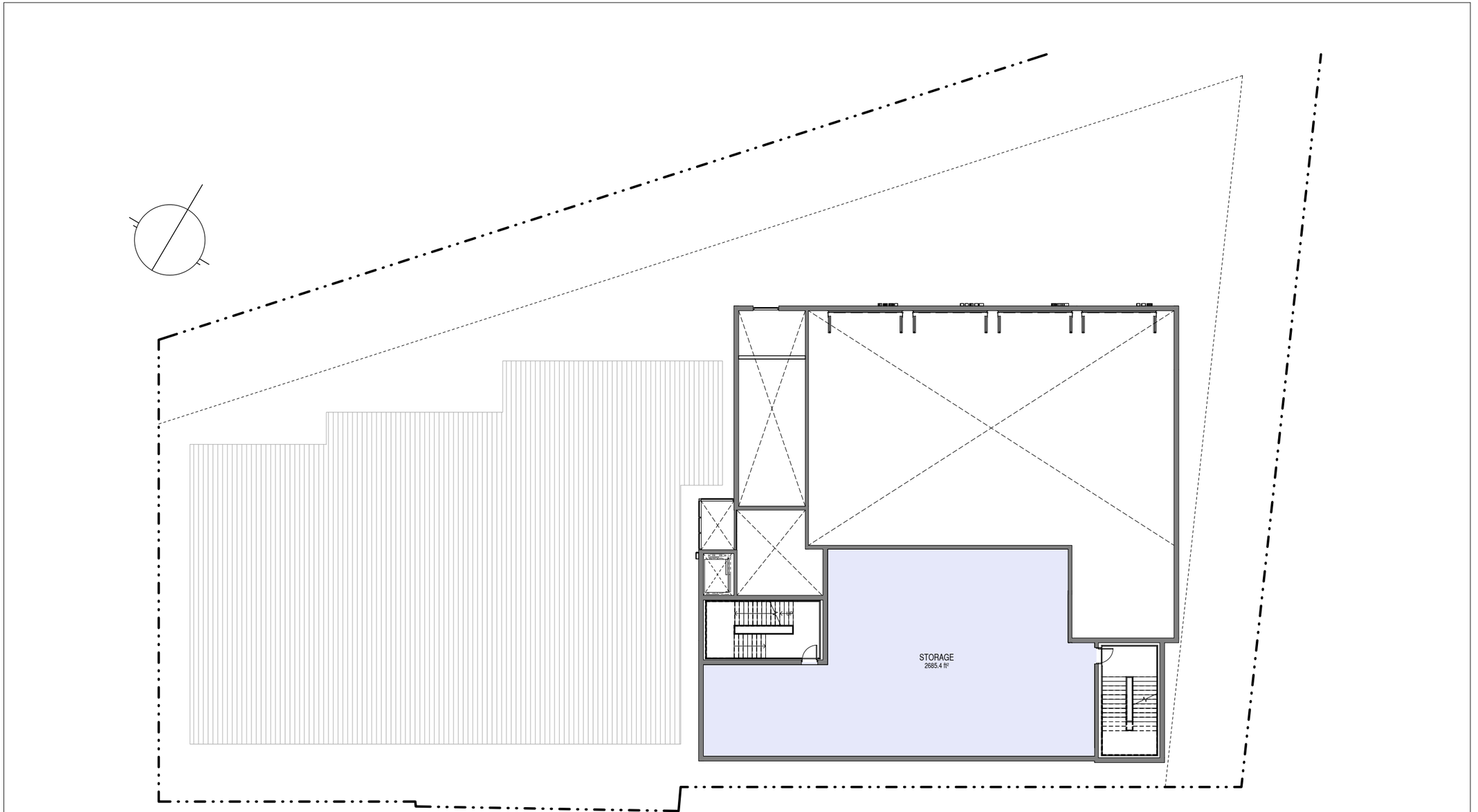
CONS:
1. Access to the Lobby etc. will not be available until existing building is demolished.

8,793 SF GROSS

LEVEL ONE - SCHEMATIC DESIGN
2025-02-05

ARCHITECTURE 49

CURRENT: 2 - PROPOSED FLOOR PLANS



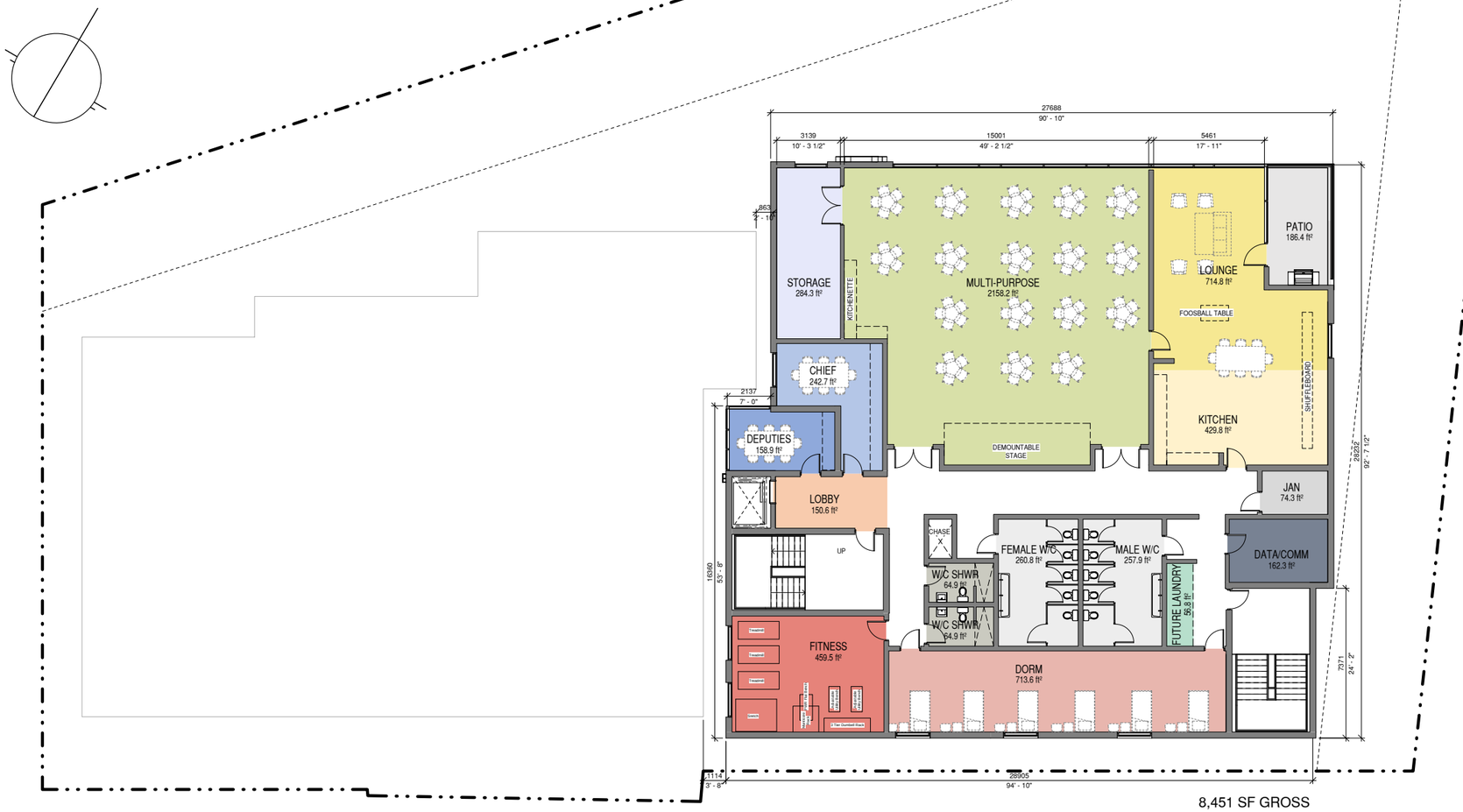
LEVEL ONE B - SCHEMATIC DESIGN
2025-02-05

ARCHITECTURE 49

CURRENT: 2 - PROPOSED FLOOR PLANS

PROS:
1. Large and front facing Conference Room.
2. Chief and Deputy Offices can be used for meetings.
3. Dorm Room could be subdivided into individual rooms. Allows for privacy between the sexes for future building.
4. Provides street facing outdoor Patio for barbecue.
5. Allows for future washer and dryer for personal belongings.
6. Lounge and Kitchen are spacious and match current uses.

CONS:
1. Necessity for more W/C capacity due to larger Occupancy Load.
2. Larger Square Footage means more cost.



8,451 SF GROSS

LEVEL TWO- SCHEMATIC DESIGN
2025-02-05

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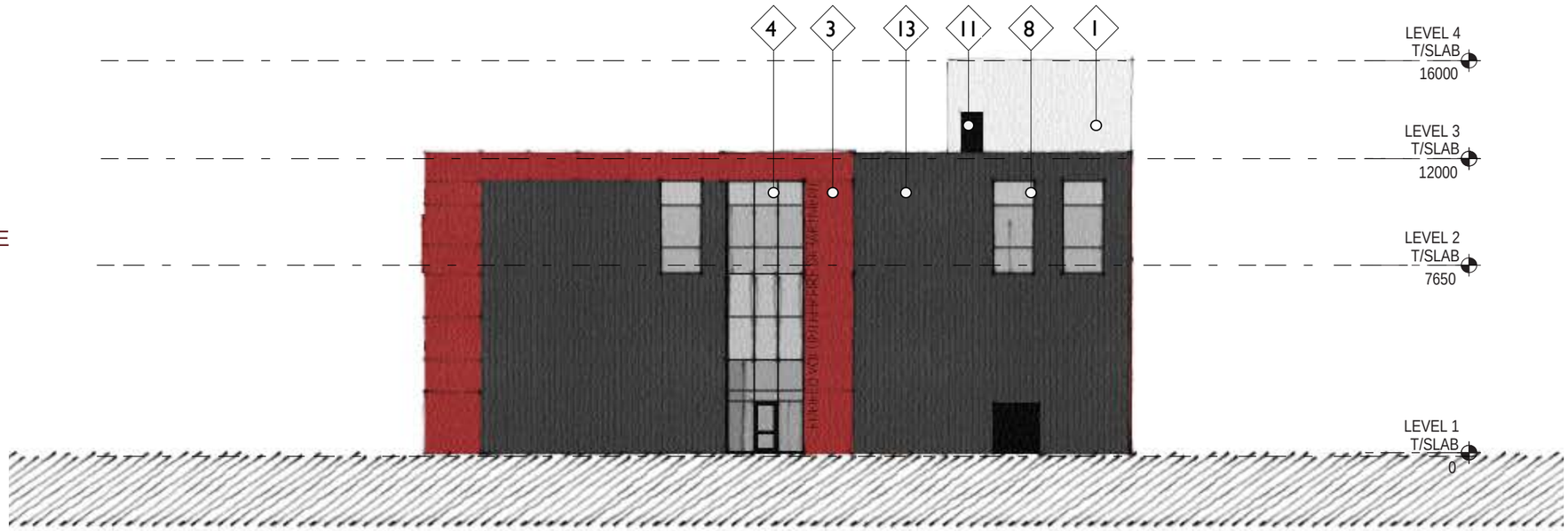
3 - ELEVATIONS

NORTH ELEVATION

SOUTH ELEVATION

PROPOSED MATERIALS:

1. WHITE CORRUGATED METAL SIDING
2. RED CORRUGATED METAL SIDING
3. RED METAL COMPOSITE PANEL
4. ALUMINUM CURTAIN WALL DOUBLE GLAZED
5. BI-FOLD DOORS
6. SPANDREL PANEL
8. ALUMINIUM DOUBLE GLAZED WINDOWS
9. PREFINISHED ALUMINIUM BACKLIT SIGNAGE
10. METAL BALCONY RAILING
11. METAL DOORS
12. TRANSLUCENT GLAZING
13. BLACK VERTICAL PLANK SIDING



EAST ELEVATION

WEST ELEVATION

4 - PRELIMINARY MASSING

EXTERIOR VIEW - FROM HIGHWAY 2

EXTERIOR VIEW - FROM PARKING LOT LOOKING EAST

EXTERIOR VIEW - FROM HIGHWAY 2 LOOKING EAST

EXTERIOR VIEW - FROM HIGHWAY 2 LOOKING SOUTH

5 - INTERIOR STUDIES

INTERIORS

The Architecture49 team has started investigating finishes and interior volumes within the project. Early renderings are provided to give an impression of how the interior spaces will function. Floor finishes will primarily be resilient epoxy in high traffic and wet areas. Carpet tile in office, dorm and lounge areas. A resilient vinyl flooring will be used in the hallways and multi-purpose rooms. Ceilings will primarily be acoustic tile and gypsum board, the Apparatus Bay will have exposed structure. This work will further evolve throughout the Design Development Phase, and will be followed with an interior finish concept board.

APPARATUS BAY

LOBBY

DEPUTY OFFICE

FITNESS

CHIEFS OFFICE

KITCHEN

LOUNGE

MULTI-PURPOSE

MULTI-PURPOSE

DORM

CIVIL

SITE GRADING

The natural topography of the site and surrounding streets necessitates the careful consideration of grading into the site and facility design. Currently, the site grades south-west towards a low point near the access with John Murray Drive. It is anticipated that the site may require some infill to the south of the site, however this will be confirmed through the detailed design process. The building pad and parking areas will generally be prepared as per recommendations on the site geotechnical report. In order to limit the requirements for retaining walls, grade at the rear of the proposed fire station would be lower than the proposed finished floor elevation. Site grading and sloping will be designed to be in conformance and meet accessibility requirements based on CAN/CSA B651 Accessible Design for the Built Environment.

The paved areas will be sized with coordination for requirements for fire truck turning movements and outside parking for the Fire Department when required. Parking stalls will be provided as per the Municipality of East Hants standards with input from the Architect and the Enfield Volunteer Fire Department as to the quantity and location of parking. Access to the site will be consistent with existing, with site access provided from Highway 2. To note, the existing driveway access from John Murray Drive would be removed.

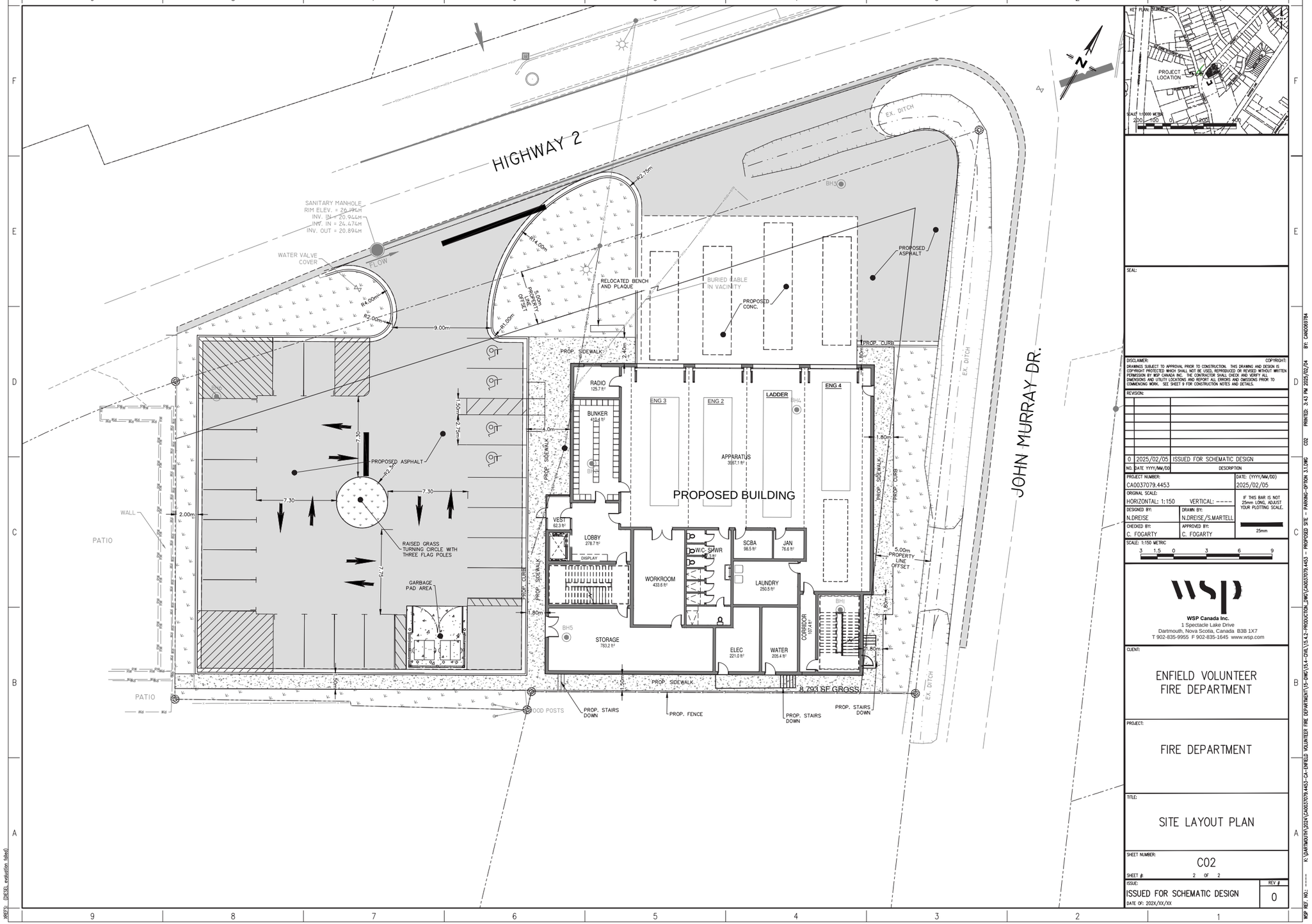
PARKING AND SITE VEHICLE CIRCULATION

Twenty-one visitor and staff parking stalls, including four barrier free stalls, will be provided adjacent to the main entrance west of the facility. In the current design, access to the facility parking is separated from the fire truck exiting. Four barrier free parking stalls are provided directly adjacent to the building entry. An accessible curb cut will be provided in this area. This parking will be accessed by a driveway from Highway 2. This driveway has been kept further East in order to accommodate the potential future roundabout at the Highway 2 and Old Enfield Road intersection. A garbage enclosure is also located in the rear of the main parking lot, adjacent to the building. Fire truck entry and exit will also be accommodated from Highway 2. Returning trucks will need to reverse into place, similar to the current fire station arrangement. We have verified fire truck reversing turning radius' in this location.

SITE SERVICES

Site municipal services will consist of underground water, wastewater, and stormwater services which will directly connect to the existing East Hants municipal system infrastructure. All services will be designed to meet requirements as per the East Hants Municipal Standards and the Standard Specifications for Municipal Services as s published by the Nova Scotia Road Builders Association – Consulting Engineers of Nova Scotia – Landscape Nova Scotia Joint Committee on Contract Documents.

Wastewater service for the facility is anticipated to include a gravity service connecting to the existing sanitary main on Highway 2. The site stormwater management system is anticipated to include a combination of traditional gravity piped infrastructure (underground pipes, catchbasins, and manholes) and surface best management features (surface swales, infiltration trenches, etc.) to collect and transport stormwater to the existing municipal system. Generally, a combination of rooftop and parking lot stormwater retention is anticipated to be required to meet the Municipality of East Hants and Province of NS requirements for stormwater quantity and water quality discharge.



SEAL:

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REVISION:

NO.	DATE YYYY/MM/DD	DESCRIPTION
0	2025/02/05	ISSUED FOR SCHEMATIC DESIGN

PROJECT NUMBER: CA0037079.4453	DATE: (YYYY/MM/DD) 2025/02/05
ORIGINAL SCALE: HORIZONTAL: 1:150 VERTICAL: ----	IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
DESIGNED BY: N.DREISE	DRAWN BY: N.DREISE/S.MARTELL
CHECKED BY: C. FOGARTY	APPROVED BY: C. FOGARTY

SCALE: 1:150 METRIC
3 1.5 0 3 6 9

WSP Canada Inc.
1 Spectacle Lake Drive
Dartmouth, Nova Scotia, Canada B3B 1X7
T 902-835-9955 F 902-835-1645 www.wsp.com

CLIENT:
ENFIELD VOLUNTEER FIRE DEPARTMENT

PROJECT:
FIRE DEPARTMENT

TITLE:
SITE LAYOUT PLAN

SHEET NUMBER: C02
SHEET #: 2 OF 2

ISSUE: ISSUED FOR SCHEMATIC DESIGN
REV #: 0
DATE OF: 202X/XX/XX

WSP REF. NO.: ---- K:\DARTMOUTH\2024\CA0037079.4453-CA-ENFIELD VOLUNTEER FIRE DEPARTMENT\05-DWG\04-CIVIL\05-PRODUCTION_DWG\CA0037079.4453 - PROPOSED SITE - PARKING-OPTION 1.DWG
BY: CAMD069784 C02 PRINTED: 3:43 PM 2025/02/04

LANDSCAPE

The new Enfield Volunteer Fire Department is situated at the high profile intersection of Old Enfield Road and Highway 2, directly adjacent to St. Bernards Park. Although the site is small, and most of the site plan is dictated by new building footprint and its associated operational needs, an opportunity exists to introduce more greenspace at this location than found currently. This can be achieved most notably by extending the avenue of street trees along Highway 2 from Saint Bernard Park. Ample space for tree planting also exists along John Murray Drive. Views into and out of the building on both levels will benefit from the additional of trees at this site.

HARDSCAPE

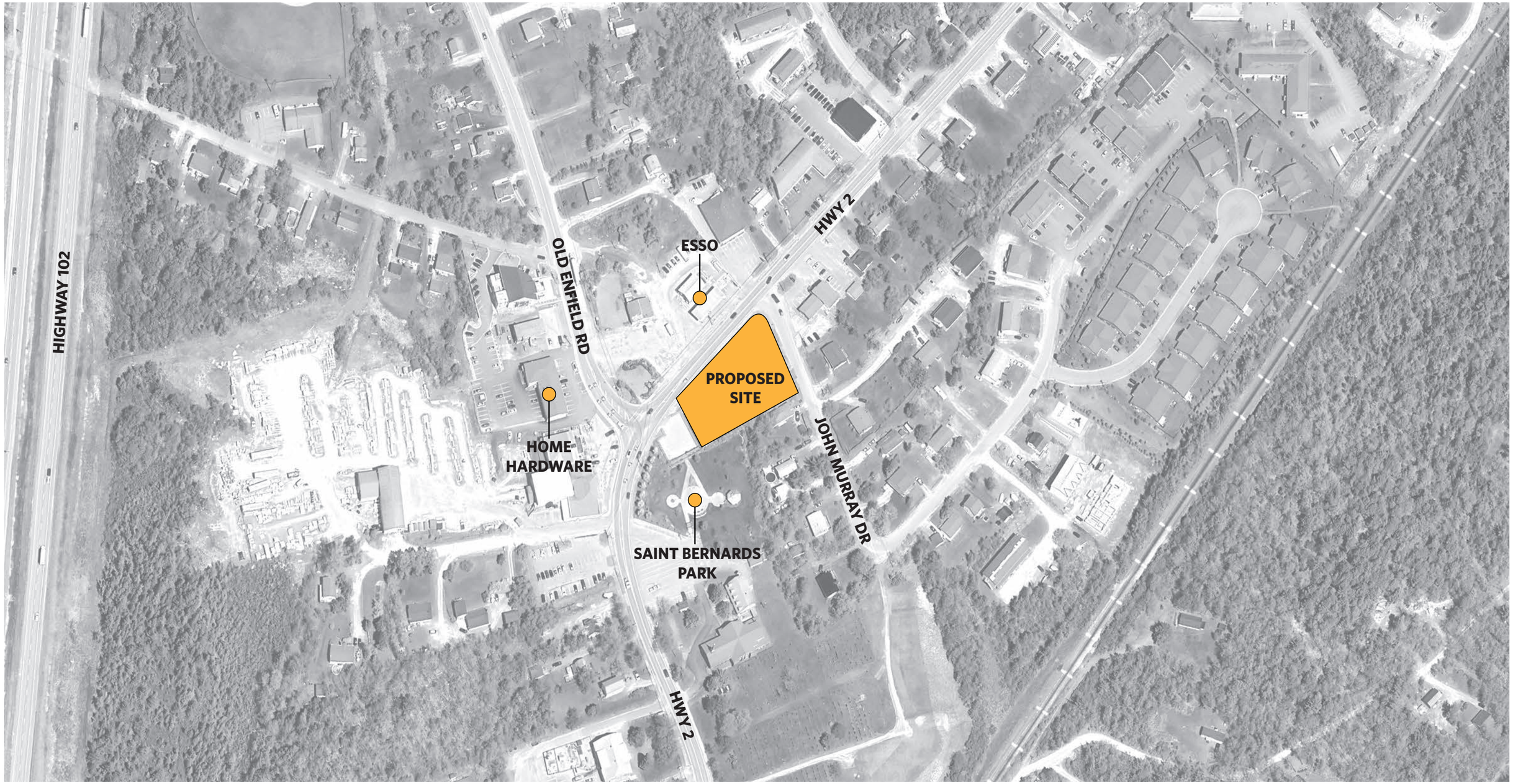
Accent concrete pavers with positive drainage away from the building are proposed in the highest profile area leading to and from the buildings new main entrance. Elsewhere, along the building perimeter and parking lot, simple, serviceable concrete sidewalks will lead people to and from the back of the new Fire hall, the parking lot, and maintain access to and from the nearby Saint Bernards Park.

SOFT LANDSCAPE

Care will be taken to ensure that no new planting will interfere with critical sight lines. The material will all be low maintenance and intended to provide year round interest. The introduction of more softscape at this location will be of benefit the new facility while also having a positive impact on the adjacent streetscape and local community. As noted above, this will be achieved most significantly by extending the avenue of street trees from Saint Bernards Park at the Old Enfield Road intersection and introducing varying shrubs, perennials, and small extents of lawn.

SITE FURNISHINGS

Site furnishings will be nominal due to site restrictions, however a high profile area will be reserved for the commemorative bench and plaque along with three flagpoles. Picnic tables and bike racks will be incorporated into the site plan at agreed locations, along with an enclosed waste bin area within the parking lot. The site will also require lighting and signage, and electric vehicle charging stations may also be incorporated into the plan if requested.



PROPOSED SITE PLAN

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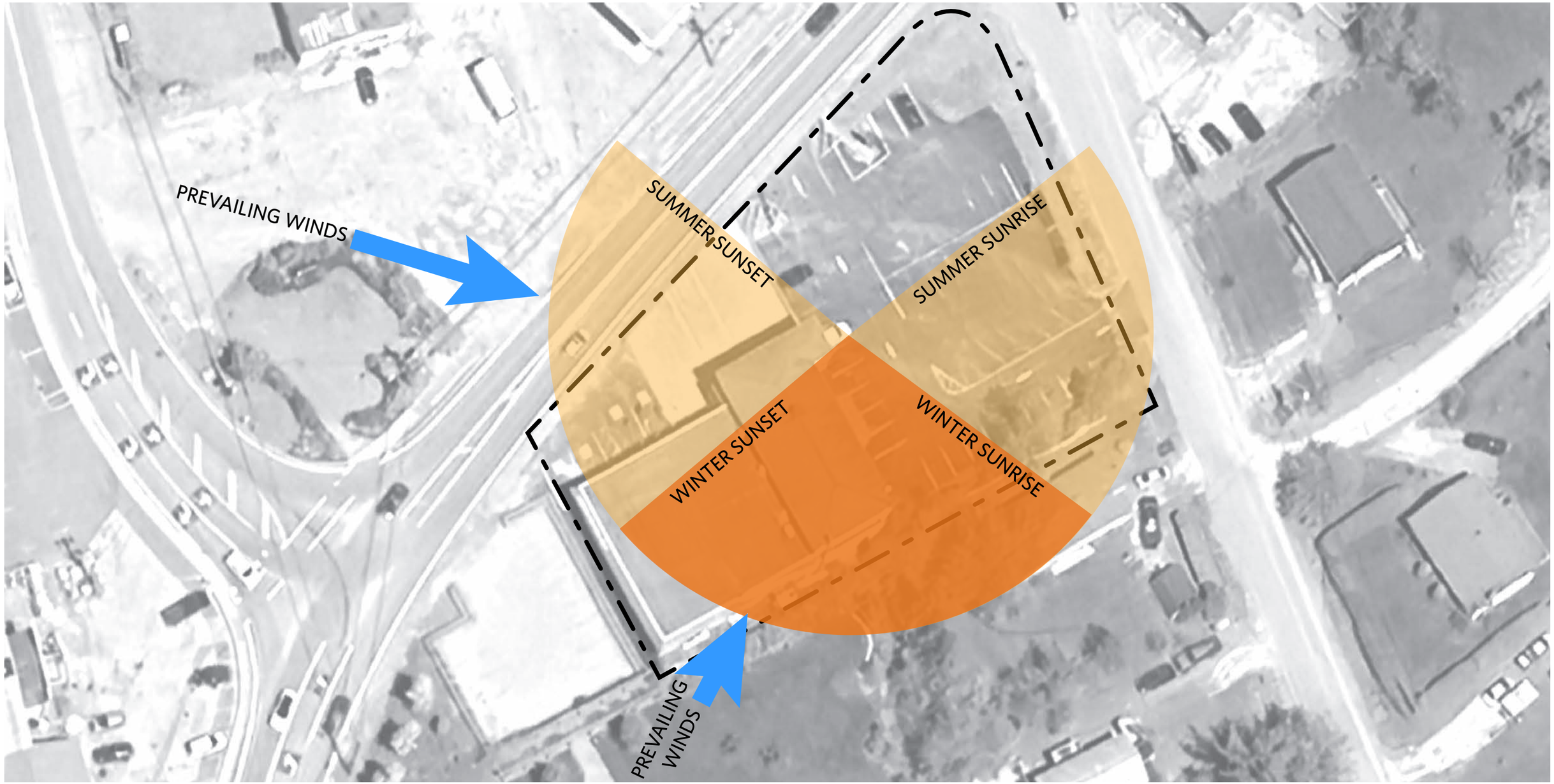

SUN DIAGRAM

Scale (m) 0 1 2 3 5 10 20

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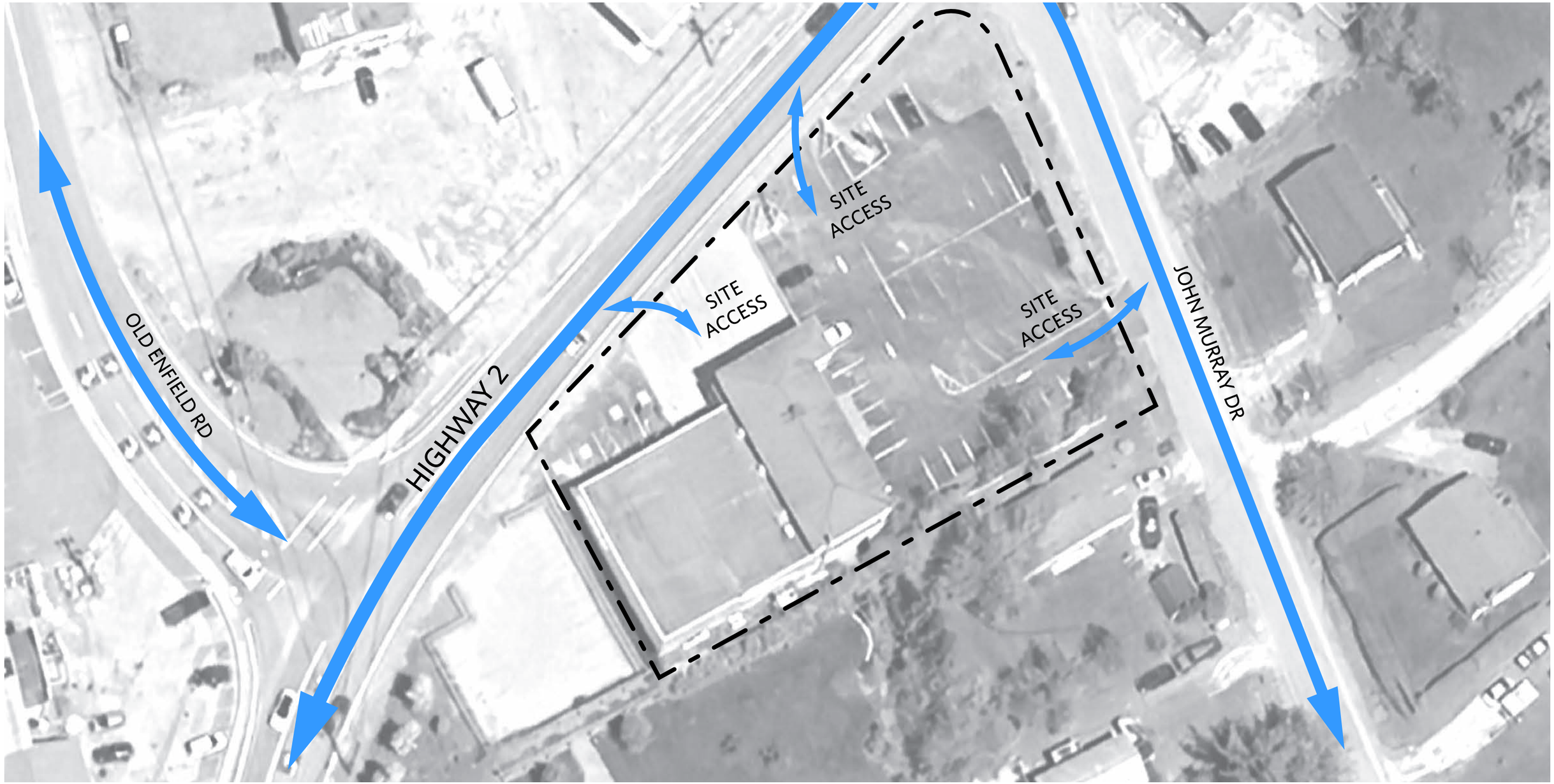
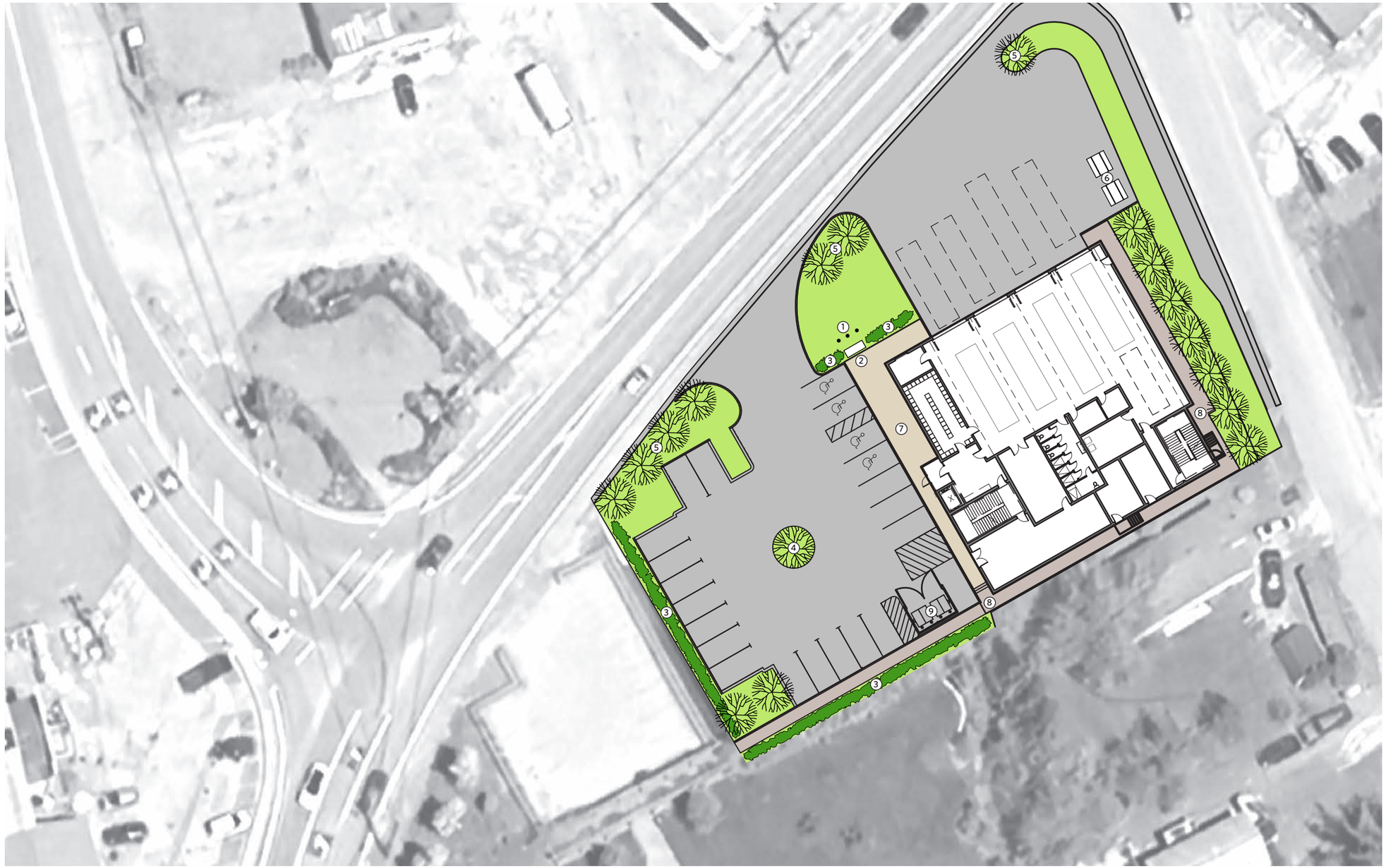


SITE CIRCULATION

Scale (m) 0 1 2 3 5 10 20

N



LEGEND:

1. FLAG POLES
2. BENCH
3. SHRUB PLANTING BED
4. CIRCULAR TRAFFIC ISLAND
5. EXTENSION OF STREET TREES
6. PICNIC TABLES
7. ACCENT UNIT PAVER SIDEWALK
8. CONCRETE SIDEWALK
9. GARBAGE ENCLOSURE

PROPOSED SITE PLAN IN CONTEXT

Scale (m) 0 1 2 3 5 10 20

N

STRUCTURAL

BUILDING CODE REQUIREMENTS

The Enfield Fire Station in Enfield will conform to the National Building Code of Canada (NBCC) requirements for a Post Disaster Importance Category Building. The building will conform to all related design criteria set out in the 2020 version of the NBCC.

Design requirements and design loads will be evaluated relative to the expected function of the specific structural element. Design requirements and loads contained in the NBCC will be increased where required to suit any specialized conditions and any construction phasing or sequencing conditions coordinated with the Construction Manager or General Contractor.

The structure will be designed to meet the requirements of CSA Standard S478, Guideline on Durability in Buildings for a Long-Life Category Design Service Life (50 to 99 years). This includes all primary structure and all secondary structure supporting cladding systems. Structural design will be undertaken using the Limit States approach in accordance with the National Building Code of Canada and applicable referenced standards. Ultimate Limit State (ULS) will be used for strength design; Serviceability Limit State (SLS) will be used for serviceability checks.

APPLICABLE CODES AND STANDARDS LIST

- National Building Code of Canada (NBCC v.2020)
- Design of Concrete Structures (CSA A23.3)
- Design of Steel Structures (CSA S16)
- Concrete Materials and Methods of Concrete Construction / Test Methods (CSA A23.1/2)
- Vibrations of Steel-Framed Structural Systems Due to Human Activity (ASIC Design Guide 11)
- Guideline on Durability in Buildings, CSA S478

BUILDING DESCRIPTION

The new fire station will be two floors tall with roof access. The ground floor will be primarily an apparatus bay with a high ceiling. The upper floor will be a community area /in house living with an outdoor patio. The roof will be a flat structure with tapered insulation and/or beams to allow for drainage. The structural systems and components will be designed as follows.

DIVISION 05 METALS

Non-combustible, structural steel frames will be provided for both vertical and lateral load-resistance systems. The steel roof structures will consist of minimum 38mm metal roof decking supported on either open webbed steel joists (OWSJ) or rolled steel framing members that, in turn, will be supported on structural steel columns and girders. All OWSJ and steel-to-steel connections will be designed and stamped by the steel fabricator and dimensional control of the roof truss geometry (vaulted ceilings, roof pitch, shape, etc.) shall be the responsibility of the architect. The floor structures above the main level will be similarly constructed of OWSJ or rolled steel framing for typical layouts. Composite floor slabs consisting of 89mm concrete slabs on 38mm composite metal decking will be provided at each floor level and be reinforced with a combination of shear studs for composite action and welded wire mesh (127mm overall thickness).

The lateral load resisting system will consist of a series of structural steel X-brace frames and structural steel moment frames integrated into the wall assemblies wherever possible. Openings through brace bays will need to be kept to a minimum so detailed coordination will be required between all disciplines. The roof decking and intermediate composite floor slabs will provide structural diaphragms to transfer lateral loads through the structural steel brace bays and down to the foundations.

Structural steel girts will be provided, wherever necessary, to support exterior cladding, frame large openings, and reduce the span of exterior wall studs. It is expected that the exterior walls along the building perimeter will consist of light-gauge steel studs or curtain wall for wind load resistance. The steel studs and curtain wall will be designed and stamped by the trade contractor's own professional engineer.

DIVISION 03 FOUNDATIONS

As noted in the geotechnical report prepared by Englobe on May 23, 2024, the foundations for the entire building will consist of shallow cast-in-place concrete spread and strip footings founded on either undisturbed soil or approved structural fill. The perimeter and exterior footings will require a minimum of 1200mm of soil cover for frost protection. The foundation wall at the rear of the building is required to resist lateral loads from surrounding soils and will be designed as cast-in-place reinforced concrete retaining walls based on parameters provided in the geotechnical report. All foundation drainage and insulation details will be specified in the architectural contract documents. Reinforced concrete pilasters will be provided, where necessary, to support structural steel columns.

DIVISION 03 CONCRETE SLABS-ON-GRADE

The slab-on-grade shall be a minimum 100mm thick cast-in-place concrete slab reinforced with welded wire mesh unless noted otherwise. In the apparatus bay, the slab-on-grade shall be a minimum 200 thick cast-in-place concrete slab reinforced with rebar. Under-slab thermal protection such as vapour barriers, insulation, etc. shall be specified by architectural and coordinated on the structural drawings.

The slab-on-grade will have isolation joints around columns to minimize plastic shrinkage cracks. The curing agent supplier shall provide written confirmation of compatibility with specified finish floor finishing materials. Where required, the slab-on-grade will be thickened and reinforced to accommodate areas of increased load such as large equipment locations or other areas of concentrated load. Floor slab surfaces requiring depressions or housekeeping pads to accommodate floor grates, freezers, equipment, etc. shall be detailed on the structural drawings in coordination with the architectural and mechanical drawings.

The precise size and location of all depressions, equipment pads, etc. will be provided on the architectural and/or mechanical drawings.

Any specialty concrete finish and/or floor flatness requirements shall be provided by the architect. The slab-on-grade will be constructed on a layer of free draining compacted granular material as per the recommendations noted in the geotechnical report. Any under-slab radon mitigation systems will require NSDTIR type C5 clear stone as a granular base where specified by mechanical. Additional concrete housekeeping pads shall be provided for floor mounted equipment in coordination with mechanical and electrical.

DESIGN LOADS

GRAVITY LOADS

The building will be designed for dead loads including the structures' self weight plus superimposed dead load. The superimposed dead loads will comply with the minimum superimposed dead load requirements in the NBCC as well as meet the project specific requirements.

Live loads will comply with the minimum live load requirements in the NBCC based on occupancy, as well as meet any project specific requirements.

SUPERIMPOSED DEAD LOADS AND LIVE LOADS

The total superimposed dead load (SDL) will include the minimum superimposed dead load components listed below:

- Roofs shall be designed for a specified uniform dead load of 1.0 kPa for roofing materials.
- Floor areas shall be designed for a minimum specified uniform superimposed dead load allowance for partitions of 1.0 kPa
- The underside of roofs shall be designed for a minimum specified uniform allowance for mechanical and electrical services of 0.30 kPa, except for roofs directly above mechanical or electrical equipment areas which shall be designed for a minimum load allowance of 1.0 kPa
- Floor and Ceiling Finish allowance of 0.25 kPa where applicable
- Allowance for Housekeeping Pads in mechanical areas of 2.5 kPa
- There is currently no allowance for green roofs or rooftop solar panels. Note: ballasted solar panel arrays are not permitted on post disaster buildings.

The following table summarizes the anticipated live loads (LL) for the buildings:

OCCUPANCY	LIVE LOADS (KPA)	MIN CONCENTRATED LIVE LOAD OVER A 750X750 AREA (KN)
All spaces unless noted otherwise	4.8	9
Resident's Rooms/apartments	1.9	9
Storage/stack areas	4.8	1.3 over 200x200mm Area
Mechanical/air handling rooms	7.2	1.3 over 200x200mm Area
Electrical/IT distribution rooms	2.4	9

SNOW LOADS

Design snow loads will be based on parameters recommended in the NBCC based on probabilities of being exceeded 1 in 50 years for strength and for serviceability. Additional snow accumulation from roof obstructions or high-to-low roofs will be considered. Post Disaster importance factors of 1.25 and 0.90 for ULS and SLS respectively shall be used.

For Enfield, the following snow load data will apply:

SR = 0.6 kPa, SS = 2.5 kPa

WIND LOADS

The design wind loads will be based on pressures and parameters recommended in the NBCC and used in the design of structural members for strength and deflections. This pressure represents reference velocity pressures on probabilities of being exceeded 1 in 50 years for strength and for serviceability. Post Disaster importance factors of 1.25 and 0.75 for ULS and SLS, respectively, shall be used.

For Enfield, the following wind load data will apply:

q50 = 0.58 kPa, q10 = 0.45 kPa

SEISMIC LOADS

The structure will be designed to withstand seismic forces assigned to a Post Disaster building category with an importance factor Ie= 1.5. Seismic data taken from the NBCC and used for design in Enfield is as follows:

Sa(0.2) = 0.21, Sa(0.5) = 0.158, Sa(1.0) = 0.0964, Sa(2.0) = 0.0497, Sa(5.0) = 0.0144, Sa(10) = 0.0051, PGA = 0.0923, PGV = 0.111. Seismic Site Class C is expected for determining seismic loads as determined by the geotechnical engineer.

LATERAL SOIL PRESSURE

Free standing retaining walls will be designed for active earth pressures and retaining/foundation walls that are part of the building will be designed for at-rest earth pressure unless noted otherwise.

SERVICEABILITY REQUIREMENTS

Serviceability requirements will be checked against the requirements specified in the NBCC and all other applicable reference standards including CSA Standards A23.3 Design of Concrete Structures, S16 Limit States Design of Steel Structures and O86 Engineering Design in Wood.

The structural systems will be designed to meet the following criteria unless noted otherwise:

VERTICAL DEFLECTIONS - SUSPENDED STRUCTURES

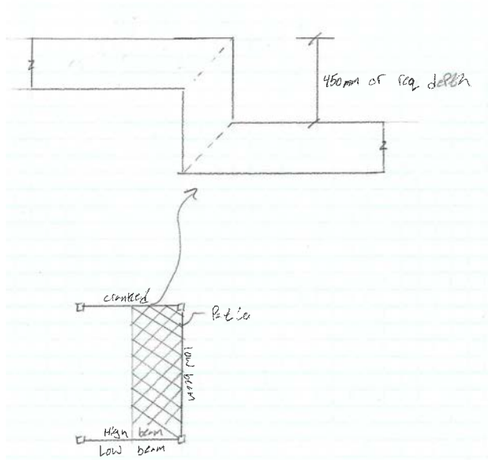
Structural systems will be designed to meet the following criteria unless noted otherwise:

Roof live load deflection	Span/240
Floor live load deflection	Span/360
Floor Total load deflection	Span/240

INTERSTOREY DRIFT

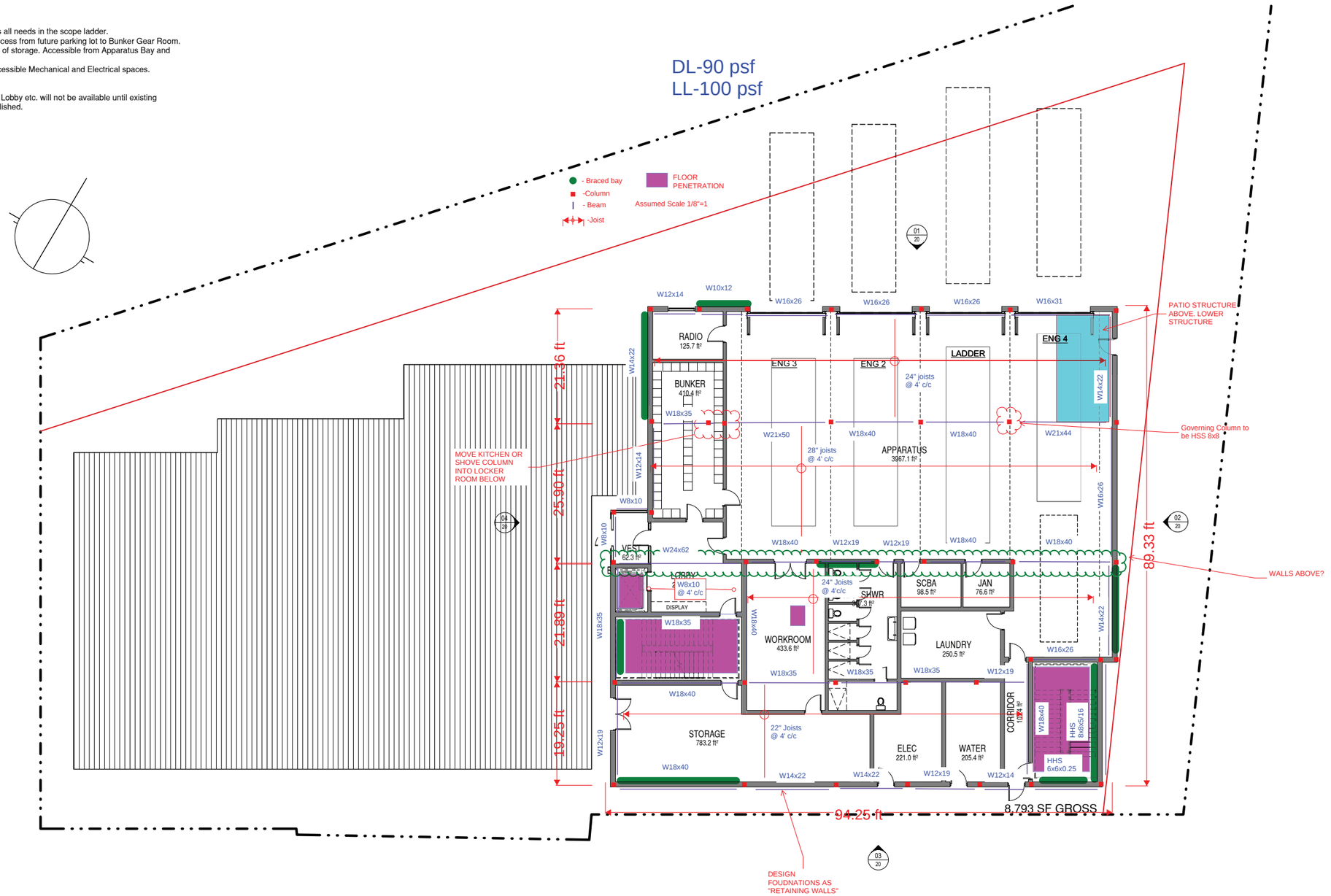
The Lateral force resisting system will be designed to meet the following criteria:

Wind Storey Drift	Height/500
Seismic Storey Drift	Height/100



PROS:
1. Building fulfills all needs in the scope ladder.
2. Good clear access from future parking lot to Bunker Gear Room.
3. Large amount of storage. Accessible from Apparatus Bay and Parking Lot.
4. Large and accessible Mechanical and Electrical spaces.

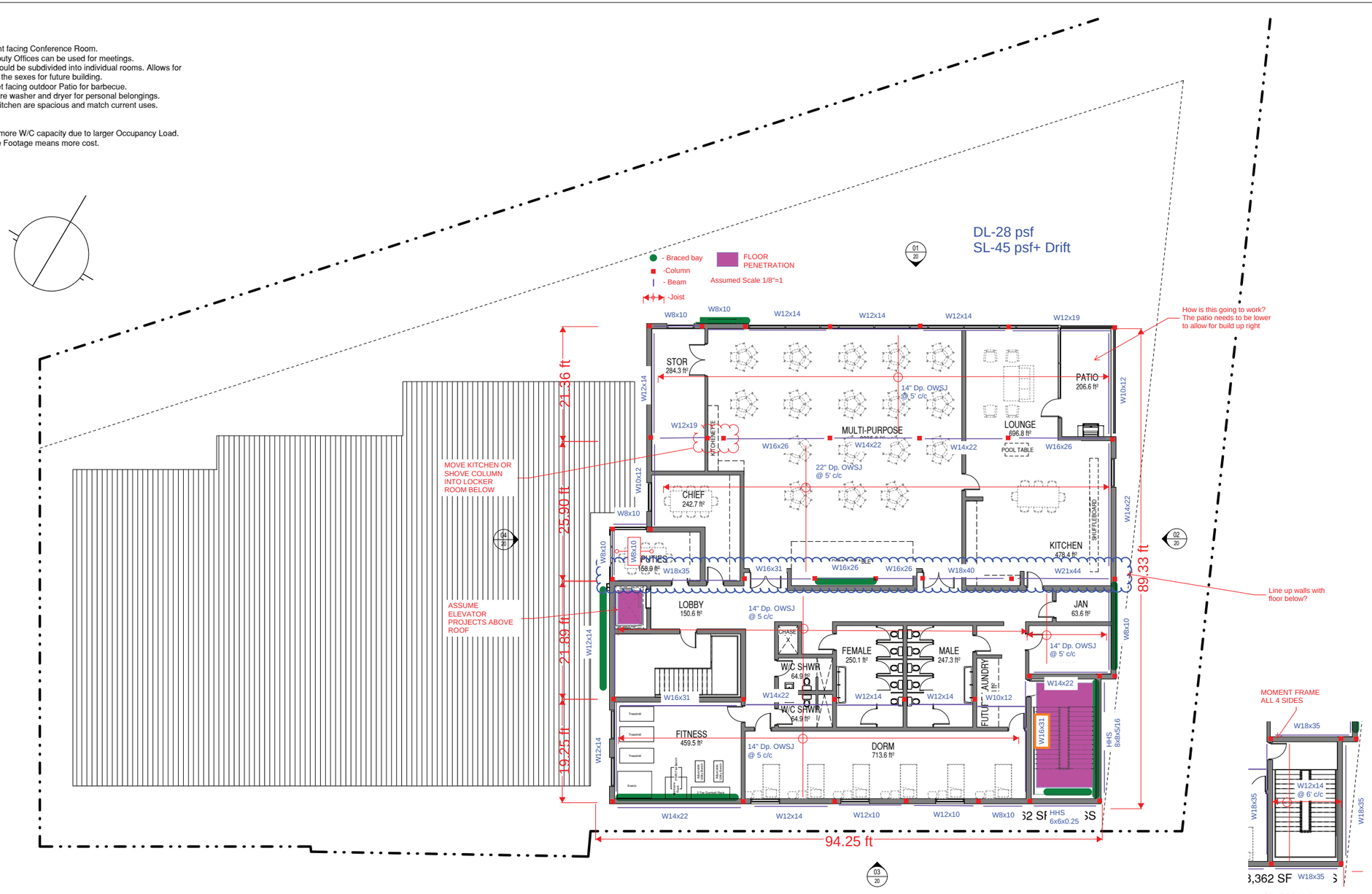
CONS:
1. Access to the Lobby etc. will not be available until existing building is demolished.



LEVEL ONE - OPTION 8
2024-10-21

PROS:
1. Large and front facing Conference Room.
2. Chief and Deputy Offices can be used for meetings.
3. Dorm Room could be subdivided into individual rooms. Allows for privacy between the sexes for future building.
4. Provides street facing outdoor Patio for barbecue.
5. Allows for future washer and dryer for personal belongings.
6. Lounge and Kitchen are spacious and match current uses.

CONS:
1. Necessity for more W/C capacity due to larger Occupancy Load.
2. Larger Square Footage means more cost.



LEVEL TWO- OPTION 8
2024-10-21

ARCHITECTURE | 49

MECHANICAL

The following section of the schematic design narrative provides a summary and introduction of the mechanical systems under consideration for a new firehall located at 273 Highway #2, Enfield, Nova Scotia. The types of mechanical systems envisaged for this facility include plumbing, heat-ing, mechanical cooling, ventilation, and controls. The systems have been determined from the conceptual floor plans received, perceived space and/or program requirements, and other written information received to date.

REFERENCE DOCUMENTS

Meet or exceed the requirements in the following documents:

- Nova Scotia Building Code Regulations 2020.
- National Building Code of Canada 2020.
- National Plumbing Code of Canada 2020.
- National Energy Code of Canada for Buildings 2020.
- National Fire Code of Canada 2020.
- The following standards/codes are referenced in the above codes:
    - NFPA 13 Installation of Sprinkler Systems.
    - NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
    - American Society of Heating, Refrigeration and Air Conditioning Engineers Handbooks.
    - ASHRAE 62.1 Ventilation for Acceptable Indoor Air Quality.
    - C22.1 Canadian Electrical Code Part 1.
    - SMACNA HVAC Duct Construction Standards – Metal and Flexible.
    - CSA B51 Boiler, Pressure Vessel and Pressure Piping Code.
    - CSA B52 Mechanical Refrigeration Code.

GENERAL

Radon piping from radon pits up through roof with offset below roof for future radon fan (if required).

Lead Free:

- In accordance with NSF/ANSI 372 Drinking water system components – Lead Content or California Health and Safety Code (Section 116875; commonly known as AB1953) or Vermont Bill S.152
- Lead free for all plumbing and heating valves, plumbing fixtures, plumbing fau-cets and entire plumbing water distribution.

Design Conditions:

- Inside temperature and humidity design conditions as per ASHRAE HVAC Ap-plication Handbook.
- Outside air volumes calculated in accordance with ASHRAE Standard 62 Venti-lation for Acceptable Indoor Air Quality.

ENERGY CONSERVATION MEASURES AND NET ZERO INITIATIVES

Water use reduction by selection of conserving fixtures.

- Water Closets 4.8 litre/flush.

The building will use electricity as the only energy source. Energy supply plant options currently being considered include:

- Air to water heat pumps with electric boilers as supplement and back up.
- Electric domestic hot water heaters. Heat pump water heaters will be considered.

Optimizing energy performance.

- Hydronic distribution systems designed with maximum water temperatures of 49°C (120°F) to increase the COP of heat pumps.
- Energy recovery devices recovering latent and sensible heat from the exhaust air where practical.
- Use of capture jet commercial kitchen range hoods to reduce exhaust require-ments.
- Variable Speed Pumps.
- Zoned HVAC by occupancy.

INSULATION

Entire storm drainage system insulated.

All domestic cold water pipe insulated as follows:

- 13 mm thick pipe insulation in NPS ½ runouts.
- 25 mm thick pipe insulation elsewhere.

Domestic hot water pipe and domestic hot water recirculation pipe insulated as per the National Energy Code of Canada for Buildings and as follows:

- 13 mm thick pipe insulation on NPS ½ vertical drops concealed in walls.
- 25 mm thick pipe insulation on NPS 4 and under.
- 38 mm thick pipe insulation on over NPS 4.

Hydronic pipe insulated as per The National Energy Code of Canada for Buildings and as follows:

- 25 mm thick pipe insulation on NPS 2 and under.
- 38 mm thick pipe insulation on NPS 2 ½ to NPS 3.

All Plumbing and hydronic pipe insulation to be rigid formed mineral fiber.

Refrigeration pipe insulation to be flexible elastomeric unicellular with aluminum jacket or weather barrier membrane for exterior piping.

Insulation covers for all valves over NPS 2 including control valves and strainers shall be removable cloth covered flexible insulation complete with metal clips.

Protection shields for cold insulated domestic water piping NPS 1 ½ and over.

Calcium silicate, Buckaroos or plastic stand-offs to be provided under all insulation protection shields.

All exposed insulation finished with ULC listed plain weave, 220 g/m2 canvas and 2 coats lagging adhesive.

PVC jacketing for elbows and fittings only.

Two 25 mm layers of duct insulation for outside air intakes to energy recovery ventilators.

One 25 mm layers of duct insulation for exhaust from energy recovery ventilators

One 25 mm layer of duct insulation for exhaust air ducting for 3 meters from ex-haust fan or louver except kitchen range hood exhaust duct.

One 25 mm layer of duct insulation for outside air for mechanical rooms and out-side air for electrical rooms.

One 25 mm layers of duct insulation for all supply air from units with mechanical cooling including supply air ductwork located in return air plenums.

Kitchen exhaust wrapped completely with fire blanket wrap.

SPRINKLER

Wet pipe sprinkler system throughout.

Sprinkler entrance equipped with a double check style back flow preventer.

Floor by floor zoning.

Supervised shut-off valves and electric supervisory flow switches will be provided for elevators and areas requiring zoning.

Wet chemical fire suppression systems will be provided for commercial kitchen hoods.

Pipe and Joints:

- Steel Pipe to ASTM A-53/A-135/A-795 Grade B.
- NPS 2 ad Smaller Pipe Joints:
    - Schedule 40: screwed, roll grooved couplings.
    - Schedule 10: Roll grooved couplings.
- NPS 2 ½ up to NPS 8 Pipe Joints:
    - Schedule 40: welded, flanged, roll grooved couplings.
    - Schedule 10: roll grooved couplings.

SOUND ATTENUATION & VIBRATION CONTROL

Silencers installed on the supply and return of packaged roof top units.

Acoustic flexible ductwork provided at each diffuser connection.

Acoustic flexible ductwork provided at each return air grille connection.

Air handling equipment to be internally isolated.

VALVING, THERMOMETERS, PRESSURE GAUGES AND DRAINS

Lead-free Quarter-turn (ball) shut-off valves (No Gate) for piping NPS 2 and small-er.

Quarter-turn butterfly and Gate shut-off valves over NPS 2.

Circuit balancing valves for each hydronic zone and each hydronic coil.

Drains from pumps, strainers and equipment terminating with hose end drain valves.

One magnetic strainer per hydronic system loop.

Pressure Gauges:

- Complete with mini ball valves as gauge cocks.
- At flanges of pumps / circulators over ½ hp.
- At domestic water entrance backflow preventer discharge.

Thermometers for hydronic and plumbing systems.

- At boiler headers.
- At heat pump supply and return.
- At each zone supply and return pipe.
- At discharge of programmed water control valves.

PLUMBING

Sanitary and Storm drainage will extend to municipal services.

Domestic water will be supplied from municipal services. The water entrance will include a meter and reduced pressure zone back flow preventer. The need for a domestic water boost-er pump will be determined one a flow test is undertaken.

Domestic hot water will be generated using electric resistance domestic hot water heaters. Consideration will be given to the application of heat pump water heaters.

Domestic hot water will be stored at 600 C (1400 F) and mixed to 490 C (1200 F) using a dig-ital master mixing valve.

In addition the plumbing system will include:

- For storm drainage below grade, PVC-SDR 35 or cast-iron pipe.
- For storm drainage above grade, cast iron pipe or PVC-DWV with flame spread not more than 25 and smoke developed classification not more than 50.
- For sanitary drainage below grade, PVC-DWV or cast-iron pipe.
- For sanitary drainage above grade Type DWV Copper, cast iron pipe or PVC-DWV with flame spread not more than 25 and smoke developed classification not more than 50.
- For sanitary serving Boiler Room, Cast Iron to CAN/CSA-B70.
- Reduced pressure zone backflow preventers on make up water feed to hydronic sys-tems.
- Domestic Hot, Cold and Recirculation Tubing, within Building: All solder joints to be lead free. Within 3 meters of domestic hot water tank, use brazed joints.
- Copper tube, hard drawn, Type L to ASTM B88.
    - NSP 2 and smaller joints: Solder/brazing: lead free to ASTM B32.Solder joint pressure fittings or Press Fit.
    - NPS 2 ½ and larger: Brazing: lead free to ASTM B32 Solder joint pressure fittings, Press Fit or Roll grooved couplings complete with EPDM flush seal gas-kets.
- Where rolled grooved couplings and fittings are used, they shall be of the same manu-facturer.
- Trap primer connections: Above grade, Hard Copper tubing as above. Below Grade, Soft type K copper and PEX pipe
- Valve all domestic water mains and domestic water branch lines.
- At domestic water branch isolation valves, provide drain unless branch can be drained through a fixture.
- Packaged Trap Seal Primers will be used to protect floor drains and will include: Elec-tronic solenoid valve with brass body, atmospheric vacuum breaker, inlet isolation valve, adjustable 24 hour timer, manual override switch and manifold with compression connections for copper tube connections, galvanized steel wall box, prime coated ac-cess door with Allen key lock. 120-volt single point power connection. All internal pip-ing to be copper. Valve and manifold inside enclosure.
- Self-draining non-freeze wall hydrants complete with backflow protection located so that any part of the exterior of the building may be reached with 30 meters of hose without having the hose across the entrance to the building.
- Institutional grade CSA approved plumbing fixtures and brass will be used throughout the building. Barrier free plumbing fixtures will be placed as per architectural drawings. Barrier free water closets selected with a dimension of 400 mm floor to rim.
- Sanitary for kitchen equipped with a grease interceptor.

HEATING PLANT

Hot water for perimeter heating will be generated using a split type Variable Refrigerant Flow (VRF) air to water heat pump with electric boilers for supplement and back up. The air to water heat pump outdoor unit(s) will be located on the roof due to site space constraints and will be connected to the refrigerant to water heat exchangers.

In addition, the hydronic heating system will include:

- Reverse return mains for each hydronic loop.
- The radiant floor heating loop will be equipped with programmed water.
- Distribution pumps will be variable speed with 100% standby.
- Chemical treatment will be provided for each closed loop piping system.
- Hydronic Pipe and Joints:
    - Steel Pipe to ASTM A-53 Grade B.
        - NSP 2 and smaller pipe joints:
            - Schedule 40: Screwed, roll grooved couplings, Viega Mega-Press.
        - NPS 2 ½ up to NPS 8 Pipe Joints:
            - Schedule 40: Welded, flanged roll grooved couplings.
    - Copper Tube: Type L hard drawn to ASTM B88M.
        - NSP 2 and smaller pipe joints:
            - Solder/brazing: lead free to ASTM B32.
            - Solder joint pressure fittings or Press Fit

HVAC DISTRIBUTION AND ZONE SUMMARY

All spaces throughout the building will be mechanically ventilated. The systems will use ful-ly ducted supply, return and exhaust ductwork constructed in accordance with ASHRAE Standards and SMACNA Standards. All ductwork will be sealed. Return air plenums will be considered where practical.

In general the ventilation system will include:

- Diffuser selected to deliver the air to the occupied zone.
- Ceiling or wall mounted return register in each space.
- Branch supply, return and exhaust ducts volume dampers.
- Branch ducts to supply diffusers to have flexible acoustic duct except where duct is ex-posed.
- Duct silencers provided in the ducts at supply and return of roof top units. (No interior lined ductwork).
- Dedicated Split system conditioning units serving main communication room.

It is envisaged that the building HVAC zones will be as follows. Refer to figure M-1 and M-2.

ZONE 1

- This zone will not incorporate mechanical cooling.
- Perimeter heating will be provided by hydronic radiant in-floor heating supplied from the air to water heat pump plant.
- A dedicated rail mounted source capture exhaust system will be provided for the each fire truck. The system will be selected in collaboration with the client.
- Emergency ventilation for control of CO2 and NO2 will be provided by an outside air intake and exhaust fan controlled from a gas detection system. Space pressurization will be negative relative to other spaces.
- Outside air will be used for cooling the SCBA compressor room with a dedicated ex-haust fan for heat removal.

ZONE 2

- This zone will not incorporate mechanical cooling.
- Space heating provided by in-floor radiant heat supplied from the air to water heat pump plant.
- A dedicated Energy Recovery Ventilator (ERV) with electric reheat will be provided for laundry and washroom/shower room and Janitor Room.

ZONE 3

- Option 1:
    - Mechanical cooling will provided for all spaces in this zone.
    - Perimeter heating will be provided by hydronic radiant in-floor heating supplied from the air to water heat pump plant.
    - Mechanical ventilation provided by a packaged energy recovery ventilator (ERV) with enthalpy recovery core, MERV 13 filters and electric air tempering coil.
    - Mechanical cooling provided by variable refrigerant flow (VRF) split air conditioning units with fan coil for each cooling zone. Outside air will be ducted from the ERV to each fan coil unit. Option 1:
    - Mechanical cooling will provided for all spaces in this zone.
- Option 2 (to be further explored):
    - Mechanical cooling will be provided for all spaces in this zone.
    - Perimeter heating and mechanical cooling provided by distributed air to water heat pumps piped to a common distribution loop. The distribution loop to receive/reject heat to the air to water heat pump plant.
    - Mechanical ventilation provided by a packaged energy recovery ventilator (ERV) with enthalpy recovery core and MERV 13 filters and electric air tempering coil.
- Option 3 (to be further explored):
    - Mechanical cooling will be provided for all spaces in this zone.
    - Perimeter heating and mechanical cooling provided by distributed four pipe fan coils supplied from hot water and chilled water distribution mains. Hot water and chilled wa-ter generated by the air to water heat pump plant.
    - Mechanical ventilation provided by a packaged energy recovery ventilator (ERV) with enthalpy recovery core and MERV 13 filters and electric air tempering coil.

ZONE 4

- Option 1:
    - Perimeter heating provided by a combination of in-floor radiant heating and low tem-perature radiation supplied from the heating plant.
    - Mechanical cooling and ventilation provided by a packaged roof top unit with DX cool-ing, VAV terminal for each zone with electric reheat. Outdoor air volumes reset to main-tain zone CO2 levels.
    - Use of a return air plenum will be explored for this zone.
    - Exhaust for the washrooms provided by a dedicated exhaust fan. The use of a packaged energy recovery ventilator with enthalpy recovery core, MERV 13 filters and coupled with the packaged roof top unit will be explored.
- Option 2 (to be further explored):
    - Mechanical cooling will be provided for all spaces in this zone.
    - Perimeter heating and mechanical cooling provided by distributed air to water heat pumps piped to a common distribution loop. The distribution loop to receive/reject heat to the air to water heat pump plant.
    - Mechanical ventilation provided by a packaged energy recovery ventilator (ERV) with enthalpy recovery core, MERV 13 filters and electric air tempering coil.

    - Use of return air plenums will be explored for this zone.
    - Mechanical cooling will be provided for all spaces in this zone.
- Option 3 (to be further explored):
    - Mechanical cooling will be provided for all spaces in this zone.
    - Perimeter heating and mechanical cooling provided by distributed four pipe fan coils supplied from hot water and chilled water distribution mains. Hot water and chilled wa-ter generated by the air to water heat pump plant.
    - Mechanical ventilation provided by a packaged energy recovery ventilator (ERV) with enthalpy recovery core and MERV 13 filters and electric air tempering coil.

ZONE 5

- Mechanical cooling, space heating and mechanical ventilation will be provided by a packaged DX roof unit heat pump unit with electric resistance back up. The unit will in-corporate MERV 13 filters. Outdoor air volumes reset to maintain zone CO2 levels.
- Use of return air plenums will be explored for this zone.

ZONE 6

- Mechanical cooling, space heating and mechanical ventilation will be provided by a packaged DX roof unit heat pump unit with electric resistance back up. The unit will in-corporate MERV 13 filters. Outdoor air volumes reset to maintain zone CO2 levels and to provide adequate make up air for the kitchen exhaust hood.
- NFPA 96 compliant kitchen hood(s) for the lounge with Welded steel duct etc. and ex-haust fan all in accordance with NFPA-96.

CONTROLS

- Native BACnet system Building Automation System (BAS) throughout project.
- Individual room control with room temperature sensor.
- Programmed heating schedule reset based on outside air and space requiring most heat.
- CO2/NO2 gas detection system controlling the ventilation systems for the Apparatus Bay.
- Concealed wiring support every 900 mm.
    - Where FT6 jacket is used, jacket to be white. Where FT4 jacket is used, jacket to be yellow.
    - All FT6 jacket wire to be rated at 300 volts. All FT4 jacket wire to be rated at 600 volts.
    - All FT6 jacket wire to bear the following labels: CSA, 300 volts and FT6. All FT4 jacket wire to bear to bear the following labels: CSA, 600 volts and FT4.
    - Control wiring to 600 volt starters to be FT4 in conduit.
    - Control wiring in conduit may be FT4.
    - All other control wiring to be FT6.

FIGURE M-1 LEVEL 1 HVAC SYSTEM ZONES

FIGURE M-2 LEVEL2 HVAC SYSTEM ZONES

ELECTRICAL

The following section of the schematic design narrative provides a summary and introduction of the electrical systems under consideration for a new firehall located at 273 Highway #2, Enfield, Nova Scotia. The electrical systems for this facility will include lighting systems, normal power distribution system, Standby power distribution system, fire alarm system, intrusion alarm system, video surveillance system, access control system, structured wiring system, fire station alerting and public address system. Types of systems envisaged have been determined from the conceptual floor plans, perceived space and/or program requirements, and other written information received to date.

REFERENCE DOCUMENTS

- RFP Document EVFD – Prime Design Consultant RFP (3.0).
- Nova Scotia Building Code Regulations.
- National Building Code of Canada (NBCC).
- National Energy Code of Canada for Buildings (NECB).
- Canadian Electrical Code, Part 1 C22.1.21 (CEC).
- National Fire Code of Canada (NFC).
- ANSI/TIA/EIA-568-C.0, Generic Telecommunications Cabling for Customer Premises.
- ANSI/TIA-569-B - Commercial Building Standard for Telecommunications Pathways and Spaces.
- ICSI/TDMM - Telecommunications Distribution Methods Manual (15th edition).
- TIA-607C Generic Telecommunications Bonding and Grounding for Customer Premises.
- IESNA Standards.
- CAN/ULC – S524, Standard for Installation of Fire Alarm Systems.
- CAN/ULC -S537 Standard for Verification of Fire Alarm Systems.
- U.S. -DOE 2016; Canada - NRCan 2019 Minimum Efficiency Values for Dry-Type Transformers.
- CSA-C860-11 Performance of Internally Lighted Exit Signs.
- CSA C282:19 - Emergency Electrical Power Supply for Buildings.
- NFPA 1221 - Standard on Installation, Maintenance, and Use of Emergency Services Communications Systems.
- Nova Scotia Power Inc. Utility Service Requirements 2023 Edition (NSPI).

POST DISASTER BUILDING

Portions of this building are required to be designed as a Post Disaster building as defined in the NBCC.

Seismic-restraint devices will be employed in these areas to accommodate differential seismic motion across building expansion/seismic joints to all electrical equipment and raceways.

ELECTRICAL SERVICE ENTRANCE

Power will be supplied to the building by an underground electrical service entrance at either 120/208 volt, three phase, 4-wire or 347/600 volt, three phase, 4-wire in accordance with NSPI requirements.

Underground duct bank and primary cables to a utility pad mount, step down transformer.

Underground secondary from utility pad mount transformer or service pole to a dedicated main electrical room.

COMMUNICATIONS SERVICE ENTRANCE

Underground communications service will enter the building from underground and will terminate in the Communication Room located on Level.

ELECTRICAL POWER DISTRIBUTION SYSTEM

NORMAL POWER DISTRIBUTION SYSTEM

Main service entrance switchboard will be free standing and will consist of a bussed incoming wireway, main overcurrent device with LSI trip unit, utility metering compartment and distribution section with bolt-on circuit breaker assemblies. An integral Surge Protective Device (SPD) will be provided. A Customer's digital meter will be provided which will include communications capabilities with an Ethernet TCP/IP connection and will provide a digital display for power, energy, demand and power quality.

Transformers of the dry core open-ventilated type with copper windings, minimum K-rating of 13, will be utilized to provide power for receptacles and miscellaneous loads. Equipment will comply with CSA C802.2 Minimum Efficiency Values for Dry-Type Transformers and NRCAN 2019.

Distribution panelboards will include tin plated copper bus bars, bonding terminal strip and bolt-on circuit breaker assemblies. Panelboards will be fully rated to withstand the voltage and available fault current at their terminals at the installed location in the distribution system. Panel tubs housing mains rated up to 225 amps will be a nominal 20 inches wide and 6 inches deep. Panelboard tubs housing mains rated greater than 225 amps will be a nominal 38 inches wide and 11 inches deep.

Motor Control Centres (MCCs) will be provided in each mechanical room (where required) to start/stop mechanical equipment. MCCs will be of freestanding construction and will be three phases, four wire (neutral conductor included to each MCC). Motors of one-half horsepower and above will be three phases. Solid-state, single-phase protection will be provided. MCCs will be factory supplied with current sensors and control relays installed and wired to a terminal strip to allow for interfacing with the Building Automation System (BAS).

Where mechanical equipment is fed from Variable Frequency Drives (VFDs), drive-rated cable will be utilized.

Drip hoods will be provided on all ventilated distribution equipment located within a sprinklered area.

An on-line, double conversion Uninterruptible Power Supply (UPS) will be provided connected to a branch circuit panelboard which in turn will feed the equipment in the main Communications/Server room. The UPS will be equipped with a wrap-around maintenance bypass switch and will be designed to operate for 10 minutes during a power outage. This will provide "ride-thru" power until the generator is on-line.

Electrical rooms, transformers and main power feeders will be located and routed in such a manner as to reduce the potential exposure to EMF radiation.

A computer simulation of the power distribution system will be carried out to provide the following:

- Fault levels at each system bus.
- Coordination analysis for overcurrent devices.
- Arc flash hazard analysis to determine incident energy values at each system bus.

Electrical Vehicle Charging Stations (EVCS)

- Consideration will be given to providing electrical infrastructure and adequate spare capacity to accommodate the future installation of electric vehicle chargers for the fire apparatus' in the apparatus bays and for public or fleet vehicles in the parking lot. This will be discussed further as the design progresses.

STANDBY POWER DISTRIBUTION SYSTEM

The building will be equipped with a Standby generator to supply power to the facility during a utility interruption. The generator will be fueled by diesel.

The generating system will include a sound attenuated, weatherproof enclosure equipped with a critical silencer.

The generator will connect to an Automatic Transfer Switch (ATS) which will transfer the normal building power system to the generator when utility power is unavailable. The ATS will be equipped with a Bypass/Isolation feature.

PHOTOVOLTAIC (PV) POWER DISTRIBUTION SYSTEM

Consideration will be given to providing a rooftop photo-voltaic array to offset building electrical energy consumption. The array could be included as part of the building design or the space for future solar equipment and rooftop readiness to accept a future installation could be provisioned. This will be discussed further as the design progresses.

The system can be designed around a three phase, 208V or 600V, grid-tied type photovoltaic (PV) system c/w PV panels,

inverters, AC junction boxes, disconnect switches, trunk cables, mounting system, hardware and standoffs, electrical junction boxes, wiring and conduit, communications devices and associated cables and connectors, grounding and bonding, labeling and identification.

The solar power generated by the array would be connected to the building power distribution system.

The building would be equipped with a bi-directional utility meter which will record energy consumed by the building and energy generated by the building and exported to the NSPI grid.

LIGHTING SYSTEM

For each room or area, the lighting system will be designed to provide maintained uniform lighting levels as per IES recommended standards.

A general lighting system will be provided consisting of energy efficient luminaries complete with an LED light source and with dimming capabilities.

The Apparatus Bay lighting system will consist of high output, impact resistant, wet location rated luminaires.

The lighting control system will generally consist of 120-volt equipment including relay panels, room controllers and standalone line voltage devices. Controls will be local dimmers, switches, occupancy sensors and photo sensors as mandated by the NECB. General areas and transition spaces will be complete with automatic time of day operation and complete with manual overrides in a central, controlled location.

Exterior lighting will be entirely LED luminaires. Luminaires will have zero uplight to minimize wasted light output and minimal glare to provide a quality of light that will maximize occupant safety and security. Exterior LED lighting will be zoned to allow various control strategies and will be switched via the Building Automation System (BAS).

EMERGENCY LIGHTING

Emergency lighting will be provided throughout the building as required by the National Building Code.

Emergency lighting will generally consist of battery packs and remote emergency LED lighting heads.

EXIT LIGHTING

A system of exit lighting will be provided in accordance with the National Building Code.

Exit lights will be LED based, Pictogram style and will be specified to comply with CSA-C860, Performance of Internally Lighted Exit Signs.

Exit lights will be self-powered and fed from a dedicated exit light circuit.

FIRE STATION ALERTING AND PUBLIC ADDRESS SYSTEM

The alerting system will use VHF two-tone paging which will activate an alert box in the fire station and a radio message will be broadcast by the dispatcher over the public address system in the fire station.

The Public Address (PA) System will be rack mounted installed in an enclosure in the main communications room with input/output to fire station PA devices.

A rack mounted UPS power supply will be provided and dedicated to this system.

A Telephone system interface will be provided.

The PA system will include the following:

- Speakers in each area of the fire station with field adjustable output to comfortable sound levels to suit the room, low profile mounting, and wide frequency response range.
- Amplified-voice communications with speakers.
- Auxiliary audio interface input.
- Local intercom (paging) from fire station phone system.

BUILDING SECURITY SYSTEMS

INTRUSION DETECTION SYSTEM (IDS)

A complete intrusion detection system will be provided and will be integrated with the Access Control System (ACS).

The Intrusion Detection System (IDS) will consist of components, hardware, controls, software, firmware, wire and conduits for a complete operating system that restricts unauthorized entry through entry/exit points at this site.

The system will include sirens and strobe lights to provide audible and visible indication of an alarm.

ACCESS CONTROL SYSTEM (ACS)

A complete Access Control system will be provided in areas designated from the risk assessment analysis to restrict unwanted entry of not validated persons and will be integrated with the Intrusion Alarm System.

System to include door access control panels, door contacts, proximity card readers, proximity cards, request-to-exit devices, power supplies, security management and reporting software and electrically operated door locking hardware (Hardware by Division 8).

The ACS will connect seamlessly to the Intrusion Alarm System (IAS).

VIDEO SURVEILLANCE SYSTEM

Consideration will be given to designing a complete Video Surveillance System (VSS) or providing electrical infrastructure to accommodate future installation.

The Video Surveillance System (VSS) would consist of an IP based system with closed circuit cameras, PoE+ switches, High-Definition Network Video Recorder Server, hardware, controls, software, wire and conduit that enables continuous video recording, observing or monitoring of activities in the building / on the property.

FIRE ALARM SYSTEM

A complete fire alarm system will be provided to suit building layout.

System to be in accordance with the National Building Code and be designed around a single stage, fully supervised, analog, addressable, multiplexed microprocessor system.

Signaling devices shall include both audible and visual appliances.

The fire alarm control panel will be located in the Communications Room.

System will include a remote LCD annunciator located in the main entrance vestibule.

A separate conduit system will be provided for initiating circuits and signaling circuits. Wiring for initiating devices will be run unbroken from device to device (no T-taps).

The fire alarm system will be connected to a Digital ULC Alarm Dual Technology Communicator to annunciate an alarm, supervisory or trouble condition remotely.

The fire alarm system will be verified to the requirements on CAN/ULCS537.

STRUCTURED CABLING SYSTEM

A complete structured cabling system will be provided to carry voice and data as required.

System shall include equipment racks, patch panels, patch cords, Category 6 UTP horizontal cables, voice backbone cabling, fibre optic data backbone cabling, copper data backbone cabling, information outlets and faceplates, etc.

Voice and Data connections will be provided in locations as required to suit building layout and Owner's requirements.

Cables and data outlets will be provided to permit the installation of wireless access points throughout the facility.

IDENTIFICATION

All junction and pull boxes will be color coded, both inside and outside to indicate voltage and system type. Standard color codes will be used.

All conduit couplings will be color coded to indicate function.

All electrical equipment enclosures will be supplied with a lamicoid plate.

All electrical devices and equipment in concealed ceiling spaces shall be identified with two (2) lamicoid plates, one on the above ceiling device and one on the ceiling below.

Conductors will be colour coded to indicate phase, neutral, bond and ground.

Each conductor will be identified using self-laminating write-on labels.

All receptacles will be identified using lamicoid plates. Each receptacle fed from a GFCI circuit breaker will be identified on the respective lamicoid plate.

All communications outlets will be identified using lamicoid plates.

Each device or piece of equipment connected to the building electrical distribution system will be equipped with a lamicoid identification plate indicating voltage source.

All fire alarm system device addresses will be identified using lamicoid plates.

All exit and emergency lighting equipment will be identified using lamicoid plates.

.Each bonding and grounding conductor will be provided with a lamicoid identification plate at each termination point at all ground bars.

BUILDING WIRE

All feeder and branch circuit conductors will be stranded, soft drawn copper, with RW90 XLPE insulation rated for a minimum of 600 VAC.

All phase conductors sized from #12 AWG up to and including #2 AWG to have appropriate coloured insulation (red, black & blue).

All neutral, grounds and/or bond conductors sized #12 AWG up to and including #3/0 AWG to have appropriate coloured insulation (white or green).

Bonding and grounding conductors will be copper.

Voltage drop at the point of utilization shall not exceed 5% of voltage at the supply side of the main breaker and 3% between the point of utilization and the originating branch circuit or feeder panel.

WIRING METHODS

Armoured cable will be used:

- For general branch circuit wiring drops, where not exposed.
- For individual drops from junction boxes to lighting fixtures.

All feeder circuit conductors are to be installed in EMT, with a separate green minimum sized #12 AWG bonding conductor in each conduit run.

All home run wiring will be installed in a conduit system. No armoured cable will originate from a branch circuit wiring panel.

Liquid seal flexible metal conduit shall be used for connections to all motors, sprinkler system devices and vibrating equipment.

Fire barrier material will be used when penetrating a wall, floor, or ceiling with a fire resistance rating.

GROUNDING AND BONDING SYSTEM

Main service entrance board shall have the neutral and ground bars connected to the electrical system ground.

The Main Communication Room will be equipped with a primary bonding busbar (PBB), electrically connected to the main service entrance ground bar, mounted on isolated supports.

A bonding conductor will be extended from the electrical room ground bar to the following systems:

- Metallic water distribution system.
- Metallic wastewater system.
- Sprinkler system.
- Gas distribution system.

Dry core transformers shall have a system grounding conductor connected to the Xo terminal and extended back to the building electrical system ground.

All panel feeders will contain a bonding conductor, sized to the requirements of CEC Table 16.

ELECTRICAL SYSTEMS TESTING AND VERIFICATION

All electrical systems installed on this project will be tested and verified by the Electrical Contractor. Manufactured systems or components shall be commissioned by factory trained technicians representing the manufacturer, in the presence of the Owner's designated representatives, and under the direction of the electrical contractor.

The electrical contractor will provide assistance to the Owner's representatives and ensure that the manufacturer's representative is on site during functional performance testing (FPT).

Tests shall be performed by qualified electricians or technicians as required by the nature and complexity of the test.

2 DRAFT IMPLEMENTATION PLAN

EVFD Project Schedule			Jun 2024		July 2024					August 2024				September 2024				October 2024					November 2024			
Project Schedule			W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24
	Task																									
	Bi weekly meetings with project team																									
	FUNCTIONAL PR0GRAMMING																									
	Startup	11-Jun																								
	Program Review with Colliers and EVFD	26-Jun																								
	Preliminary Functional Program Submission	02-Jul																								
	Client Review Meeting	16-Jul																								
	Program/Preliminary Floor Plan Update	23-Jul																								
	Class D Estimate	20-Aug																								
	Project On Hold																									
	Programming Meeting	18-Sep																								
	Further Design Excersise	09-Oct																								
	Review of Full Build Out Drawings	30-Oct																								
	Project On Hold																									
	Project Start Up	27-Nov																								
	Approval to move forward with Class D based on Full Build Out	02-Dec																								
	Class D Estimate (take 2)	23-Dec																								
	SCHEMATIC DESIGN																									
	Startup	06-Jan																								
	Coordination with Consultants- Drawing Development	Jan 06- Jan 20																								
	SD Meeting #1	22-Jan																								
	SD Submission	05-Feb																								
	SD Hall Planning Review Meeting	10-Feb																								
	Class C Estimate	04-Mar																								
	SD Hall Planning Signoff	07-Mar																								
	Group Membership SD Presentation	10-Mar																								
	Permit Submission	12-Mar																								
	DESIGN DEVELOPMENT																									
	Startup	18-Mar																								
	Security and Communication Review Meeting	28-Mar																								
	Site Design Review Meeting	07-Apr																								
	Meeting with the Fire Marshall	11-Apr																								
	DD Submission	29-Apr																								
	DD Hall Planning Review Meeting	01-May																								
	Class B Estimate	22-May																								
	DD Hall Planning Signoff	30-May																								
	Group Membership DD Presentation	03-Jun																								
	CONSTRUCTION DOCUMENTS																									
	Startup	09-Jun																								
	Hardware Meeting	23-Jun																								
	66% Submission	11-Jul																								
	Hall Planning Signoff	25-Jul																								
	Group Membership Presentation	28-Jul																								
	95% Submission	01-Sep																								
	Class A Estimate	22-Sep																								
	Hall Planning Signoff	06-Oct																								
	Pre-Tender Report (100%)	20-Oct																								
	Tender Approval	27-Oct																								
	Group Membership Tender Presentation	03-Nov																								
	BIDDING PHASE																									
	Issue Tender Documents	04-Nov																								
	Tender Close	04-Dec																								
	Tender Award	18-Dec																								
	CONSTRUCTION ADMINISTRATION																									
	Mobilization	12-Jan																								
	Substantial Completion	March 2027																								
	Flushout	June 2027																								
	Final Completion	July 2027																								
	Existing Building Demolition	July 2027																								
	Warranty	March 2028																								

	Submissions / Review Deadines
	Meetings
	Work Progress

2024-12-03

EVFD Project Schedule		December 2024				January 2025					Febraury 2025				March 2025				April 2025				May 2025					June 2025				July 2025					August 2025			
Project Schedule		W25	W26	W27		W28	W29	W30	W31	W32	W33	W34	W35	W36	W37	W38	W39	W40	W41	W42	W43	W44	W45	W46	W47	W48	W49	W50	W51	W52	W53	W54	W55	W56	W57	W58	W59	W60	W61	W62
	Task																																							
	Bi weekly meetings with project team																																							
	FUNCTIONAL PROGRAMMING																																							
	Startup																																							
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2024-12-03

EVFD Project Schedule		August 2025				Semptember 2025					October 2025					November 2025				December 2025					
Project Schedule		W59	W60	W61	W62	W63	W64	W65	W66	W67	W68	W69	W70	W71	W72	W73	W74	W75	W76	W77	W78	W79	W80	W81	
	Task																								
	Bi weekly meetings with project team																								
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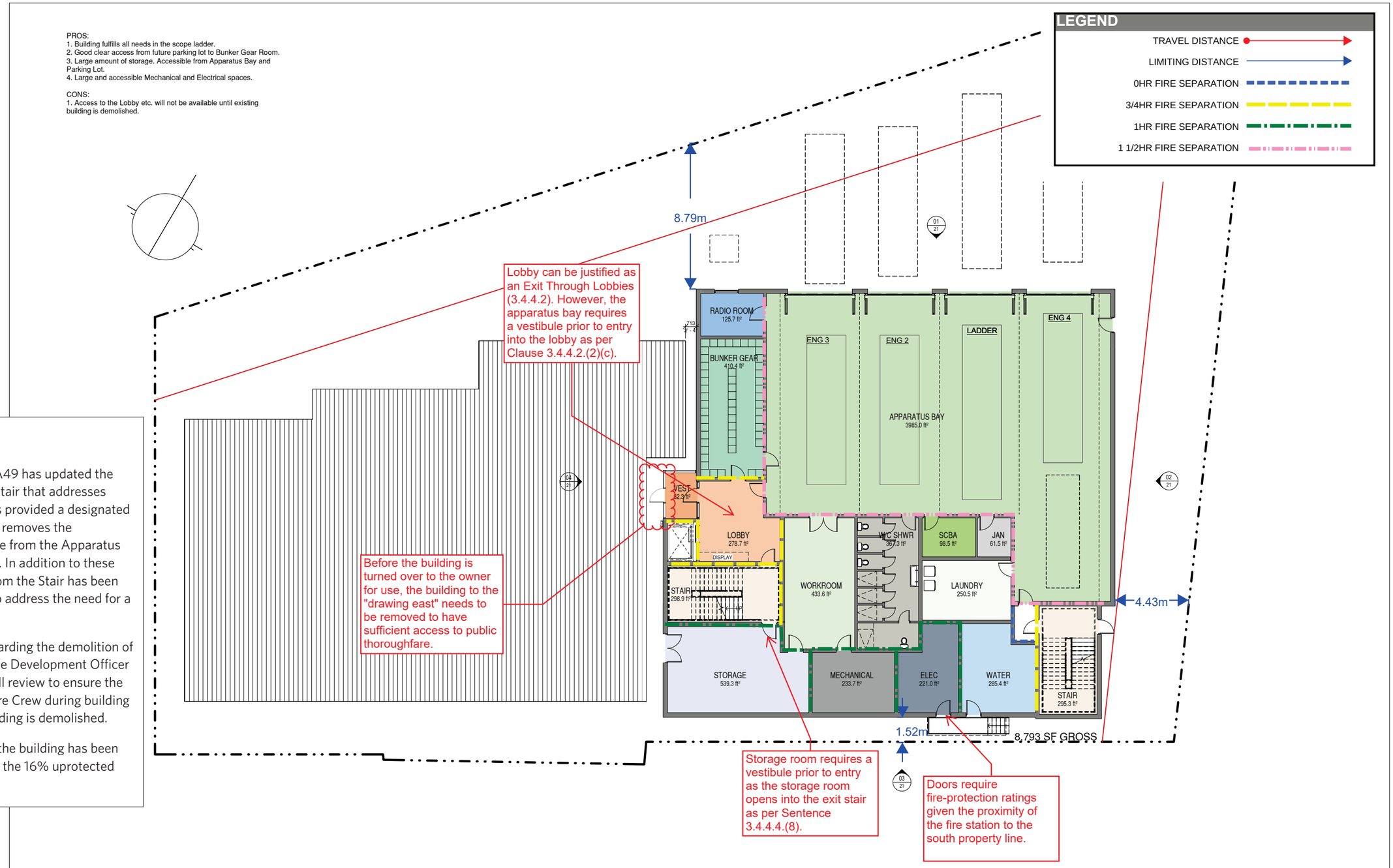
	Final Completion																								
	Existing Building Demolition																								
	Warranty																								

2024-12-03

3 CODE REVIEW

PROS:
1. Building fulfills all needs in the scope ladder.
2. Good clear access from future parking lot to Bunker Gear Room.
3. Large amount of storage. Accessible from Apparatus Bay and Parking Lot.
4. Large and accessible Mechanical and Electrical spaces.

CONS:
1. Access to the Lobby etc. will not be available until existing building is demolished.



SUMMARY OF UPDATES

In response to the issues raised, A49 has updated the floorplans to reflect a re-worked stair that addresses exiting through the Lobby and has provided a designated exit from the stair enclosure. This removes the requirement of needing a vestibule from the Apparatus Bay into the Lobby of the building. In addition to these changes, Storage Room access from the Stair has been removed from the building plan to address the need for a vestibule.

Further discussion is required regarding the demolition of the adjacent building with both the Development Officer and the Code Consultant. A49 will review to ensure the Second Floor is off limits to the Fire Crew during building occupation until the adjacent building is demolished.

Lastly, window size at the rear of the building has been addressed to ensure that it meets the 16% uprotected openings aspect ratio.

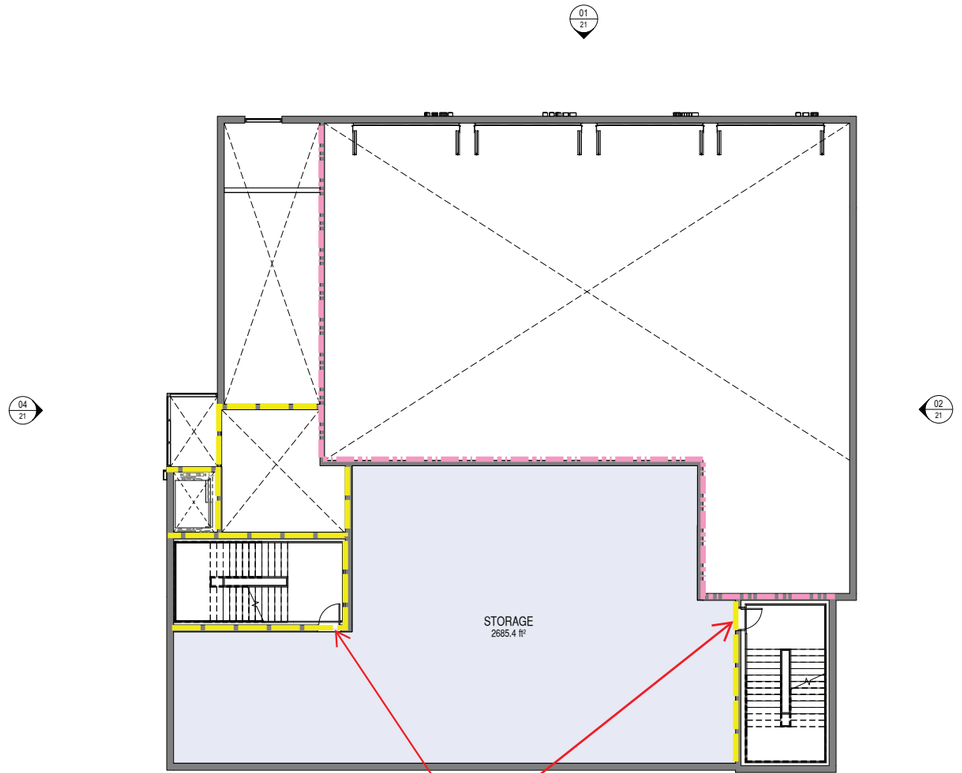
LEVEL ONE - OPTION 8
2025-02-05

3 CODE REVIEW

General note: Given the size of this level of the building, it exceeds the maximum area permitted to be considered a mezzanine under (10%, Sentence 3.2.1.1.(4)). Therefore, the building is considered to be 3-storeys in height for the determination of the building's construction article.

LEGEND

- TRAVEL DISTANCE
- LIMITING DISTANCE
- 0HR FIRE SEPARATION
- 3/4HR FIRE SEPARATION
- 1HR FIRE SEPARATION
- 1 1/2HR FIRE SEPARATION



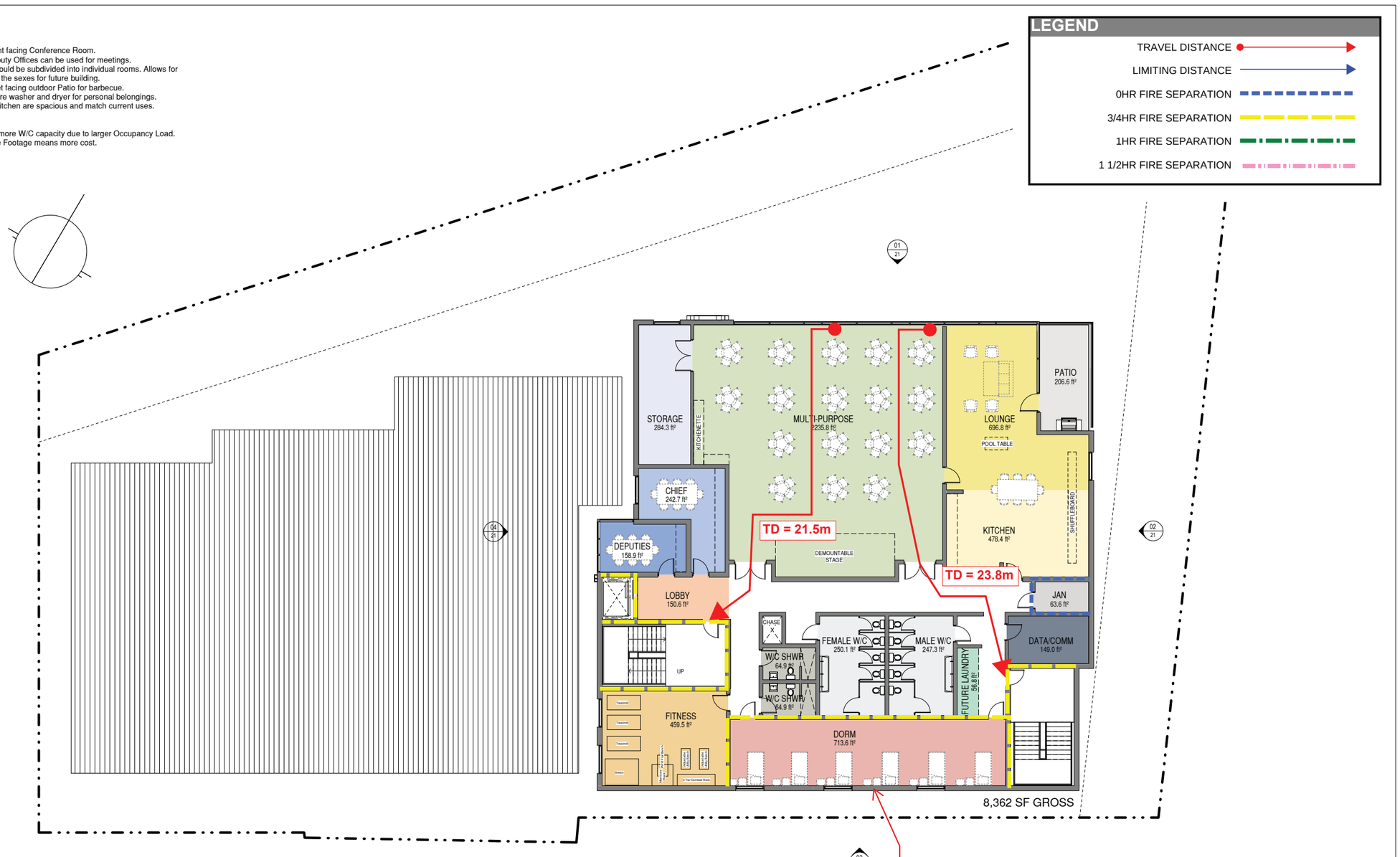
Storage rooms require a vestibules prior to entry as the storage room opens into the exit stairs as per Sentence 3.4.4.4.(8).

LEVEL ONE B - OPTION 8
2025-02-05

3 CODE REVIEW

PROS:
1. Large and front facing Conference Room.
2. Chief and Deputy Offices can be used for meetings.
3. Dorm Room could be subdivided into individual rooms. Allows for privacy between the sexes for future building.
4. Provides street facing outdoor Patio for barbecue.
5. Allows for future washer and dryer for personal belongings.
6. Lounge and Kitchen are spacious and match current uses.

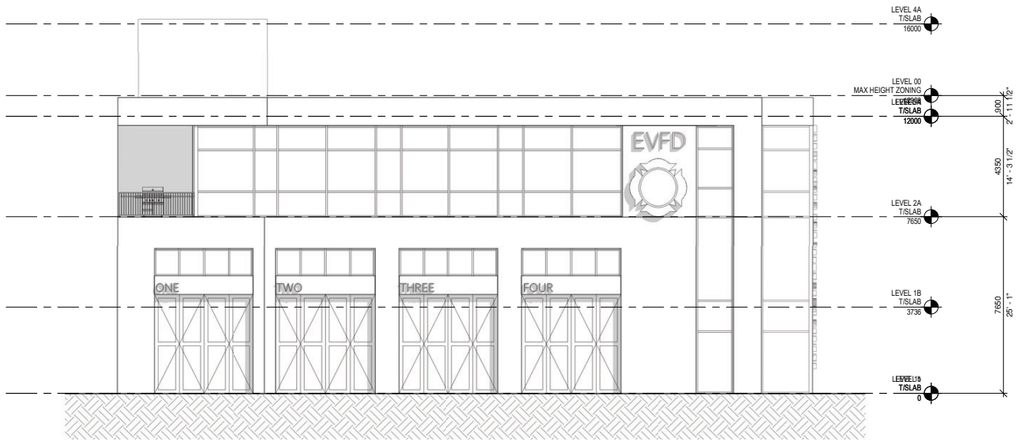
CONS:
1. Necessity for more W/C capacity due to larger Occupancy Load.
2. Larger Square Footage means more cost.



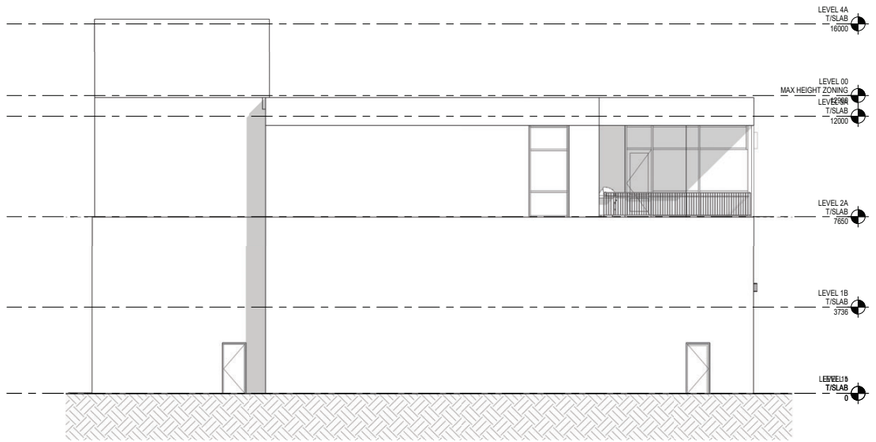
LEVEL TWO- OPTION 8
2025-02-05

ARCHITECTURE 49

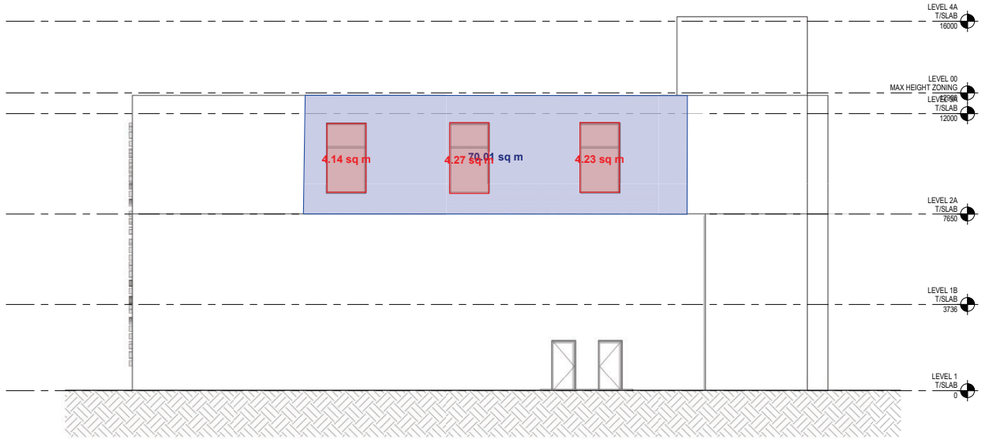
3 CODE REVIEW



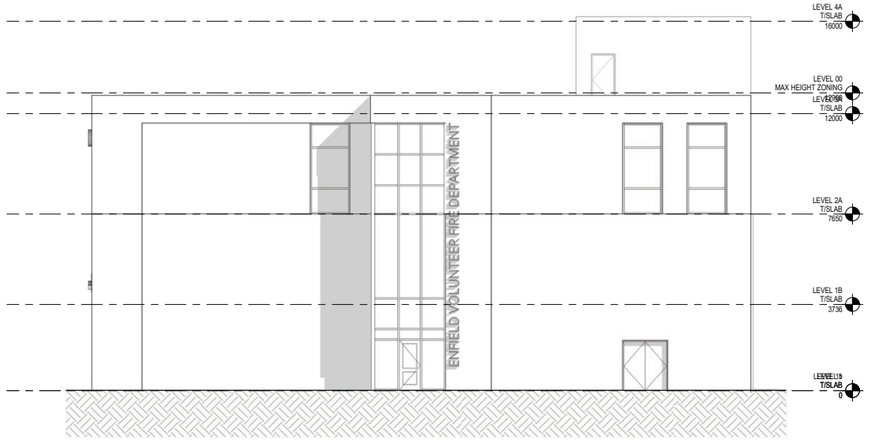
1 : 100 01 21 **ELEVATION NORTH Copy 1**



1 : 100 02 21 **ELEVATION EAST Copy 1**



1 : 100 03 21 **ELEVATION SOUTH Copy 1**



1 : 100 04 21 **ELEVATION WEST Copy 1**

NOTES: THESE ELEVATIONS ARE TO GET A SENSE OF THE OVERALL MASSING OF THE BUILDING. THEY WILL BE DEVELOPED FURTHER, AND FINISHES ETC. WILL BE SELECTED BASED ON CLIENT COMMENTS AND BYLAW GUIDLINES