



CARNARVON PARK MASTER PLAN REFRESH PRE-DESIGN

PROJECT TITLE

District of Oak Bay

Carnarvon Park Master Plan – Preferred
Conceptual Designs

PRESENTED TO

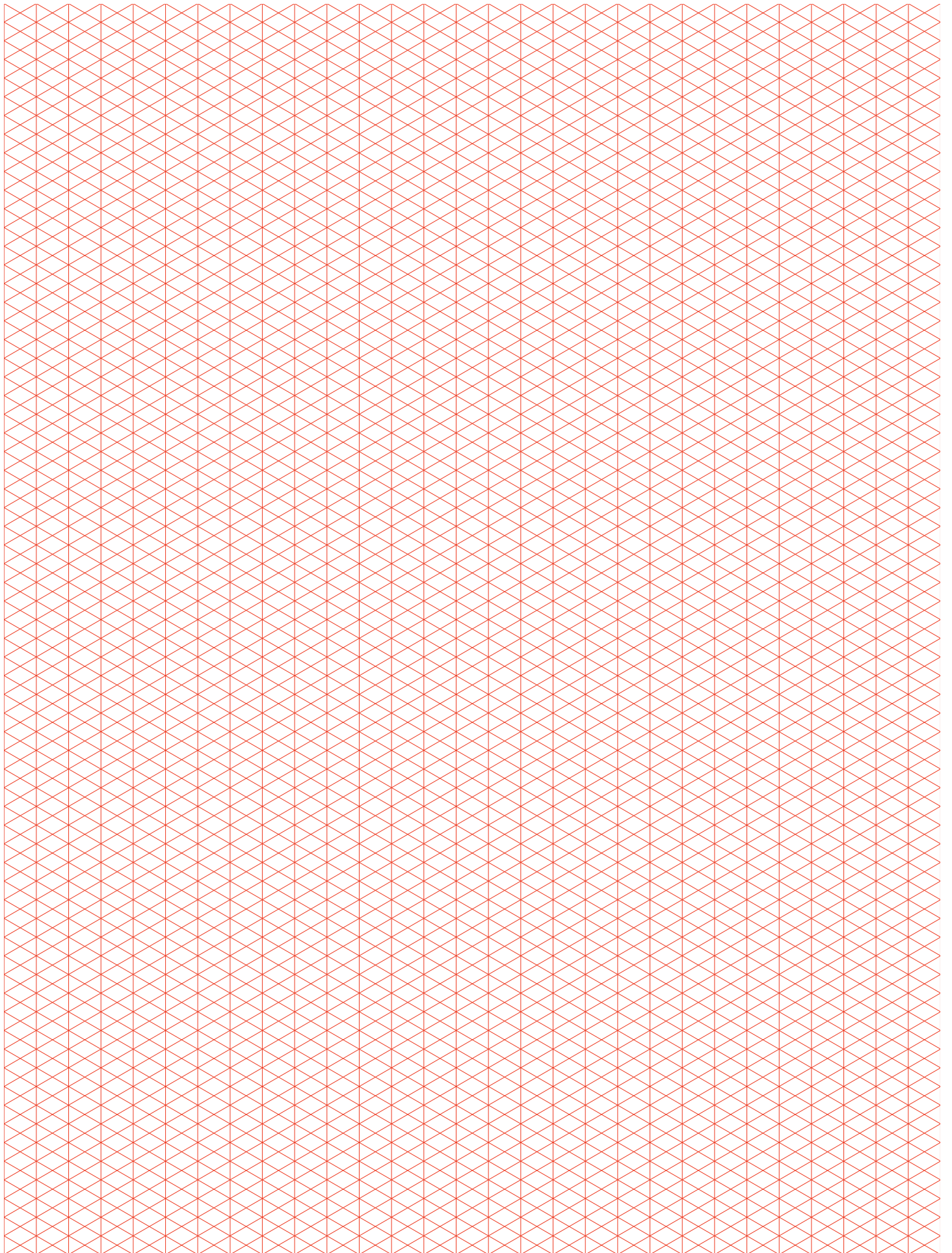
Corporation of the District of Oak Bay
2167 Oak Bay Avenue
Victoria BC V8R 1G2

Steve Meikle DIRECTOR PARKS
David Graham PROGRAM MANAGER

DEADLINES & DELIVERABLES

November 29, 2024

1 PDF by email to SMeikle@oakbay.ca





November 29, 2024

Steve Meikle DIRECTOR PARKS, RECREATION AND CULTURE
District of Oak Bay
2167 Oak Bay Avenue
Victoria BC V8R 1G2

Re: District of Oak Bay – Carnarvon Park Master Plan Refresh and Community Amenity Building

Mr. Meikle,

Please find enclosed for your review our Design Report for the Carnarvon Park Community Amenity Building and Park Master Plan.

The consultant team would like to thank you and your team for your direction and comments throughout the process of preparing the report. We are pleased to have had the opportunity to work with you.

Yours truly,

Ian Ross McDonald PARTNER ARCHITECT AIBC AAA LEED GA

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1.0 EXECUTIVE SUMMARY

This report provides project background, preferred park master plan, and two building options which are the result of the District of Oak Bay’s (District’s) Carnarvon Park Master Plan Refresh project.

Since the 2019 Carnarvon Park Master Plan, several initiatives have been pursued to improve the park, including the conversion of the sport court to dedicated pickleball courts. However, the need to replace the park building is urgent, as the existing structure is closed and not usable. The trends and current pressures in the community have also changed, demanding a review of the Master Plan to align and reprioritize the recommendations to account for current and anticipated needs.

In the Spring of 2024, the District of Oak Bay retained Carscadden Stokes McDonald Architects, LEES + Associates, and supporting consultant group, to build on earlier studies to review Carnarvon Park, its master plan, and its deteriorating field house.

A series of public engagement activities took place to gather feedback and were presented to District of Oak Bay Council and the public on September 12, 2024. As outlined in the Public Engagement report, four options were presented, of which two options were selected by Council for further development. The refined designs presented in this report build on the public engagement portion of this project and incorporates feedback from council, the steering committee, interest groups, and the public through a series of engagement activities and questions.

The District of Oak Bay’s Carnarvon Park Master Plan as outlined will be an opportunity to improve outdoor park programming, replace the community amenity building to support park users, allow for new community spaces, provide childcare facility for 24 children (as an option), and construct a fully accessible, environmentally sensitive and sustainable building.

In general, this project includes:

- Review and analysis of the park context,
- Design considerations including aspirations, trends, and sustainability options,
- Review and refinement of the Conceptual Park Master Plan,
- Review and refinement of the Conceptual Main Building Design,
- Strategies to move forward the design,
- Conceptual drawings,
- Engineering reports,
- Energy modelling report; and,
- Cost Estimates for the design.

Through this report we hope to aid the District, advance the preferred design, and support any grant applications for the District. Additionally, the report will provide future design teams with a basis of design to hit the ground running in Design Development, with the goal of having it built.

Collectively, these enhancements and additions will bring Carnarvon Park in line with its community’s needs and expressed desires, ensuring its continued relevance in the coming years.

2.0 INTRODUCTION

PROJECT TEAM

Architecture & Planning

Carscadden Stokes McDonald Architects Inc.

Ian Ross McDonald PARTNER ARCHITECT

AIBC AAA LEED GA

Mechanical

AME Group

Cassidy Taylor PRINCIPAL

PENG CPHD LEED AP

Traffic Consulting

Bunt Engineering

James Potter ASSOCIATE

MSC PTP

Landscape & Engagement

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Megan Turnock PRINCIPAL

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Electrical

AES Engineering

Andy Su PRINCIPAL

BENG LEED AP BD+C

Quantity Surveying

BTY Group

Eldon Lau

PQS MRICS LEED AP

Structural

Read Jones Christoffersen

Aaron Post PROJECT ENGINEER

PENG

Civil Engineering

Gwaii Engineering

Corey Brown PRINCIPAL

PENG ASCT

Energy Analysis & Modelling

RJC Engineers

Mohammad Fakoor,

PHD, PENG

The consulting team was assisted by the contributions of District staff who gave their time, energy, and guidance in this process and in the preparation of this report.

INFORMATION GATHERING

This study started with the Information Gathering phase, including the review of existing documents and previous work completed in 2019. This was followed by a Public Engagement Open House and Workshops which offered the opportunity for the Steering Committee, Public Interest Groups and the general public to provide input.

The following important documents were made available for review:

- Polaris Land Surveying Inc. “Carnarvon – Site Plan – Ortho.” January 17, 2024.
- District of Oak Bay. “Carnarvon Park Ortho-PARKS Model.” January 9, 2024.
- Ryzuk Geotechnical. “Geotechnical Report.” May 3, 2024.
- District of Oak Bay. “Carnarvon Park Renewal Program – Milestone Planning” Aug 8, 2023.
- Carscadden & LEES + Associates. “Carnarvon Park Master Plan” April 2019.
- Carscadden & LEES + Associates. “Carnarvon Park Master Plan Refresh and Main Building Options Analysis – Public Engagement Summary” September 9, 2024

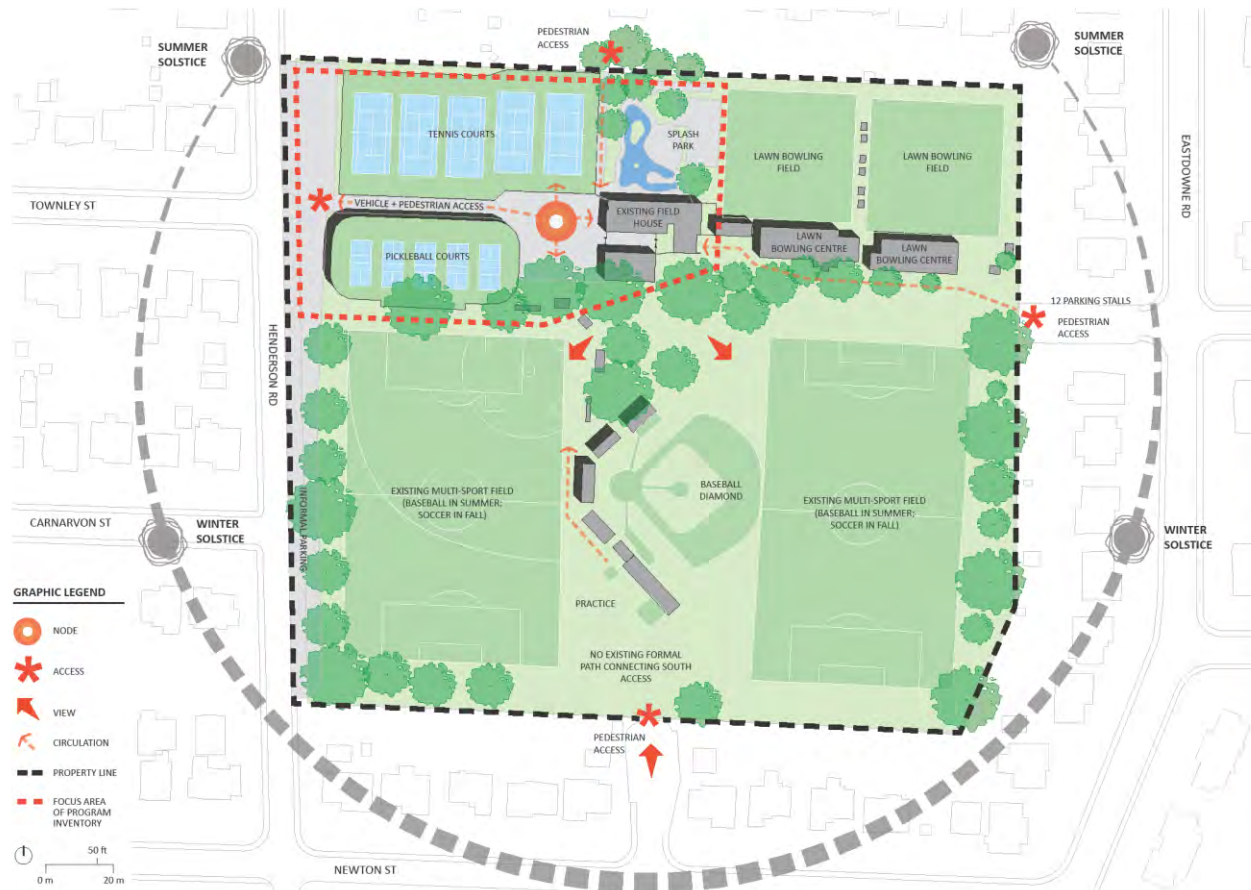
3.0 REVIEW AND ANALYSIS

PARK CONTEXT + OVERVIEW

Carnarvon Park is situated in a residential neighbourhood with access from three directions and partial access from a fourth direction. It is considered a “Multi-sports Park” in Oak Bay’s Official Community Plan (OCP).

EXISTING AMENITIES + PROGRAMMING

- 2 playing fields for rugby and soccer;
- 2 ball diamonds with bleachers and scoreboard/ concession building;
- Batting cage;
- 5 tennis courts;
- 5 pickleball courts (located in old lacrosse box);
- Rotary Water Park;
- Playground (slides, swings, zipline);
- Building with washrooms, change rooms and storage;
- Mature trees;
- Parking lots;
- Picnic tables;
- Park benches;
- Lawn Bowling Club (including buildings and greens); and
- 1 bike rack.



4.0 DESIGN CONSIDERATIONS

LESSONS LEARNED

Carscadden Stokes McDonald Architects' expertise designing park washroom facilities provides a foundation to ground the District's park improvements. Through Carscadden's time designing park facilities, themes of accessibility, safety, and universality have risen to the forefront of best practices. These best practices are present in Carscadden's designs for park facilities within the lower mainland including Norgate Fieldhouse, Murdo Frazer Park Washroom, and the Delbrook Park Fieldhouse.

Norgate Fieldhouse is constructed from durable brick with mortarless joints for natural ventilation. Heat is transferred from the mechanical room to prevent pipes from freezing. After 6 years of use, staff have noted that the porous brick is difficult to clean following vandalism. Future park facilities should be constructed with materials that are easy to clean.

Murdo Frazer Park Washroom uses exterior reinforced concrete walls that are finished with an anti-graffiti coating. Staff have commented that the anti-graffiti coating has been effective in removing vandalism.

Delbrook Park Fieldhouse offers fully universal facilities. Single toilet rooms are designed to be large enough to accommodate change benches and users accompanied by caregivers.

The strategies and best practices outlined in this report aligns with the aspirations of the District of Oak Bay. Park facilities should support the community while addressing behavioral and demographic trends. This involves providing park facilities that are accessible, safe, and universal.

ASPIRATIONS

Parks are essential elements of healthy, happy communities and attract all people regardless of age, ability, and economic status. Washroom buildings contribute to the park's identity and afford users the ability to use the park for prolonged durations of time. The following aspirations are proposed following consultation with the District and serve as best practices in the design of park facilities. The following aspirations highlight matters associated with the core values of civic responsibility, accessibility, equity, maintenance, and place making.

Accessible

Providing fully accessible facilities ensures that park washrooms can be accessed by people of all ages and abilities. The BC Building Code also outlines accessibility requirements for washrooms to ensure barrier free access.

Easy to Maintain

Carnarvon Park receive high use by a range of users. Facilities should be designed for ease of maintenance by utilizing durable materials that withstand heavy use and mitigate vandalism. Surfaces should be easy to clean and stand up to pressure washing.

Hands-Free

Touchless fixtures including faucets, soap dispensers, and flush valves keep the spread of germs to a minimum while conserving water.

Universal

Facilities should provide people with equal ease of access regardless of gender or gender identity. Signage can be used to clarify the use of universal facilities and should be standardized to focus on service rather than the identity of the user.



The universal facilities can include signage at the building entrance or each individual toilet room to help users identify what services are available



Icons above stall doors reinforce the use of the universal stalls.

Inviting

Park Facilities should allow for natural light and ventilation, promoting a safe and clean environment.

Safe

Crime Prevention Through Environmental Design (CPTED) strategies should be used in the design and siting of park facilities. This involves situating park facilities in visible locations, with clear sightlines from inside and outside the building, and using durable construction materials. These strategies aim to reduce victimization, deter offender decisions that precede criminal acts, and build a sense of community.

Seasonality

District Parks receive visitors regardless of season, so park facilities should be available year-round. Mechanical spaces (washrooms) should be insulated and minimally heated to prevent freezing.

Sustainable

Facilities should be designed to reduce negative impacts on the environment. This may include reducing the embodied carbon footprint of the building through the selection of low embodied carbon building materials, achieving green building certifications to reduce the operational carbon footprint, or practicing sustainable rainwater management.

TRENDS

Parks and park facilities are evolving spaces that respond to behavioral and demographic trends. These trends have led to the creation of municipal policies that contribute to sustainable, inclusive, resilient, and vibrant communities.

More than just trends in park facilities, the following themes have emerged as best practice in decision making at a municipal level and have informed the Main Building design options.

Social Equity: Provide an inclusive environment for all members of the public. Trends include:

Accessibility

Ensure the facilities meet or exceed the accessibility requirements of the Building Code.

Universality

Ensure the facilities help to reduce barriers for gender variant community members. Provide people with equal access to facilities and resources regardless of gender.

Safety

Provide facilities which promote a sense of safety and inclusivity for the public.

Social

Provide spaces for the public to gather and socialize year-round.

Access

Ensure the facilities can be accessed by public transit or active transportation.

Wi-Fi

Provide Wi-Fi for public use.

Sustainability: Design new buildings that are sustainable.

Embodied Carbon

Embodied carbon refers to the amount of greenhouse gas emissions generated during the construction of a building. The embodied carbon footprint of a building can be reduced by renovating rather than rebuilding, using low-carbon concrete mixes, and reducing the use of carbon-intensive materials such as aluminum, plastic, and foam insulation.

Operational Carbon Footprint

Operational carbon refers to the amount of greenhouse gas emissions generated by a building once it's in use. The operational carbon footprint can be reduced by specifying energy efficient mechanical and electrical systems.

Rainwater Management

Rainwater management refers to approaches taken to infiltrate, evaporate, or capture rainwater on site. Strategies may include implementing rain gardens, green roofs, permeable paving, or rainwater retention tanks.

Green Mobility

Green mobility considers amenities for active transportation users. Strategies may include providing charging stations for electric vehicles, bicycles and scooters.

Natural Habitats and Biodiversity

Strategies may be employed to protect natural habitats and support biodiversity on site. This includes siting the building in an area that minimizes site disturbance, or implementing green roofs with native plant species tailored to attract local fauna such as bees and birds.

Operational Resilience: Design new buildings with resiliency in mind.

Building footprint

Keep building footprint to a minimum to maximize outdoor space.

Right fit

Size building to meet expected user needs. This reduces construction and operational costs.

Flexibility

Design facilities to be flexible and adaptable to changes over time.

Maintenance

Provide facilities that are easy to maintain.

Cleanliness

Include hands-free fixtures to reduce touch-surfaces.

Graffiti

Provide anti-graffiti and/or graffiti deterring surfaces.

Construction

Park facilities should be robust and built to withstand public use.

Post-disaster / Emergency Response

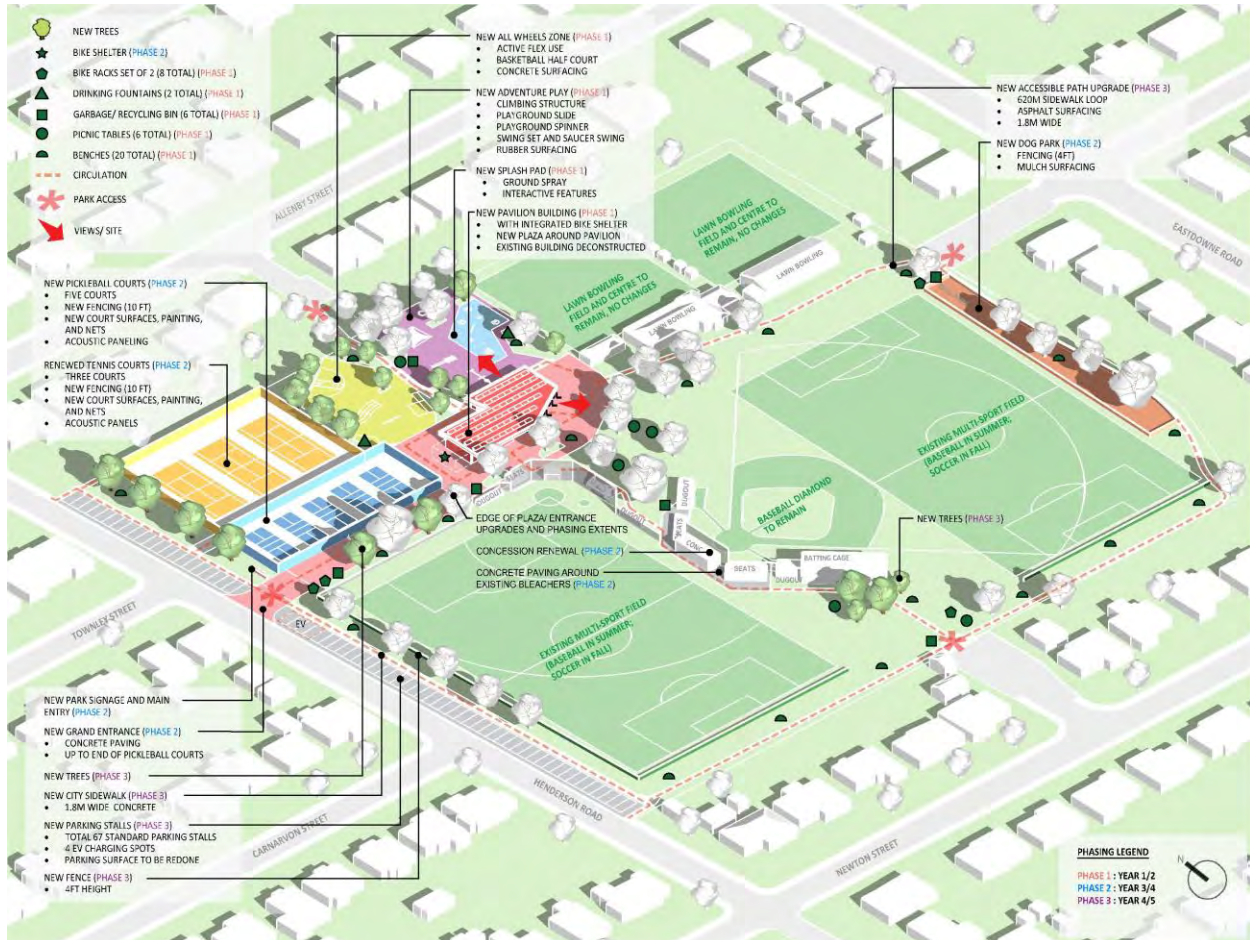
Buildings that are assigned an importance category of post-disaster are designed to remain operational following a disaster and may provide shelter or serve as gathering points.

Year-round

Facilities should be insulated and minimally heated to prevent freezing and allow for year-round use.

5.0 PARK MASTER PLAN

The preferred concept plan for Carnarvon Park is based on site findings, project team input, best practices, technical considerations, public engagement feedback received in April 2024, and feedback received during the public/council meeting on September 12, 2024. The concept seeks to reflect the needs of the local community and balance the diverse needs of current and future users.



Through the public engagement survey and report it was determined that the park has a high daily usage rate. The park is most used for casual activities like sitting, relaxing, or picnicking, playing on the grass, walking pets, and visiting the splash pad. Tennis and pickleball were also popular, with more than one third of respondents engaging in these sports. Observations from the public engagement portion of the project included: a desire to maintain or add to the existing pickleball/tennis courts, improve the play/splash areas which are well used, and add alternative programming to the hardscape for kids of varying ages.

It is intended that either of the Main Building Options presented in the next section of this report can be located in the same central location in the park while maintaining the same park uses, and racket sport courts. Notably the main building option 3.1 has a reduced footprint which has allowed retention of all 5 pickleball courts.

In general, the proposed concept plan is comprised of 7 distinct zones in the northwestern corner of the site. These include:

- Pickleball (5 courts)
- Tennis (3 courts)
- Splash Park/pad
- Adventure Playground
- Plaza
- Field house
- All-Wheels

Additionally, a series of park improvements are suggested. These include:

- Park Entry Signage
- Park Benches
- Park Picnic Tables
- Bike Racks
- Bike Shelter (covered enclosure for 20-25 bikes and E-bikes plugins)
- Garbage/Recycling Bins
- Drinking Fountains
- Perimeter Walking Loop
- Leash Optional Area/Dog Park
- Rearrangement of parking closer to Henderson Street
- EV parking stalls
- Sidewalk along Henderson Street
- New trees and planting
- Perimeter fencing along western field
- Paving around existing baseball bleachers

Components of Carnarvon Park that are intended to remain from the existing condition are:

- The District of Oak Bay Lawn Bowling club including the two bowling greens
- The two multi-use sport fields which are shared between soccer, rugby, and baseball
- Baseball Diamonds, Bleachers, dugouts, and concession (concession building is currently under review as part of the Districts Asset Management program for potential renewals/upgrades)

Modifications to the park plan as previously presented include:

- Addition of a dedicated leash optional area/dog park
- Alternate activities for older youth groups through the inclusion of basketball hoop in the All-Wheels zone and climbing structures in the Adventure Play zone.
- Fencing around the multi-sport fields
- Planting areas around the all-wheels and adventure playground areas for rainwater management

Due to the large capital required to refresh Carnarvon Park it is proposed that the site improvements be phased into three scopes of work so that funding can be gathered and allocated appropriately.

6.0 CONCEPTUAL MAIN BUILDING OPTIONS

A new building was identified as a key priority by the community during the engagement process in 2019. Evident since that time is further deterioration of the existing building with parts of it being abandoned and deemed unsafe. The existing building is to be deconstructed as part of the master plan.

Building off the work of the 2019 report, seven options for a new field house or District improvements were explored by the design team during a series of meetings with the project team. These seven options ranged in scale and of these seven, four were advanced and shown to the public to seek their input and gauge level of support and community need. These were identified as:

- Option 1 – Downsized Field House
- Option 2 – Pavillion with Community Room
- Option 3 – Large Pavillion with Childcare
- Option 4 – Housing over covered pickleball courts

Through the public engagement findings as outlined in Carscadden & LEES report dated September 9, 2024, and District of Oak Bay council meeting dated September 12, 2024, two building options were selected for further development and engineering analysis. These were identified as:

- Option 2 – Pavillion with Community Room
- Option 3 – Large Pavillion with childcare

Council requested the design team to further explore Option 3 to expand programming by including additional community rooms and basement options.

DESIGN STRATEGIES

Layout Strategies

- Locate the “human” spaces at the perimeter to allow for access to natural light and connections to the exterior.
- Allow after-hours areas to be separately accessed and to be secured. The after-hours spaces are to include the Community Rooms, Flex Spaces, Kitchen, and Outdoor Patios.
- Target about 10’ clear ceilings in the ground floor washrooms, and childcare spaces and 12’ in the Community spaces. These heights allow for an open and inviting area with a practical use of materials and structures.
- Utilize locally available wood construction that could be undertaken by a range of local contractors to reduce risk and cost of the project.
- Include a covered outdoor space to provide shelter from the elements (rain and sun) for park users during all seasons of the park’s use.
- The use of dedicated change rooms has diminished over the last 30 years to the point that existing change rooms are rarely used. For this reason, it is proposed that toilet rooms will be increased by in size to accommodate change benches.

Sustainability Strategies

- In general, the building options presented explored a variety of sustainability certifications. Of these options two streams were selected for the purpose of energy modelling and advancement. These are defined as Net Zero Carbon and Net Zero Energy certification. Refer to Appendix C of this report for a full list of detailed measures and assumptions required for each certification.
- Net Zero Carbon (as defined by Canada Green Building Council - Zero Carbon Building)
 - Is a building that is highly energy-efficient and minimizes greenhouse gas emissions from building materials and operations.
- Net Zero Energy
 - Is a building that demonstrate that the net energy consumption is equal to or less than the energy generation on site and that the total Energy Usage Intensity (EUI) is at most 80 kWh/m².
- Strategies to achieve either of the above certifications are flexible and can be implemented in a variety of means. Note that implementation is not limited to the list below but for discussion, comparison, and costing purposes the design team has considered the following:
 - Use locally available, low carbon materials.
 - Accommodate photovoltaic arrays on the roof.
 - Accommodate high performance HVAC and air filters to accommodate respite during wildfires.
 - Eliminate gas fired combustion equipment
 - Upgrade the building envelope to meet energy targets
 - Upgrade the windows to meet energy targets

Geotechnical Considerations

- From a geotechnical perspective, a one- to three- story building, with a maximum of one below-ground level, is considered generally feasible.
- However, careful consideration of the foundation design/ construction and bulk excavation will be required due to the presence of firm grey clay encountered.
 - A below-ground level would require shoring during construction to ensure adjacent park assets/ infrastructure remains undamaged. Additional foundation design considerations would also be required.
 - At-grade building would not require shoring.

- Seismically, geotechnical does not consider there to be a risk of liquefaction. However, a detailed analysis is recommended to confirm if cyclic softening must be considered due to the firm clay that was encountered.
- Blasting was not specifically mentioned within the report, but is a possibility given the unknown conditions.

MAIN BUILDING OPTION 2.1 – PAVILLION WITH COMMUNITY ROOM



This option of the main building option comprises a one storey structure with a total gross floor area of approximately 276 square meters. The building comprises two volumes connected by a covered plaza. Programming includes a community room, six (6) universal washroom/change stalls, concession, small office, storage (4 sections), mechanical/electrical, custodial, and covered plaza.

- Benefits: Capital costs are less, small and easier to maintain than a larger building, resulting in lower operating and maintenance costs. Keeping everything on one level makes for a readily accessible building. No elevator required.
- Drawbacks: Reductions in levels of service compared to the original building. No childcare.

This option was previously presented during the public engagement report as Option 2. Modifications from the previous version were to eliminate the two (2) dedicated change rooms in favour of six (6) individual washroom stalls that are fully accessible and include a larger space to change within. This will maintain the ability of sports teams to change at the park but eliminates programming (change rooms) that may be underutilized based on feedback during public and interest group engagement.

The building sub-structure will comprise traditional perimeter and interior standard cast-in-situ concrete strip and pad footings, with a reinforced concrete slab on grade. The building superstructure will comprise a combustible wood decking supported by glulam beams and wood joists and interior wood framed walls.

The exterior envelope is yet to be determined but could be clad in cementitious materials if wildfire resilience is a priority. A standard 2 ply SBS insulated roof membrane is proposed with options for EV panels to hit different levels of energy targets. Windows will be high performing double-glazed units.

The interior spaces will include paint, resilient flooring, and a combination of painted drywall ceilings, acoustic ceiling systems, and T-bar ceilings in service spaces.

PROGRAM

Through an iterative process of reviewing the existing building and interest group input, a preferred program of spaces, was developed and graphically presented. It was determined that this option would include the following:

Ground floor

Public Functions

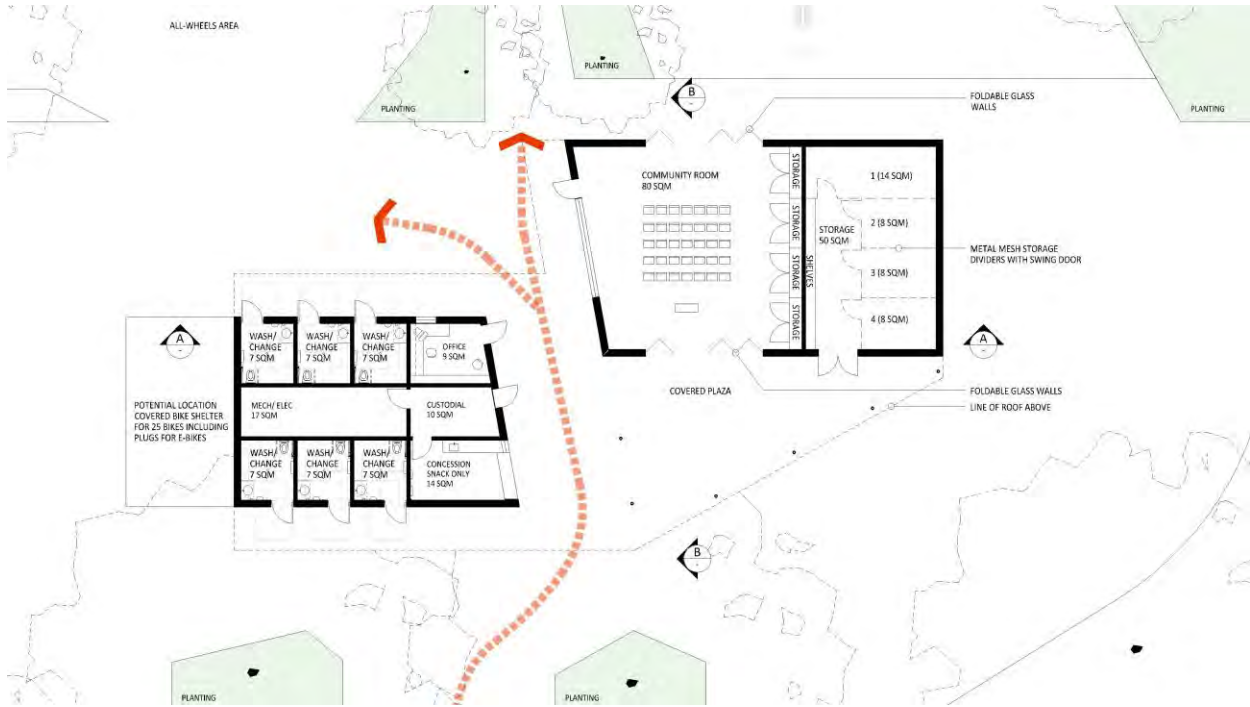
Community Room	80 SM
Washroom/Change x 6 (7 SM each)	42 SM
Concession	14 SM
Office	9 SM
Covered Plaza	

Service Functions

Storage	50 SM
Mechanical	17 SM
Custodial	10 SM

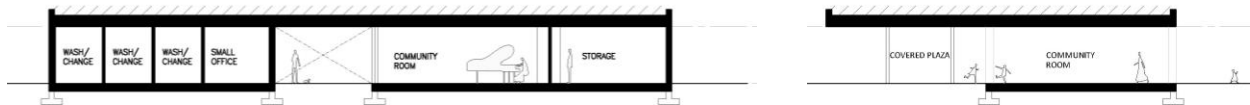
Total **276 SM**
(includes gross up for walls)

CONCEPTUAL FLOOR PLANS



Option 2.1 – Ground Floor Plan

CONCEPTUAL SECTIONS



Option 2.1 – Section A (left), Section B (right)

CONCEPTUAL ELEVATIONS



Option 2.1 - View looking Southeast



Option 2.1 – View looking North

MAIN BUILDING OPTION 3.1 – LARGE PAVILLION WITH CHILDCARE



This option of the main building option comprises a two-storey structure with underground basement, and total gross floor area of approximately 1247 square meters (including patios).

The building comprises two volumes connected by the second-floor community rooms. Programming includes a childcare suitable for 24 children, six (6) universal washroom/change stalls, two (2) community rooms, outdoor patios, two (2) flex spaces, kitchen, storage (4 sections), mechanical/electrical, custodial, parks operations room, and a covered plaza.

- Benefits: Increased capacity for community events and support spaces. Second storey keeps the building footprint reasonable while providing for views over the park. Adds much needed Daycare to the Community.
- Drawbacks: Higher capital costs but several Grants may be available to bring the costs to the District down. Higher operating costs including staffing. Additional maintenance costs (e.g. Elevator) required.

This option was previously presented during the public engagement report as Option 3. Modifications from the previous version presented include relocation of storage to a basement floor, which has been expanded in size. Elimination of the two (2) dedicated change rooms in favour of six (6) individual washroom/change stalls at the ground floor (for the same reasons as outlined in option 2.1). The elimination of the dedicated change rooms in this option has reduced the building's footprint allowing for the retention of all five (5) pickleball courts were previously only four (4) were retained. The addition of a second Community room at the second floor including outdoor patios/viewing areas. Flex spaces

have been provided to respond to comments received from sports groups to have an office that could be used during tournament play. A small kitchen has been included on the second floor that is intended to act as an area where prepared foods can be brought to site and stored until served for special events. The community concession has been eliminated from the ground floor.

While council's original request was to explore expanding the additional community rooms upwards to a third storey, the design team feel the proposed resolution of a two-storey building achieves the same expansion of programming and additional views over the park. Beneficially, the two-storey proposal retains a building massing that does not overpower the surrounding site. As observed and recorded during the previous public engagement portion of this project; building massing including height, were noted by the community public as being a concern (housing option). Additionally, the two-storey building is more cost effective as it generally requires less material for construction.

The building sub-structure will comprise traditional perimeter and interior standard cast-in-situ concrete strip and pad footings, with a reinforced concrete slab on grade. The building superstructure will comprise a combustible wood decking supported by glulam beams and wood joists and interior wood framed walls.

The exterior envelope is yet to be determined but could be clad in cementitious materials if wildfire resilience is a priority. A standard 2 ply SBS insulated roof membrane is proposed with options for EV panels to hit different levels of energy targets. Windows will be high performing double-glazed units. The interior spaces will include paint, resilient flooring, and a combination of painted drywall ceilings, acoustic ceiling systems, and T-bar ceilings in service spaces.

PROGRAM

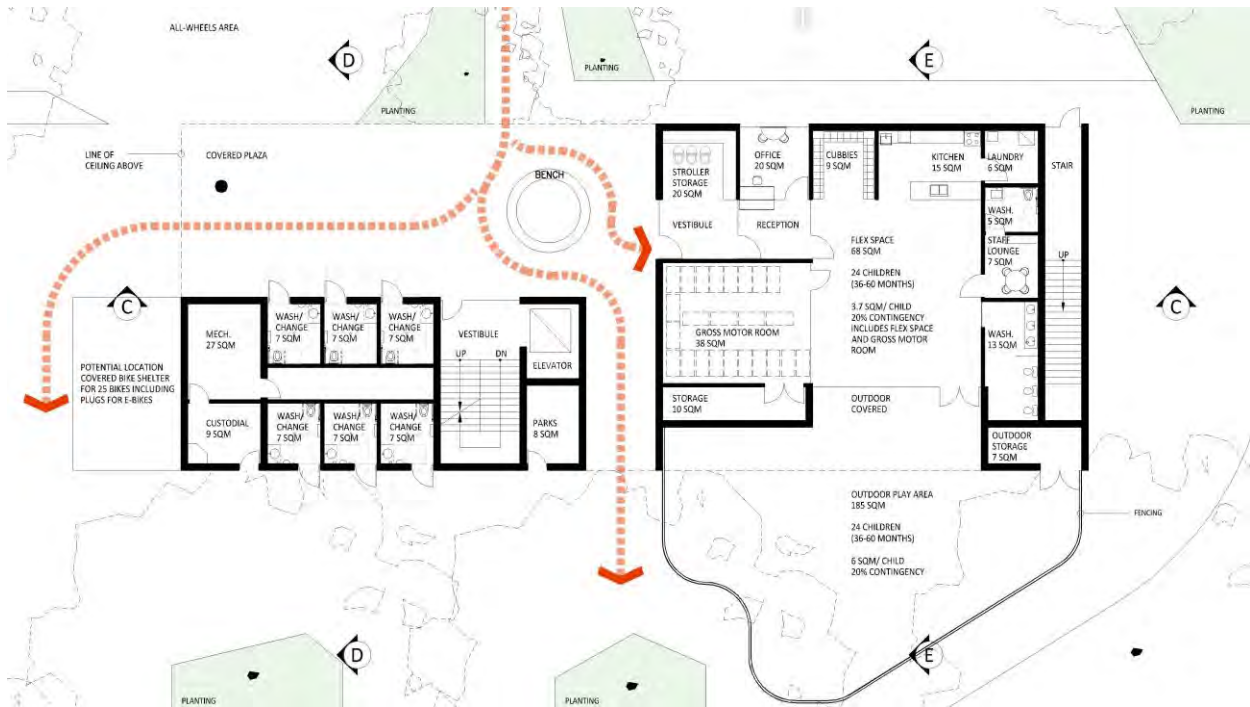
Through an iterative process of reviewing the existing building and interest group input, a preferred program of spaces, was developed and graphically presented. It was determined that this option’s future facility could include the following:

<p>Basement floor</p> <p><u>Service Functions</u></p> <p>Storage 85 SM</p> <p>Elevator Machine Room 9 SM</p> <p>Circulation</p>	
<p>Ground floor</p> <p><u>Public Functions</u></p> <p>Washroom/Change x 6 (7 SM each) 42 SM</p> <p>Circulation</p> <p>Covered Plaza</p> <p><u>Service Functions</u></p> <p>Mechanical 27 SM</p> <p>Custodial 9 SM</p> <p>Parks 8 SM</p> <p><u>Childcare Functions</u></p> <p>Flex Space 105 SM</p> <p>Gross Motor Room 38 SM</p> <p>Vestibule (including stroller) 20 SM</p> <p>Reception (including office) 20 SM</p> <p>Cubbies 9 SM</p> <p>Kitchen 15 SM</p> <p>Laundry 6 SM</p> <p>Staff Lounge 7 SM</p> <p>Staff Washroom 5 SM</p> <p>Children Washroom 13 SM</p> <p>Storage 10 SM</p> <p>Outdoor Storage 7 SM</p> <p>Outdoor Play 185 SM</p>	<p>Second floor</p> <p><u>Public Functions</u></p> <p>Community Room 1 90 SM</p> <p>Storage (for CR 1) 15 SM</p> <p>Community Room 2 135 SM</p> <p>Storage (for CM2) 10 SM</p> <p>Kitchen 14 SM</p> <p>Flex Space 16 SM</p> <p>Flex Space 16 SM</p> <p>Universal Washroom (7 SM each) 7 SM</p> <p>Washroom (5 SM each) 15 SM</p> <p>Circulation</p> <p><u>Service Functions</u></p> <p>Mechanical/Electrical 35 SM</p> <p><u>Total (All floors)</u> 1100 SM (includes gross up for walls)</p> <p>Outdoor Patio (North) 67 SM</p> <p>Outdoor Patio (West) 20 SM</p> <p>Outdoor Patio (South) 60 SM</p> <p><u>Total (All floors with Patios)</u> 1247 SM (includes gross up for walls)</p>

CONCEPTUAL FLOOR PLANS



Option 3.1 – Basement Floor Plan



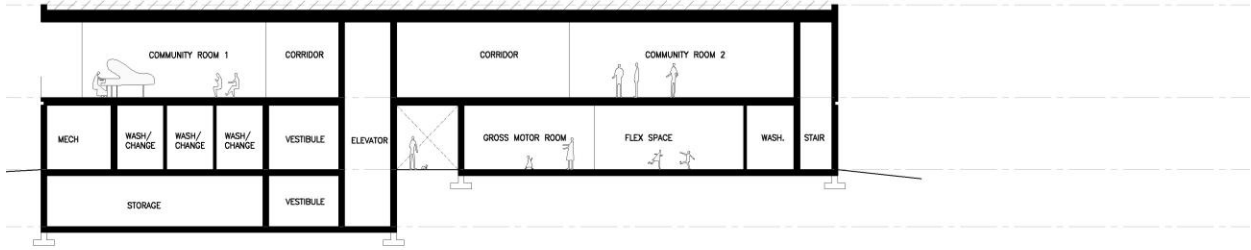
Option 3.1 – Ground Floor Plan

CONCEPTUAL FLOOR PLANS (CONTINUED)

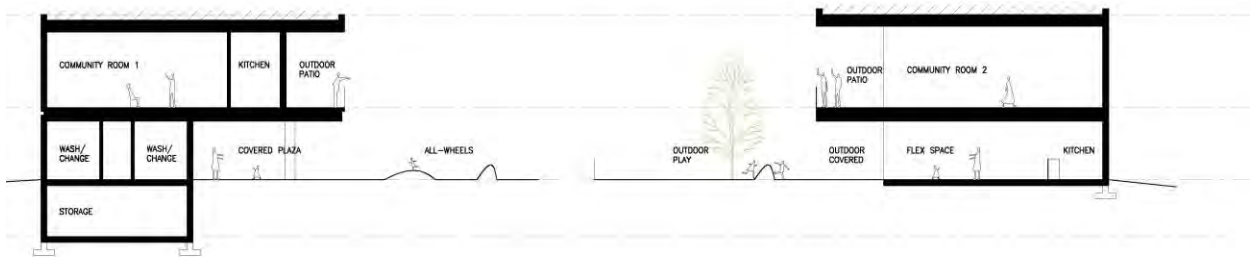


Option 3.1 – Second Floor Plan

CONCEPTUAL SECTIONS



Option 3.1 – Section C



Option 3.1 – Section D (left), Section E (right)

Conceptual Elevations



Option 3.1 - View looking Southeast



Option 3.1 – View looking North

7.0 COSTING

Base Project

Upon completion of the Design Development report, **Class D** costing was completed. A **Class D** Estimate has a level of accuracy of **+/- 25%** for this project due to the conceptual/early stage of the project. The estimate is based on the engineering reports included and provided to Quantity Surveyor.

For the purposes of the cost estimate, a **Base Project** cost was developed which included the minimum building design and cost appropriate for this project and outlined by the District of Oak Bay aspirations (BC Building Code Step Code 4 equivalent and LEED Gold).

Building Options and Upgrades

A list of cost options is listed below. These options are meant as upgrades over the **Base Project** and can provide general building upgrades, achieve Net Zero Carbon certification, or Net Zero Energy certification.

As a reminder the strategies to achieve either of the below sustainability certifications are flexible and can be implemented in a variety of means. The implementation is not limited to the list below but for discussion, comparison, and costing purposes these are the assumptions of the design team at this point in the project.

General Building Upgrades

- **Option 1** for a cost to add CATV, security and access control.
- **Option 2** for a cost to add building to a post-disaster level.

Net Zero Carbon Upgrades

- **Option 3** for a cost to increase meet the certification targets.
 - Wall insulation to R-13 effective
 - Floor Slab Insulation to R-15
 - Roof Insulation to R-30 effective
 - Photovoltaic panels to match 5% of the energy requirements.
 - **NOTE: This sustainability upgrade must be chosen to maintain grant funding under the GICB program which has already been applied for and is pending approval.**

Net Zero Energy Upgrades

- **Option 4** for a cost to increase meet the certification targets.
 - Wall insulation to R-29 effective (+6" of mineral wool insulation)
 - Floor Slab Insulation to R-15
 - Roof Insulation to R-30 effective
 - Improve windows to be triple glazed
 - Add photovoltaic panels to match 100% of the energy requirements
 - Option 2.1 - 35% roof coverage required (~63 panels)
 - Option 3.1 – 57% roof coverage required (~160 panels)

Option 2.1 Pavillion with Community Room

BASE ESTIMATE	PHASE 1	PHASE 2	PHASE 3	TOTAL
CONSTRUCTION COSTS				
Building	\$3,493,800			\$3,493,800
Site Development	\$4,377,700	2,098,200	\$939,500	\$7,415,400
Sub-Total Construction Costs	\$7,871,500	\$2,098,200	\$939,500	\$10,909,200
Design Contingency (25%)	\$1,967,900	\$524,600	\$234,900	\$2,727,400
Construction Contingency (5%)*	\$492,000	\$131,100	\$58,700	\$681,800
Total Construction Costs	\$10,331,400	\$2,753,900	\$1,233,100	\$14,318,400
SOFT COSTS (30%)**				
Professional Fees (12%)	\$1,239,800	\$330,500	\$148,000	\$1,718,200
Connection Fees and Permits (6%)	\$619,900	\$165,200	\$74,000	\$859,100
Miscellaneous Soft Costs (6%)	\$619,900	\$165,200	\$74,000	\$859,100
Furnishing, Fittings & Equipment (6%)	\$619,900	\$165,200	\$74,000	\$859,100
Total Soft Costs	\$3,099,500	\$826,100	\$370,000	\$4,295,500
TOTAL PROJECT COSTS	\$13,430,900	\$3,580,000	\$1,603,100	\$18,613,900
UPGRADES (ADD TO BASE ESTIMATE)				
Option 1 – CATV, Security & Access Control				\$30,900
Option 2 – Post-disaster level Upgrade				\$870,600
Option 3 – Net Zero Carbon Upgrades***				\$96,900
Option 4 – Net Zero Energy Upgrades				\$388,500

Note: Numbers have been rounded to nearest \$100

* Calculated using the total of (sub-total construction costs & design contingencies)

** Calculated using total construction costs

***Net Zero Carbon Upgrades must be chosen to maintain grant funding under the GICB program which has been applied for

Option 3.1 Large Pavilion with Childcare

BASE ESTIMATE	PHASE 1	PHASE 2	PHASE 3	TOTAL
CONSTRUCTION COSTS				
Building	\$10,567,000			\$10,567,000
Site Development	\$4,332,300	2,097,700	\$939,500	\$7,369,500
Sub-Total Construction Costs	\$14,899,300	\$2,097,700	\$939,500	\$17,936,500
Design Contingency (25%)	\$3,724,800	\$524,400	\$234,900	\$4,484,100
Construction Contingency (5%)*	\$931,200	\$131,100	\$58,700	\$1,121,000
Total Construction Costs	\$19,555,300	\$2,753,200	\$1,233,100	\$23,541,600
SOFT COSTS (30%)**				
Professional Fees (12%)	\$2,346,600	\$330,400	\$148,000	\$2,825,000
Connection Fees and Permits (6%)	\$1,173,300	\$165,200	\$74,000	\$1,412,500
Miscellaneous Soft Costs (6%)	\$1,173,300	\$165,200	\$74,000	\$1,412,500
Furnishing, Fittings & Equipment (6%)	\$1,173,300	\$165,200	\$74,000	\$1,412,500
Total Soft Costs	\$5,866,500	\$826,000	\$370,000	\$7,062,500
TOTAL PROJECT COSTS	\$25,421,800	\$3,579,200	\$1,603,100	\$30,604,100
UPGRADES (ADD TO BASE ESTIMATE)				
Option 1 – CATV, Security & Access Control				\$51,600
Option 2 – Post-disaster level Upgrade				\$1,898,500
Option 3 – Net Zero Carbon Upgrades***				\$208,400
Option 4 – Net Zero Energy Upgrades				\$834,300
SEPARATE PRICES (included in base estimate above, but cost provided for info and breakout at rate of \$9,730/m2 <u>excluding</u> contingencies and softs costs)				
Basement (150m2)				\$1,459,500
Community Room 2 (205m2) (including south patio and storage)				\$1,994,700

Note: Numbers have been rounded to nearest \$100

* Calculated using the total of (sub-total construction costs & design contingencies)

** Calculated using total construction costs

*** Net Zero Carbon Upgrades must be chosen to maintain grant funding under the GICB program which has been applied for

Estimate Basis

Pricing for this project is based upon an opinion of current 2024 standard construction industry market costs for this size and type of institutional project in District of Oak Bay, BC. It has been assumed that the project will be procured on a fixed stipulated 'lump sum' contract basis, from a competitive bidding field of at least five (5) competent General Contractors. It has also been assumed that a competitive bidding field of at least three competent sub-contractors for each trade will tender for the work and that there will be no 'sole source' bids. This class 'D' design development estimate attempts to establish a fair and reasonable price for the proposed work and is not intended to be a prediction of 'low bid'.

Contingency Reserves

A Design Contingency Allowance of **25%** has been included in this estimate. This allowance is a reserve of funds in the Construction Estimate to cover unforeseen items during the design phase that do not change the project scope. This allowance is ultimately absorbed into the designed and quantified work as more detailed information becomes available and is, therefore, normally reduced to zero at the tender stage.

A Construction Contingency of **5%** has been included in this estimate. This allowance accounts for changes during the course of construction that are unforeseen or require revisions to the drawings or specifications.

Soft Costs

An allowance for soft costs has been included and allocated between a variety of sub-categories as outlined below. In general the total allowance represent **30%** of the total construction costs and represent a recommended percentage at this conceptual/schematic point of the project. The District can adjust the allotment as required to suit their specific needs of the project, and as it is further developed.

- Professional Fees (12%)
- Connections & Permits (6%)
- Miscellaneous Soft Costs (6%)
- Furnishings, Fittings & Equipment (6%)

Escalation

An Escalation Contingency Allowance is currently **not included** in this estimate. This allowance is a reserve of funds in the Construction Estimate to cover price increases in construction costs due to changes in market conditions between the date the estimate is prepared and the date the tender is called (this contingency allowance should be updated once a confirmed target date is known). Current escalation forecasts are as follows:

- 2024: 4%-6%
- 2025: 3%-5%
- 2026: 3%-5%

8.0 NEXT STEPS

Next steps will include fund raising and grant applications, completing the construction ready documents and drawings; and choosing a project delivery method that is suitable for this project.

It is recommended that the District review upcoming funding and grant opportunities. The contents and supporting documents of this report should be sufficient for the purposes of grant applications including the Class D Estimate.

The work in this report represents the completion of Pre-Design. The remaining phases of a project include Schematic Design, Design Development, Contract Documents, Bidding and Negotiations, and Contract Administration summarized below.

Contract Documents:

This step includes preparation of drawings and specifications that will be used by the contractor to carry out the work. As a result, this step is often referred to as working drawings, which form part of the construction contract and take on legal significance. The drawings and specifications are a means to communicate detailed technical information and requirements and the basis of a legal contract. They will also be used to submit a Building Permit to the authorities having jurisdiction for permission to build.

In this step, the Client / owner / operator will meet once or twice a month as necessary to approve or direct the design solutions and check that the project continues to meet owner requirements. Typically, this step will include cost estimates at specified intervals, and the owner's directions and approvals at these intervals will be sought.

Bidding and Negotiations:

This step is also referred to as construction procurement. The architect and design team will assist in obtaining bids and in awarding and preparing the construction contracts. Often working closely with the Client's purchasing department, the architect will analyze bids after opening and make a recommendation considering the owner's parameters on awarding the project.

Contract Administration:

The architect and design team "look out for the client's interest" during construction through services called contract administration. This process is needed to ensure the contractor and owner are fulfilling their respective roles and obligations as outlined in the construction contract (CCDC-2). The architect will represent and provide advice to the client, document changes and meetings, review progress and submittals, and issue monthly certificates for payment in the amount owing the contractor by the owner all as defined in the contract as roles of the consultant.

The owner will provide direction to the design team on changes, authorize payments, and importantly, make prompt decisions. Representation at biweekly construction meetings is typical.

There are many potential construction delivery methods and the most common are summarized on the next page.

Design-Bid-Build

Most projects follow this traditional method of project delivery in which the owner engages an architect to design, prepare contract documents and tender to general contractors for a “Stipulated Price Contract”. Advantages include its wide use, clear role definition, and price certainty upon award.

Design-Build

In this method, the owner contracts with only one firm to provide both design and construction services. While there are numerous variations on this theme, the method provides for price certainty and allows for market ingenuity. Advantages might include both speed of delivery and price certainty, and the downside is that design and quality control shifts from the owner and architect to the builder.

Construction Management (at Risk)

Construction Management is a broad term, but generally means a construction manager (CM) is added to the team at an early stage, offers specialized knowledge to the owner, and oversees schedule, costs, and technology. Because the addition of the CM fee is at the project’s front end, this approach is most commonly used on large, complex projects. The CM does not replace the owner but is acting as an agent for the owner. An advantage might include the speed of delivery. The downside is often that the full cost is not known until the project is complete.

Alternately, a CM at Risk can be employed wherein Construction Manager is engaged during design who then becomes a General Contractor with a contract similar to Design-Bid-Build.

Recommendation

For the scale of the project, price certainty upon award, and the current aggressive construction industry suggests that **Design-Bid-Build** might be the best approach.

9.0 APPENDICES

The appendices include technical reports and drawings from the consultant team and are coordinated as it relates to cost estimate breakdowns and represent the completion of Pre-Design.

Appendix A – Preferred Building Options and Master Park Plan

Appendix B – Engineering Reports

Appendix C – Energy Modelling Report

Appendix A

Preferred Building Options and Master Park Plan

Carscadden Stokes McDonald Architects with LEES & Associates, November 28, 2024



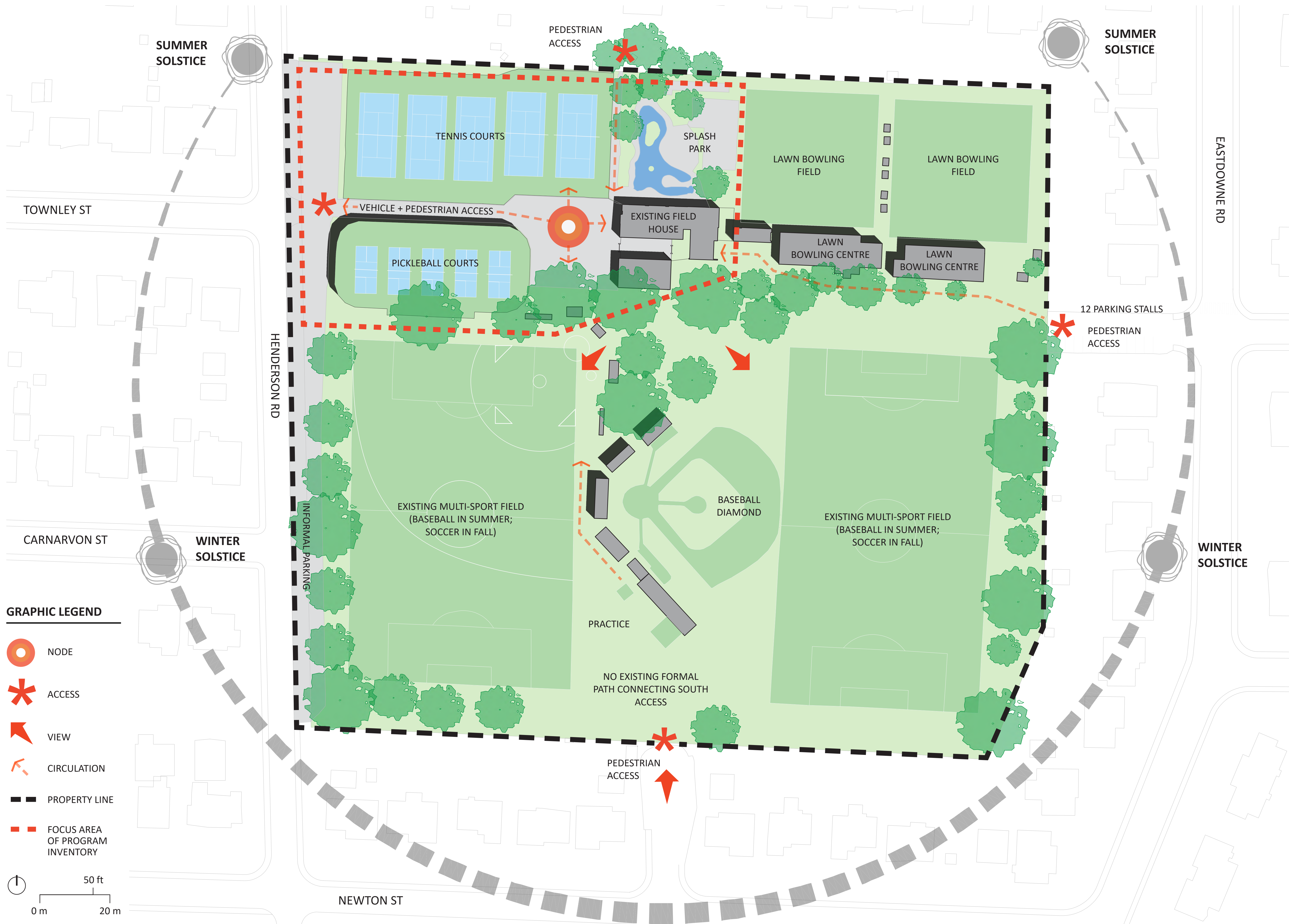
Carscadden

LEFS ASSOCIATES

DISTRICT OF OAK BAY

CARNARVON PARK MASTER PLAN REFRESH

CURRENT AMENITIES AND PROGRAM SITE CONDITIONS



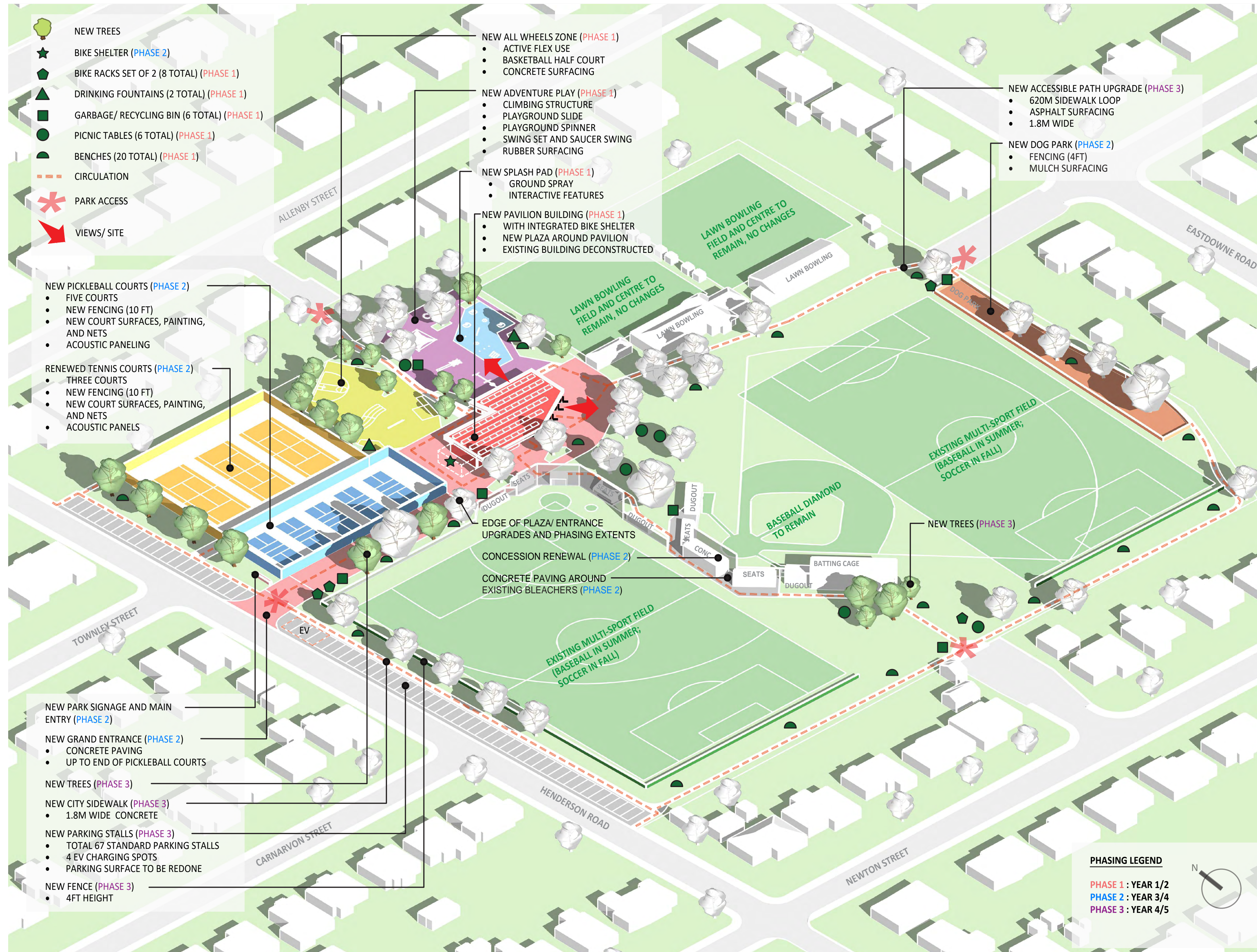
GRAPHIC LEGEND

- NODE
- ACCESS
- VIEW
- CIRCULATION
- PROPERTY LINE
- FOCUS AREA OF PROGRAM INVENTORY

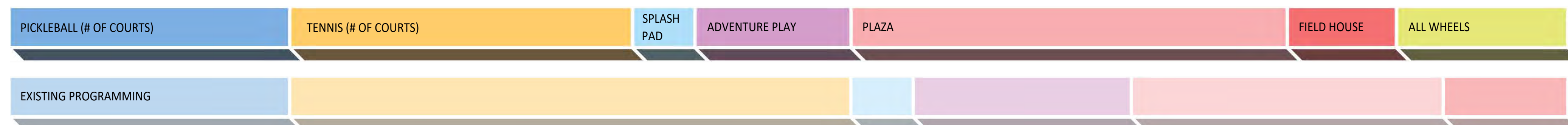


PAVILION WITH COMMUNITY ROOM

SINGLE-STORY BUILDING WITH A COMMUNITY ROOM, SIX PRIVATE WASH/ CHANGE ROOM STALLS, A CONCESSION STAND, SMALL OFFICE, ELECTRICAL/ MECHANICAL ROOM, STORAGE, AND COVERED PLAZA.



PROPOSED PROGRAM INVENTORY



BAR GRAPH COMPARING EXISTING PARK PROGRAMMING AND PROPOSED PROGRAMMING IN NORTHWEST FOCUS AREA

EXAMPLES



NORGATE PARK FIELD HOUSE, NORTH VANCOUVER



WEST NEWTON CRICKET FIELD HOUSE, SURREY



OVAL PAVILION, NOVA SCOTIA



Carscadden

LEFS ASSOCIATES
DISTRICT OF OAK BAY

CARNARVON PARK
MASTER PLAN REFRESH

PAVILION WITH COMMUNITY ROOM
AXONOMETRIC
OPTION 2.1



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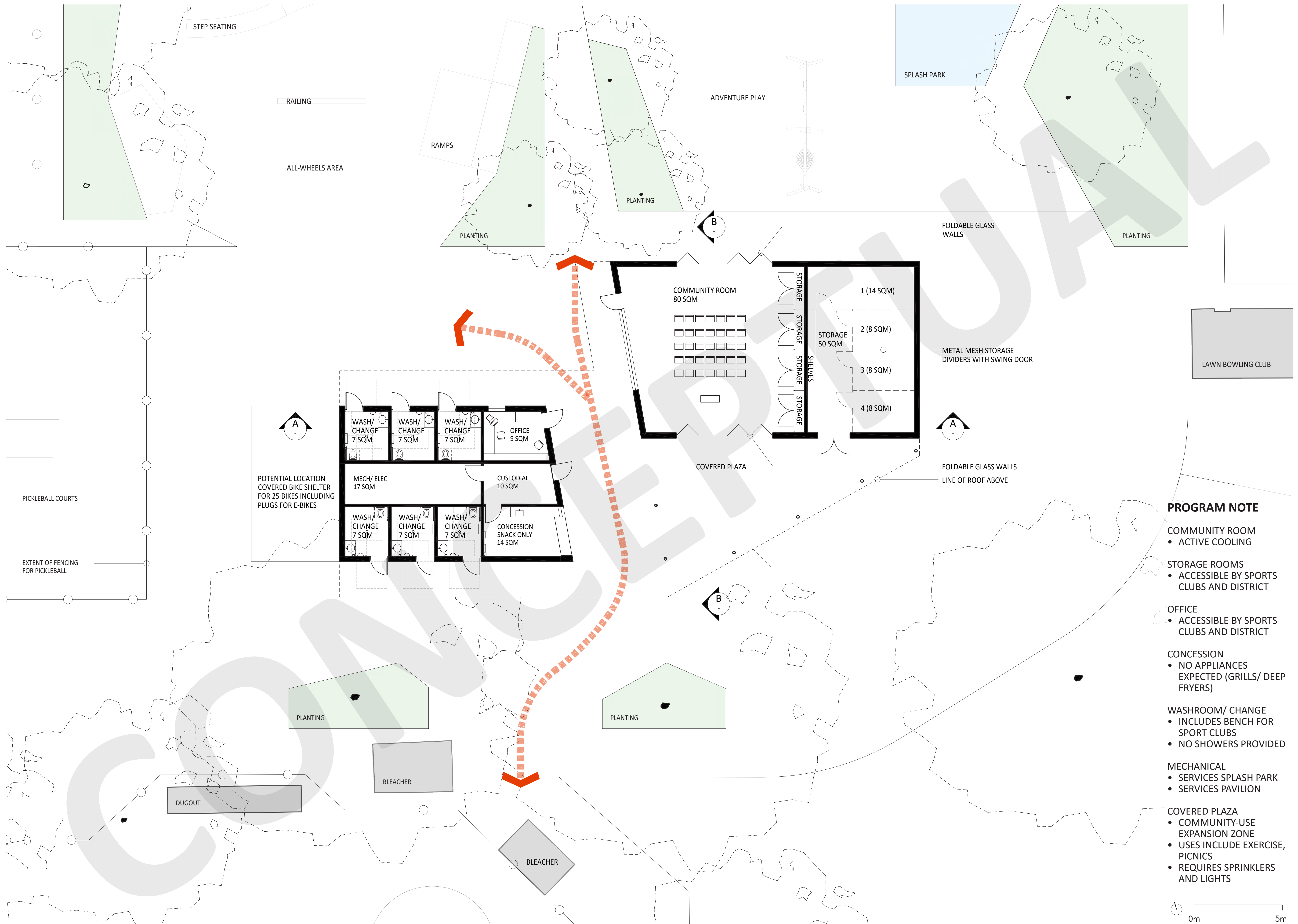
DISTRICT OF OAK BAY

CARNARVON PARK MASTER PLAN REFRESH

PAVILION WITH COMMUNITY ROOM

BUILDING PLAN AND DETAILS

OPTION 2.1



PROGRAM NOTE

- COMMUNITY ROOM**
 - ACTIVE COOLING
- STORAGE ROOMS**
 - ACCESSIBLE BY SPORTS CLUBS AND DISTRICT
- OFFICE**
 - ACCESSIBLE BY SPORTS CLUBS AND DISTRICT
- CONCESSION**
 - NO APPLIANCES EXPECTED (GRILLS/ DEEP FRYERS)
- WASHROOM/ CHANGE**
 - INCLUDES BENCH FOR SPORT CLUBS
 - NO SHOWERS PROVIDED
- MECHANICAL**
 - SERVICES SPLASH PARK
 - SERVICES PAVILION
- COVERED PLAZA**
 - COMMUNITY-USE EXPANSION ZONE
 - USES INCLUDE EXERCISE, PICNICS
 - REQUIRES SPRINKLERS AND LIGHTS

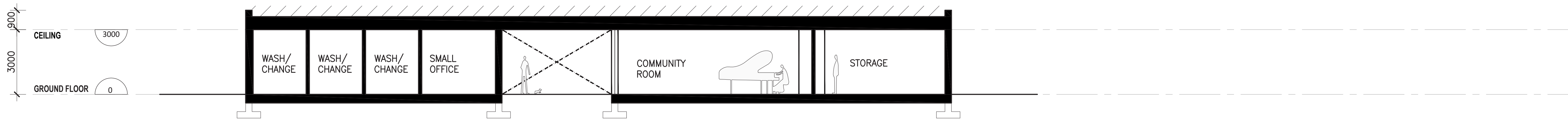


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DISTRICT OF OAK BAY

CARNARVON PARK MASTER PLAN REFRESH



A KEY SECTION
Scale 1:100



B KEY SECTION
Scale 1:100



OPTION 2.1
 PAVILION WITH COMMUNITY ROOM
 SECTIONS

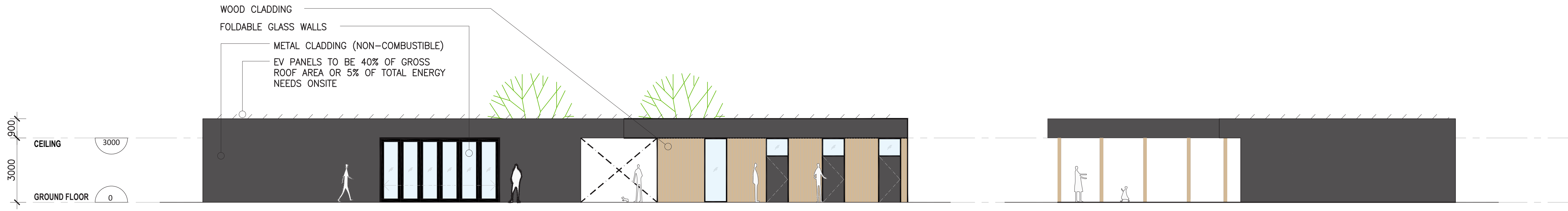


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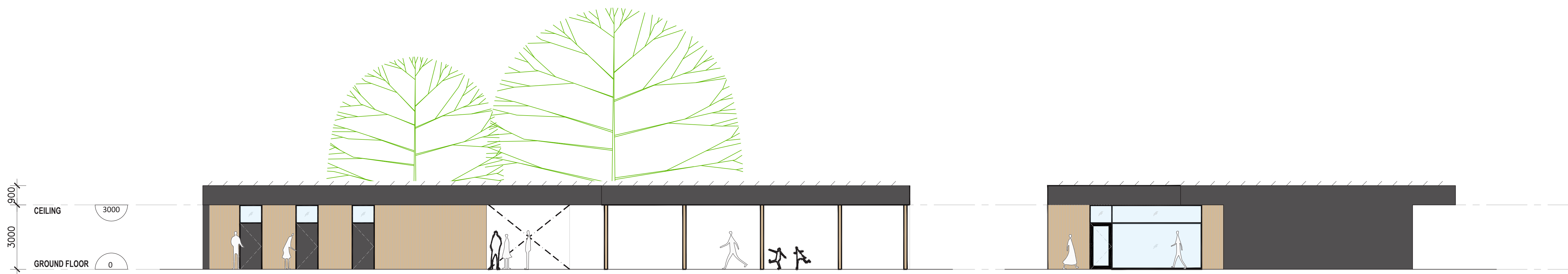
DISTRICT OF OAK BAY

CARNARVON PARK MASTER PLAN REFRESH



NORTH ELEVATION
Scale 1:100

EAST ELEVATION
Scale 1:100



SOUTH ELEVATION
Scale 1:100

WEST ELEVATION
Scale 1:100



PAVILION WITH COMMUNITY ROOM
OPTION 2.1
ELEVATIONS



VIEW LOOKING SOUTHEAST



VIEW LOOKING NORTH

NOTE: MATERIALS ARE CONCEPTUAL IN NATURE AND ARE NOT FINAL. RENDERS ARE PROVIDED TO DEPICT GENERAL FORM/ MASSING AND SITE CONTEXT.



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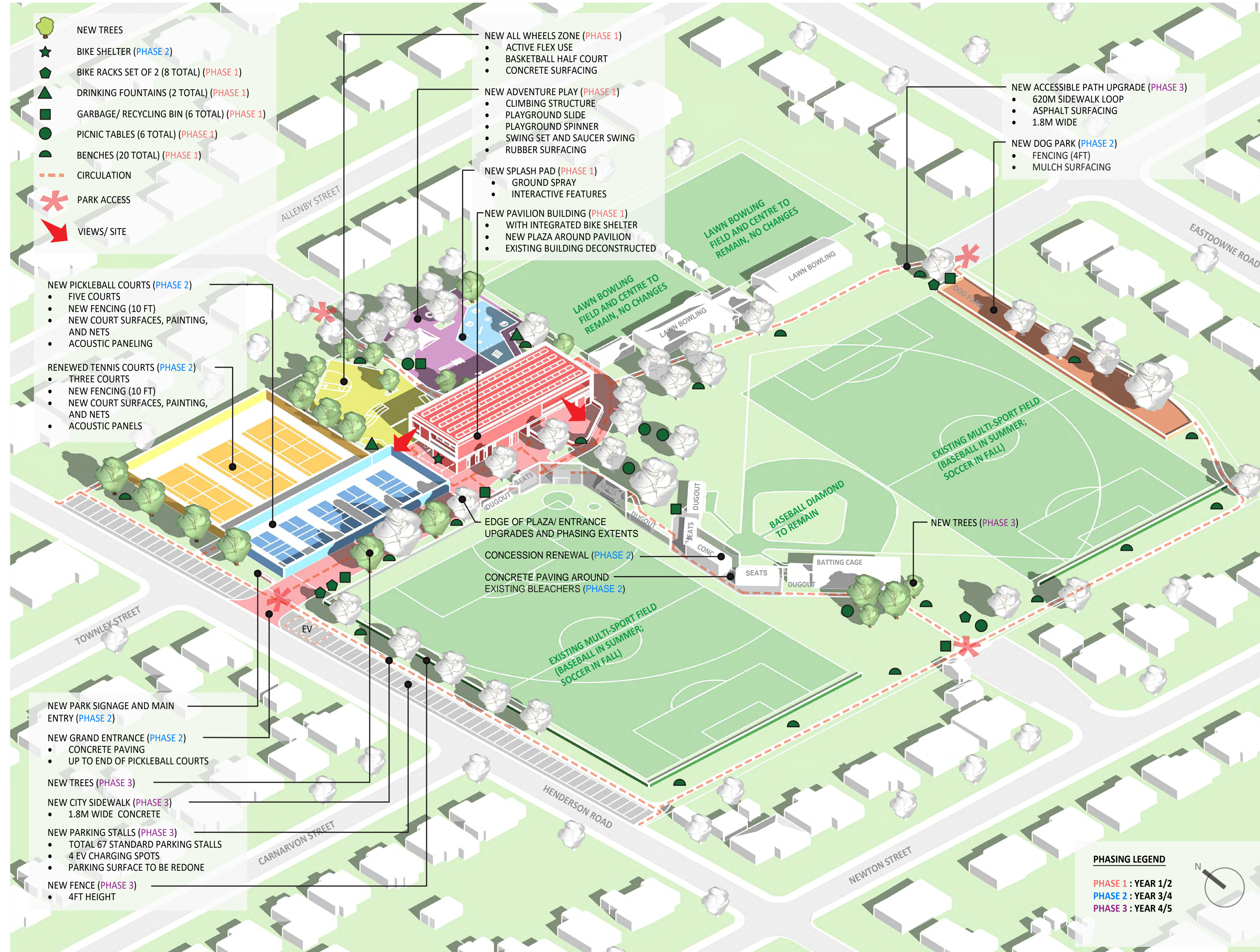
DISTRICT OF
OAK BAY

CARNARVON PARK
MASTER PLAN REFRESH

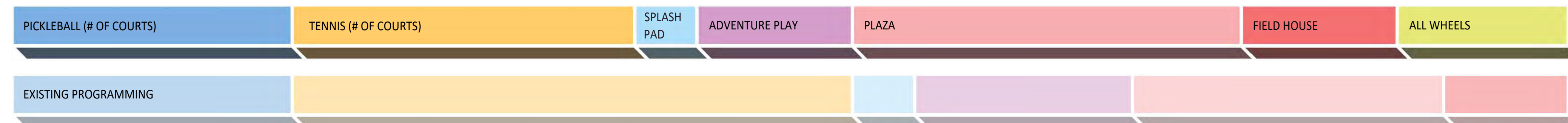
PAVILION WITH COMMUNITY ROOM
CONCEPTUAL RENDERS
OPTION 2.1

LARGE PAVILION WITH CHILDCARE

TWO-STORY BUILDING WITH CHILDCARE, SIX PRIVATE WASH/ CHANGE STALLS, TWO COMMUNITY ROOMS, TWO FLEX SPACES, COVERED OUTDOOR PATIO, KITCHEN, ELECTRICAL/ MECHANICAL ROOM, AND STORAGE.



PROPOSED PROGRAM INVENTORY



BAR GRAPH COMPARING EXISTING PARK PROGRAMMING AND PROPOSED PROGRAMMING IN NORTHWEST FOCUS AREA

EXAMPLES



WINDSOR PAVILION, OAK BAY



NATIONAL CENTRE FOR INDIGENOUS LAWS AND FRASER BUILDING RENOVATION, VICTORIA



CHEAKAMUS CENTRE, BRACKENDALE



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CARNARVON PARK
MASTER PLAN REFRESH

LARGE PAVILION WITH CHILDCARE
OPTION 3.1
AXONOMETRIC



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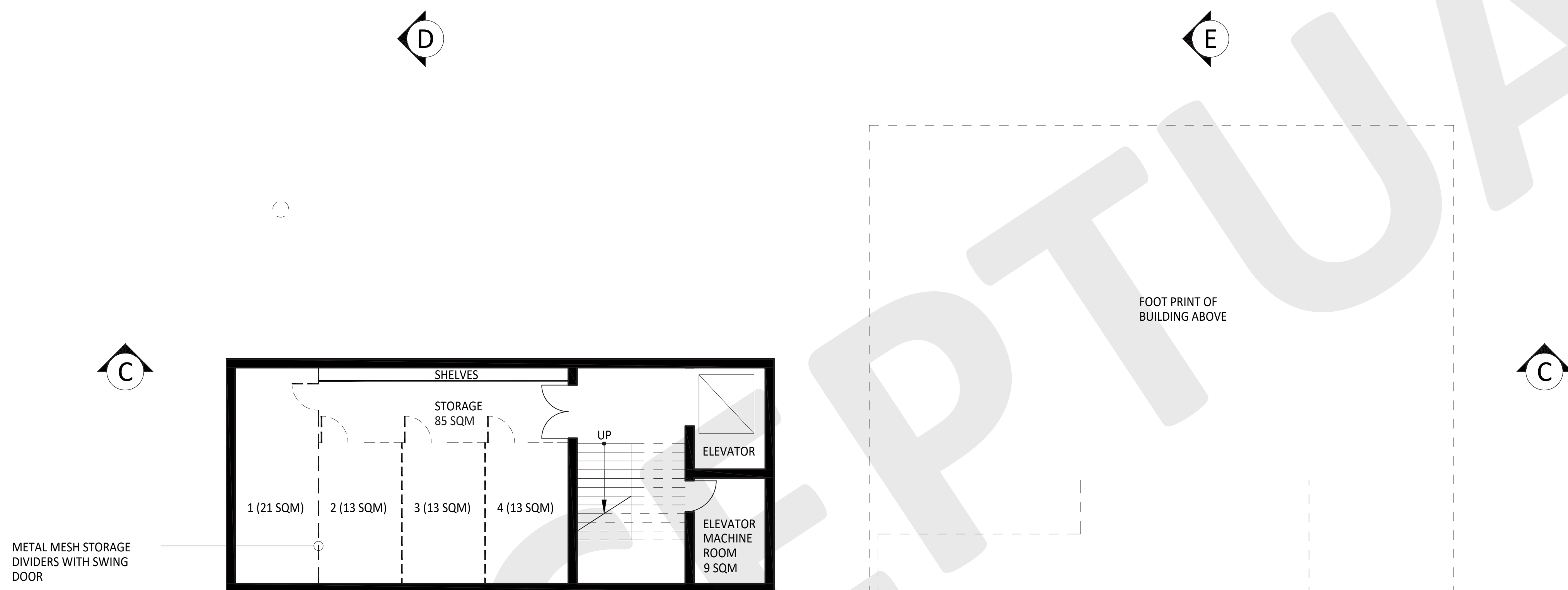
DISTRICT OF OAK BAY

CARNARVON PARK MASTER PLAN REFRESH

OPTION 3.1

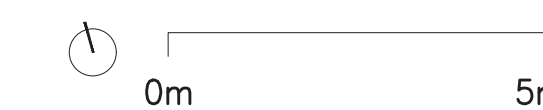
LARGE PAVILION WITH CHILDCARE

BUILDING PLAN AND DETAILS - BASEMENT



PROGRAM NOTE

- STORAGE ROOMS
- ACCESSIBLE BY SPORTS CLUBS AND DISTRICT



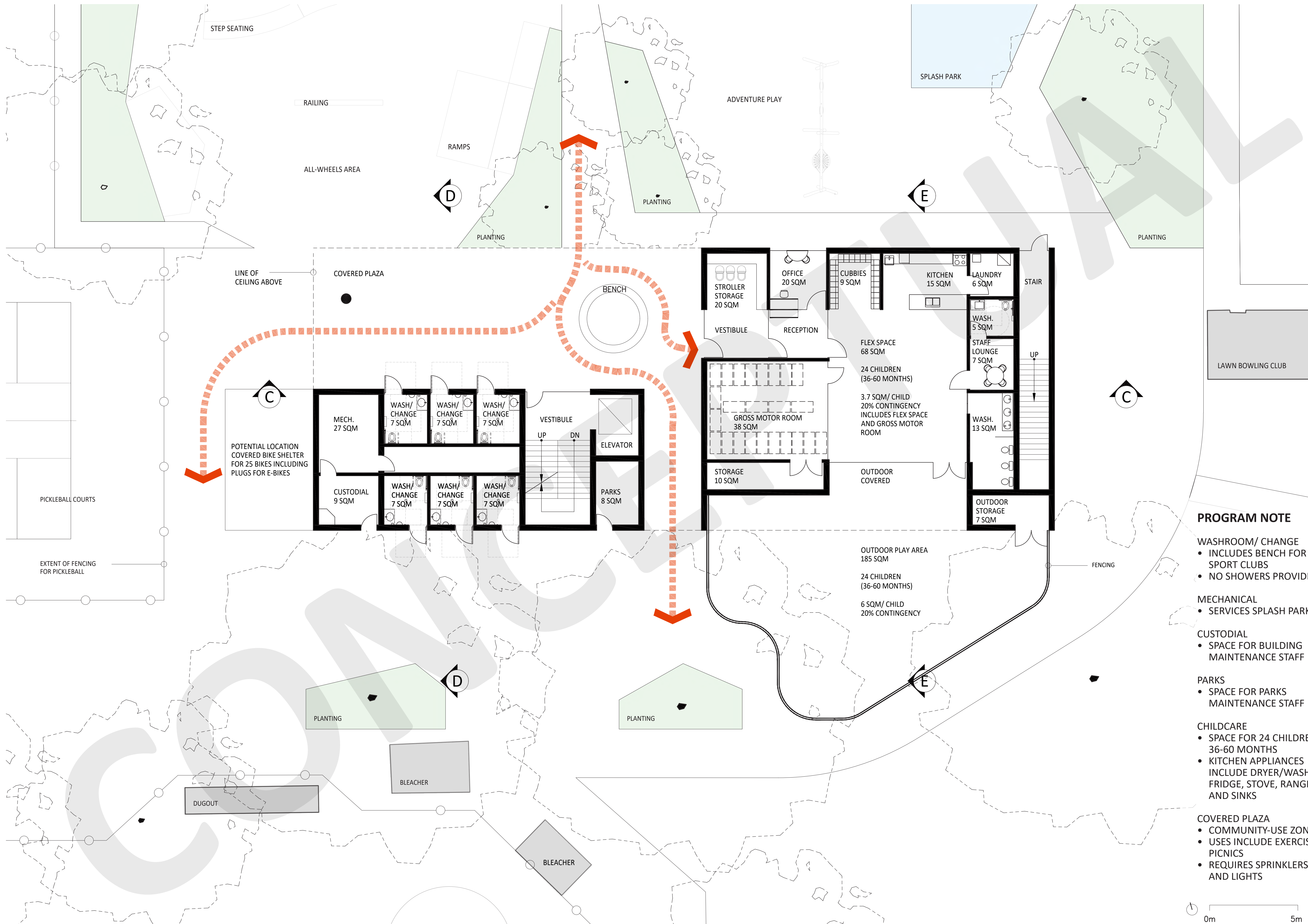


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DISTRICT OF OAK BAY

CARNARVON PARK MASTER PLAN REFRESH



PROGRAM NOTE

- WASHROOM/ CHANGE
 - INCLUDES BENCH FOR SPORT CLUBS
 - NO SHOWERS PROVIDED
- MECHANICAL
 - SERVICES SPLASH PARK
- CUSTODIAL
 - SPACE FOR BUILDING MAINTENANCE STAFF
- PARKS
 - SPACE FOR PARKS MAINTENANCE STAFF
- CHILDCARE
 - SPACE FOR 24 CHILDREN, 36-60 MONTHS
 - KITCHEN APPLIANCES INCLUDE DRYER/WASHER, FRIDGE, STOVE, RANGE, AND SINKS
- COVERED PLAZA
 - COMMUNITY-USE ZONE
 - USES INCLUDE EXERCISE, PICNICS
 - REQUIRES SPRINKLERS AND LIGHTS



LARGE PAVILION WITH CHILDCARE
 BUILDING PLAN AND DETAILS - GROUND FLOOR
OPTION 3.1

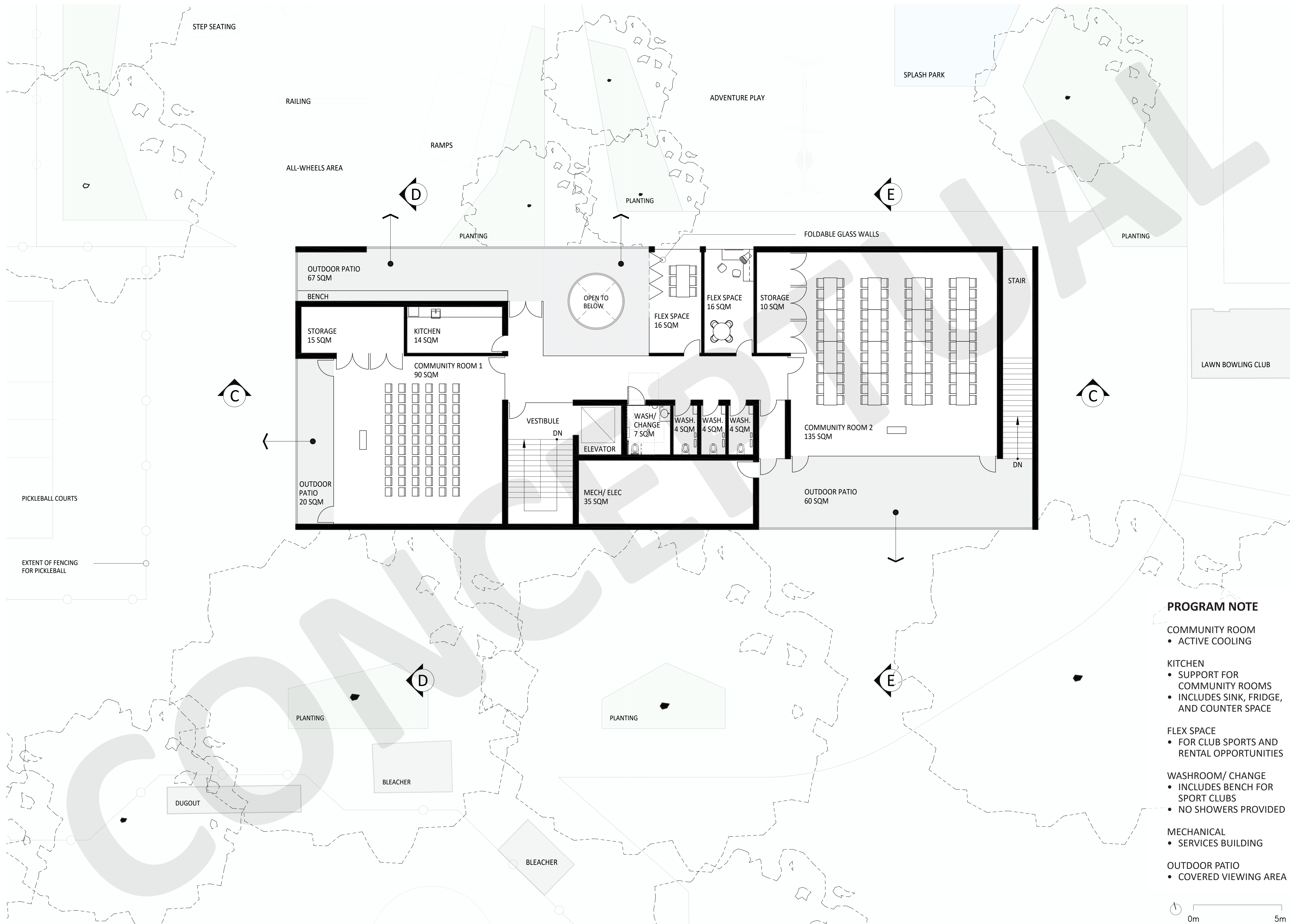


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DISTRICT OF OAK BAY

CARNARVON PARK MASTER PLAN REFRESH



PROGRAM NOTE

- COMMUNITY ROOM**
 - ACTIVE COOLING
- KITCHEN**
 - SUPPORT FOR COMMUNITY ROOMS
 - INCLUDES SINK, FRIDGE, AND COUNTER SPACE
- FLEX SPACE**
 - FOR CLUB SPORTS AND RENTAL OPPORTUNITIES
- WASHROOM/ CHANGE**
 - INCLUDES BENCH FOR SPORT CLUBS
 - NO SHOWERS PROVIDED
- MECHANICAL**
 - SERVICES BUILDING
- OUTDOOR PATIO**
 - COVERED VIEWING AREA



LARGE PAVILION WITH CHILDCARE
BUILDING PLAN AND DETAILS - 2ND FLOOR
OPTION 3.1

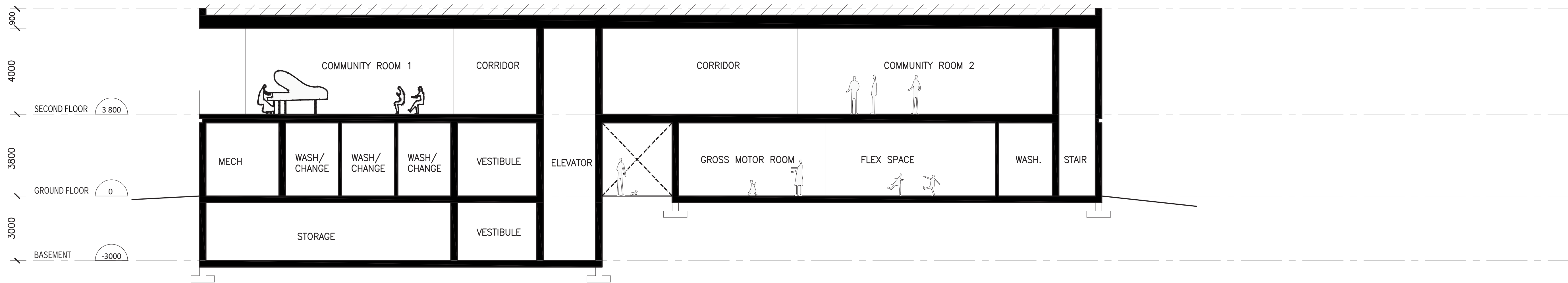


Carscadden

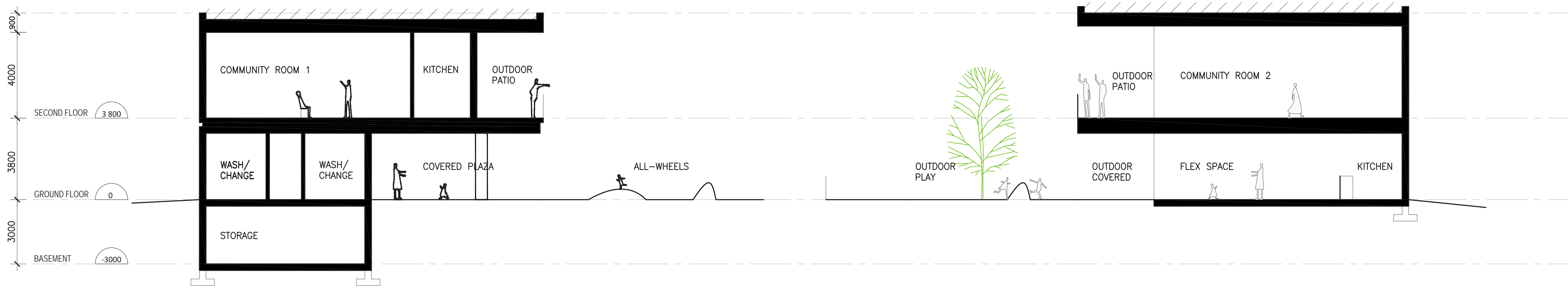
LEFS ASSOCIATES

DISTRICT OF OAK BAY

CARNARVON PARK MASTER PLAN REFRESH



C KEY SECTION
Scale 1:100



D KEY SECTION
Scale 1:100

E KEY SECTION
Scale 1:100



LARGE PAVILION WITH CHILDCARE
OPTION 3.1
 SECTIONS

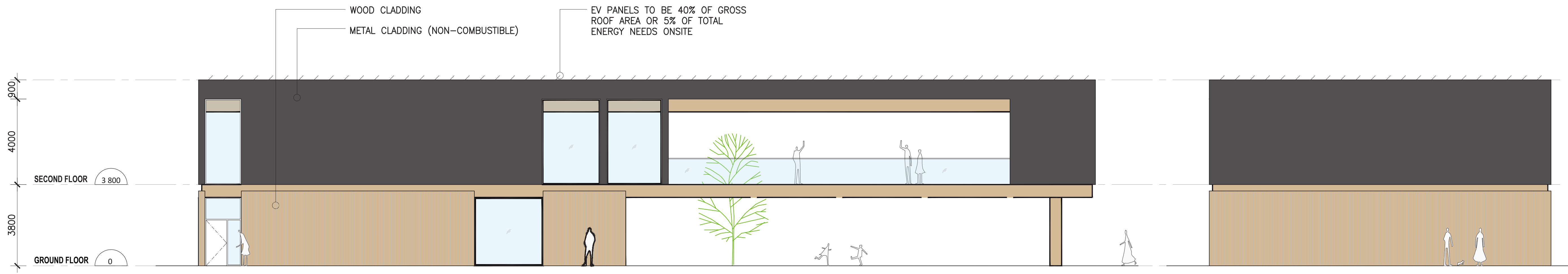


Carscadden

LEFS ASSOCIATES

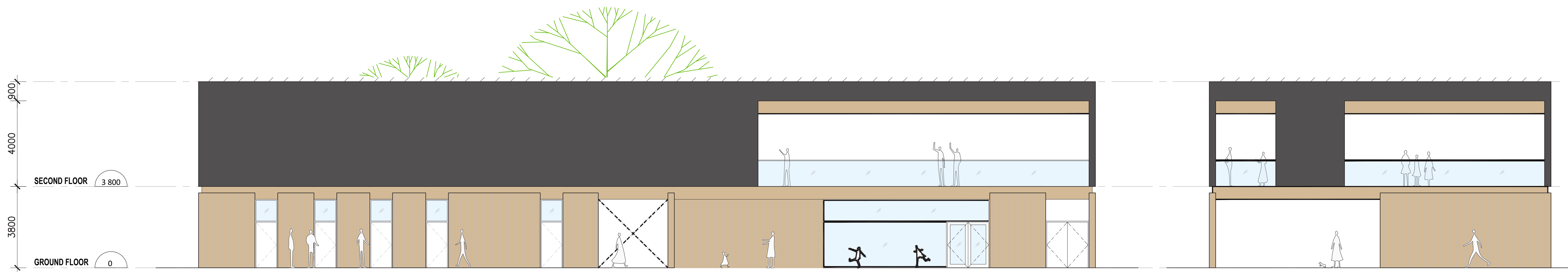
DISTRICT OF OAK BAY

CARNARVON PARK MASTER PLAN REFRESH



NORTH ELEVATION
Scale 1:100

EAST ELEVATION
Scale 1:100



SOUTH ELEVATION
Scale 1:100

WEST ELEVATION
Scale 1:100



LARGE PAVILION WITH CHILDCARE ELEVATIONS
OPTION 3.1

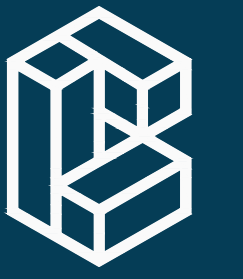


VIEW LOOKING SOUTHEAST



VIEW LOOKING NORTH

NOTE: MATERIALS ARE CONCEPTUAL IN NATURE AND ARE NOT FINAL. RENDERS ARE PROVIDED TO DEPICT GENERAL FORM/ MASSING AND SITE CONTEXT.



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ASSOCIATES

DISTRICT OF
OAK BAY

CARNARVON PARK
MASTER PLAN REFRESH

LARGE PAVILION WITH CHILDCARE
CONCEPTUAL RENDERS
OPTION 3.1

Appendix B

Engineering Reports

Schematic Design Reports from RJC Engineers, AME Group, and AES Engineering,
November 1 – 14, 2024

November 4, 2024



Engineers

Emma Carscadden
Carscadden Stokes McDonald Architects Inc.
310 – 1930 Pandora Street
Vancouver, BC V5L 0C7
emma@carscadden.ca
Dear Emma,

RE: Oak Bay – Carnarvon Park Master Plan Refresh
2801 Henderson Road, Oak Bay, BC
Schematic Design Report
Structural Engineering

RJC No. VIC.137618.0002

1.0 STRUCTURAL

We understand the current scope is to develop different building options for new facilities at Carnarvon Park, 2801 Henderson Road, in Oak Bay. The structural scope of this report includes a feasibility review and schematic design plans for two options.

- Option 2.1 – Pavilion with Community Room
- Option 3.1 – Large Pavilion with Childcare

1.1 Design Criteria

The new structure will be designed, to meet the requirements of the 2024 British Columbia Building Code (BCBC 2024). The design criteria for this project are outlined in Appendix A.



1.2 Proposed New Construction

The proposed new construction is expected to be as follows for the two current options:

- Option 2.1 – Pavilion with Community Room
 - Single-storey
 - Foundations are anticipated to be conventional cast-in-place concrete spread footings, with a 102 mm reinforced slab-on-grade and reinforced concrete pad and strip footings supporting the columns and walls. Spread footings will be founded as shallow as possible to grade, but a minimum of 450 mm below grade for frost protection, or wherever suitable bearing is first found.
 - Ground Floor - 275 m² of building space
 - Roof - 437 m² with allowance for 40% of roof area to include EV Panels
 - The roof construction was assumed to be 19 mm tongue and groove plywood sheathing on 241 mm deep wood I joists at 610 mm on centre, at typical interior spans. The larger spans of the covered plaza would be 406 mm deep wood I joists at 406 mm to 610 mm on centre. These will be supported by wood stud walls or PSL beams. Lateral restraint will be provided by wood frame shear walls. For the larger spans in the community room, 800 mm deep pre-engineered parallel chord roof trusses are anticipated as noted. This depth may be reduced by shortening spans with additional beam and column lines.

- Option 3.1 – Large Pavilion with Childcare
 - Two-storeys with partial basement
 - Basement and Foundations - 150 m² below grade. Foundations are anticipated to be conventional cast-in-place concrete spread footings, with a 102 mm reinforced slab-on-grade and reinforced concrete pad and strip footings supporting the columns and walls. Spread footings will be founded as shallow as possible to grade, but a minimum of 450 mm below grade for frost protection, or wherever suitable bearing is first found. The basement area will be enclosed with 203 mm thick reinforced concrete retaining walls. The structure above the basement area, at ground level, is anticipated to be a 190 mm deep suspended concrete slab.
 - Ground Floor - 150 m² ground level washroom and changing space, 275 m² childcare/flex space and 247 m² of outdoor covered area.
 - Second Floor - 672 m² upper level consisting of 506 m² of indoor community space and 166 m² of outdoor patio space.
 - The second floor construction was assumed to be 38 mm concrete topping on 19 mm tongue and groove plywood sheathing on 302 mm deep wood I joists at 406 mm



on centre, at typical spans. Due to large spans over the childcare space and the covered plaza, and load-bearing wall transfers, areas of joist may need to be as deep as 457mm, as indicated. These depths may be reduced by reducing spans with additional beam and column lines. The joists will be supported by wood stud walls or PSL beams. Lateral restraint will be provided by wood frame shear walls.

- Roof - 672 m² with allowance for 40% of roof area to include EV Panels
 - The roof construction was assumed to be 19 mm tongue and groove plywood sheathing on 302 mm deep wood I joists at 406 mm on centre, at typical spans. These will be supported by wood stud walls or PSL beams. Lateral restraint will be provided by wood frame shear walls. For the larger spans in the community rooms, pre-engineered parallel chord roof trusses ranging from 800 – 1200 mm deep are anticipated as noted. These depths may be reduced by shortening spans with additional beam and column lines.

Both building options have the flexibility to be a variety of conventional construction materials. Conventional wood-frame, mass timber, concrete, masonry, structural steel, and combinations thereof are all feasible for the proposed buildings. The attached sketches indicate framing layouts assuming conventional wood-frame, with wood-frame shear walls providing the lateral force resisting system, which is believed to be the most cost effective structure for the proposed buildings.

All areas are approximate and based on the October 17, 2024 Architectural drawings provided by Carscadden Architecture. Areas are approximate and if used for costing should be independently confirmed. For the purpose of developing loads, we assumed a low profile photovoltaic array, with 0.5 kPa weight allowance that does not cause snow drifting.

Sketches of the proposed framing for the new build options are provided in this report's appendix.

Please contact the undersigned if you have any questions.

Yours truly,

READ JONES CHRISTOFFERSEN LTD. | EGBC Permit to Practice No. 1002503

Aaron Post, P.Eng.
Project Engineer
ADP/sem



APPENDIX A

DESIGN CRITERIA



Design Criteria

The new construction at Carnarvon Park, 2801 Henderson Road, will be designed to meet the 2024 British Columbia Building Code (BCBC 2024) requirements based on the National Building Code of Canada 2020 (NBCC 2020). The design would be based on the following loading criteria:

Ground Snow Load: $S_s = 1.5 \text{ kPa}$
 $S_r = 0.3 \text{ kPa}$

Floor Design Live Loads: Assembly Areas, Corridors, Exit Stairs, Exterior Walkways, and Balconies = 4.8 kPa
 Storage = 4.8 kPa
 Mechanical Rooms = 3.6 kPa

Importance Factor: $I_e = 1.0$ Normal Importance

Table 1 - Seismic Parameters:

Force Level	Probability of exceedance	Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	Sa(5.0)	PGA
Fully Code Compliant	2% in 50 Years	1.860	1.630	0.950	0.556	0.142	0.797

Soil Site Class: Site Class C (assumed)
 Allowable Bearing Pressure: To be provided by Geotechnical Engineer
 Minimum Footing Depth: 0.45 m below grade
 Wind Pressure: $q_{50} = 0.57 \text{ kPa}$


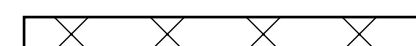
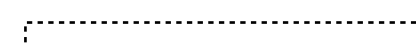
Geotechnical items such as bearing pressures and site class must be confirmed by a Geotechnical Engineer and submitted to the consulting group prior to any detailed design.

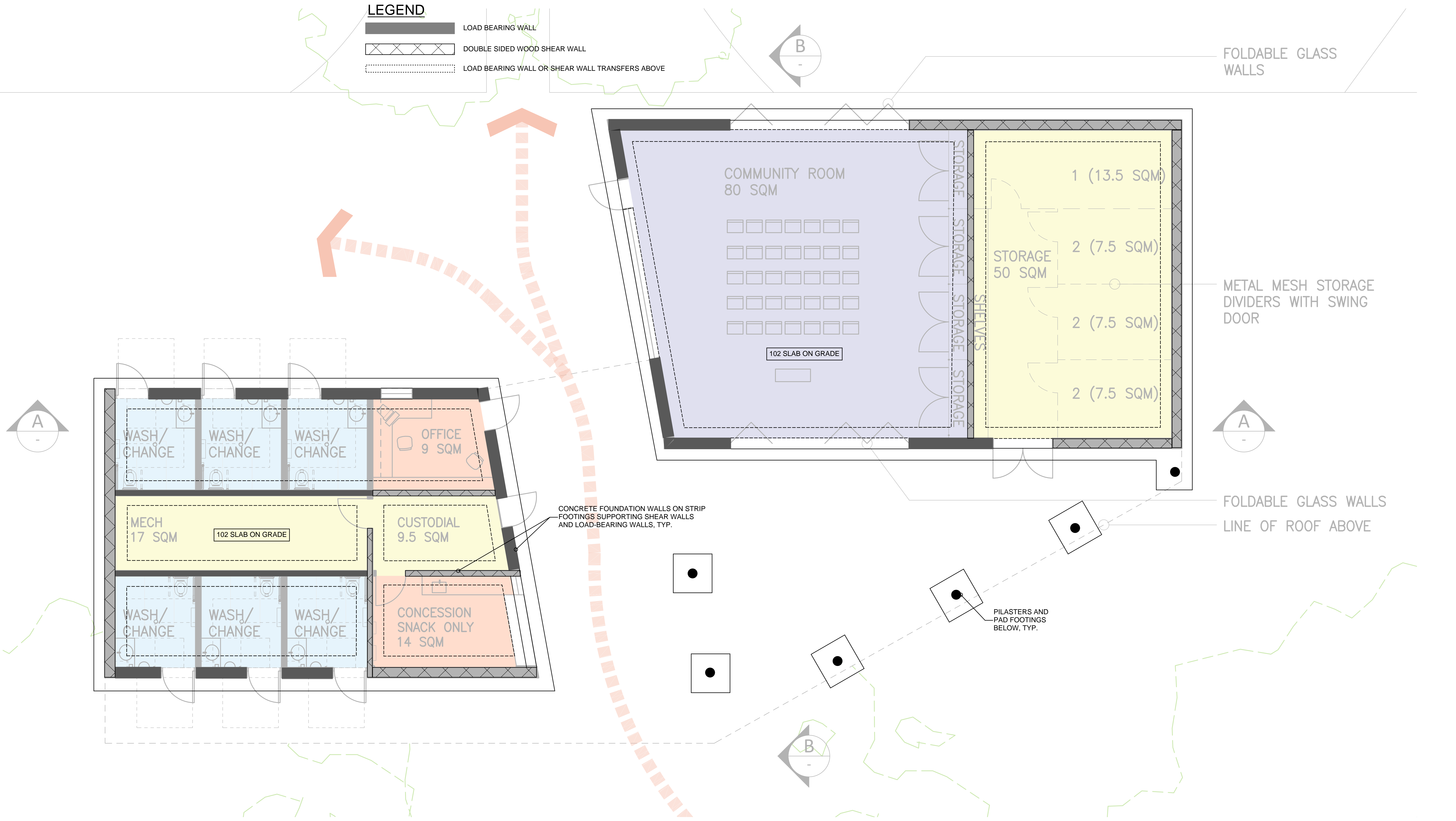


APPENDIX B

SCHEMATIC BUILDING SKETCHES

LEGEND

-  LOAD BEARING WALL
-  DOUBLE SIDED WOOD SHEAR WALL
-  LOAD BEARING WALL OR SHEAR WALL TRANSFERS ABOVE



FOLDABLE GLASS WALLS

METAL MESH STORAGE DIVIDERS WITH SWING DOOR

FOLDABLE GLASS WALLS
LINE OF ROOF ABOVE

CONCRETE FOUNDATION WALLS ON STRIP FOOTINGS SUPPORTING SHEAR WALLS AND LOAD-BEARING WALLS, TYP.

PILASTERS AND PAD FOOTINGS BELOW, TYP.


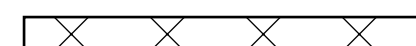
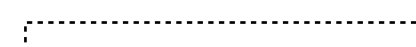
1 OPTION 2.1 GROUND FLOOR PLAN WITH FOUNDATIONS
SSK-02 N.T.S.



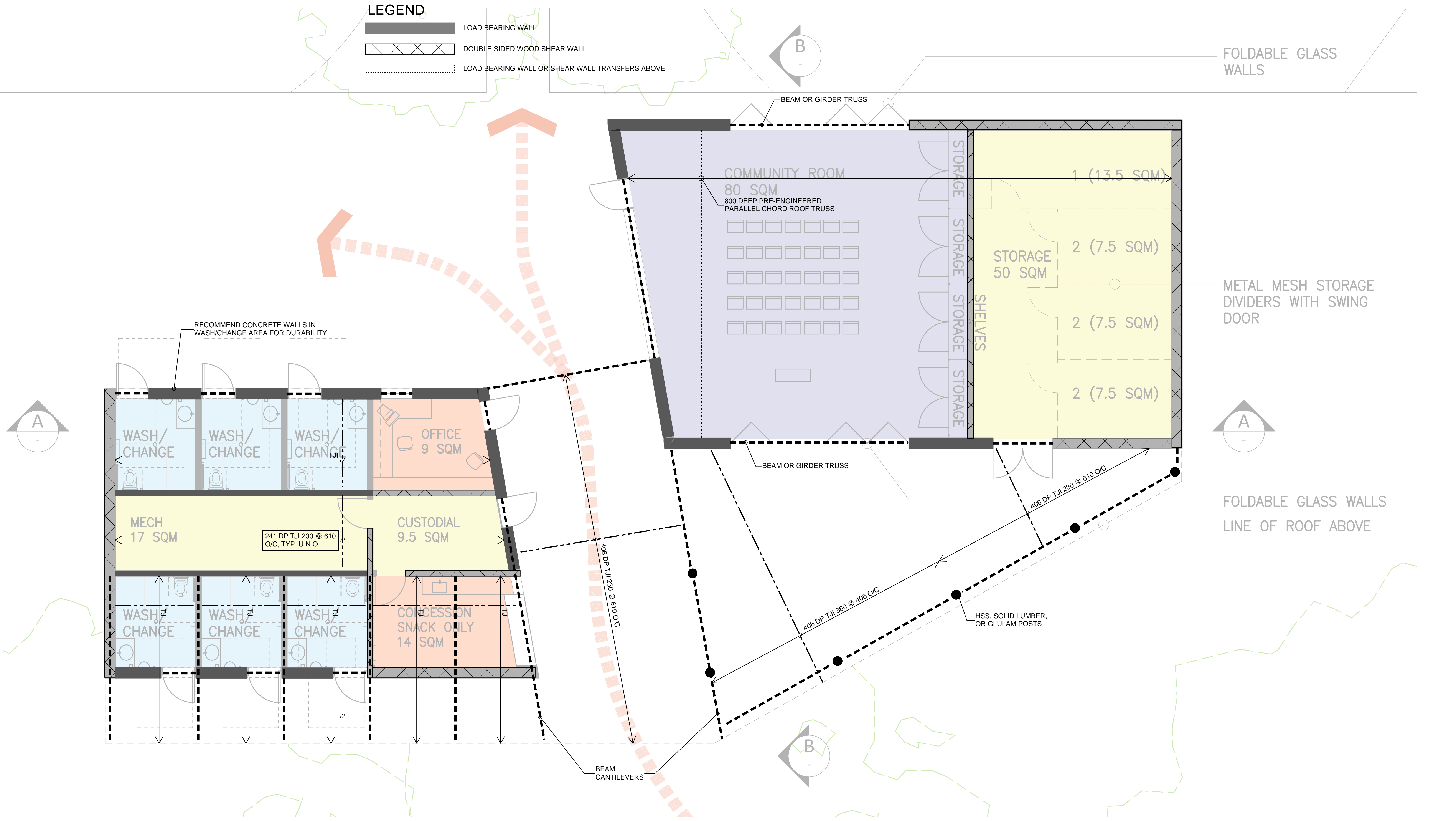
Project Name
**OAK BAY - CARNARVON PARK
MASTER PLAN REFRESH**
Sketch Title
**OPTION 2.1 GROUND FLOOR PLAN WITH
FOUNDATIONS**

Dwg. Ref. -
Scale N.T.S.
Date 2024/11/04
Project No. VIC-137618.0002
Sketch Number
SSK-01 Rev. 00

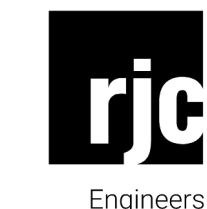
LEGEND

-  LOAD BEARING WALL
-  DOUBLE SIDED WOOD SHEAR WALL
-  LOAD BEARING WALL OR SHEAR WALL TRANSFERS ABOVE

FOLDABLE GLASS WALLS



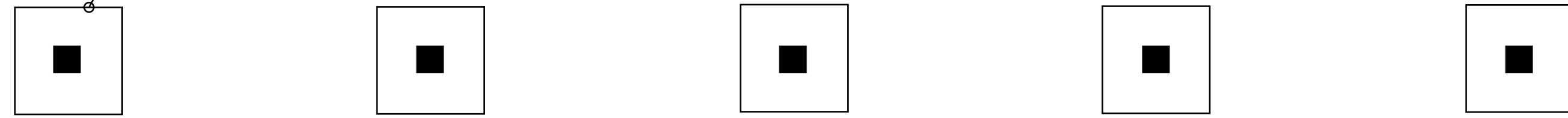
1 OPTION 2.1 GROUND FLOOR PLAN WITH ROOF FRAMING OVER
SSK-02 N.T.S.



LEGEND

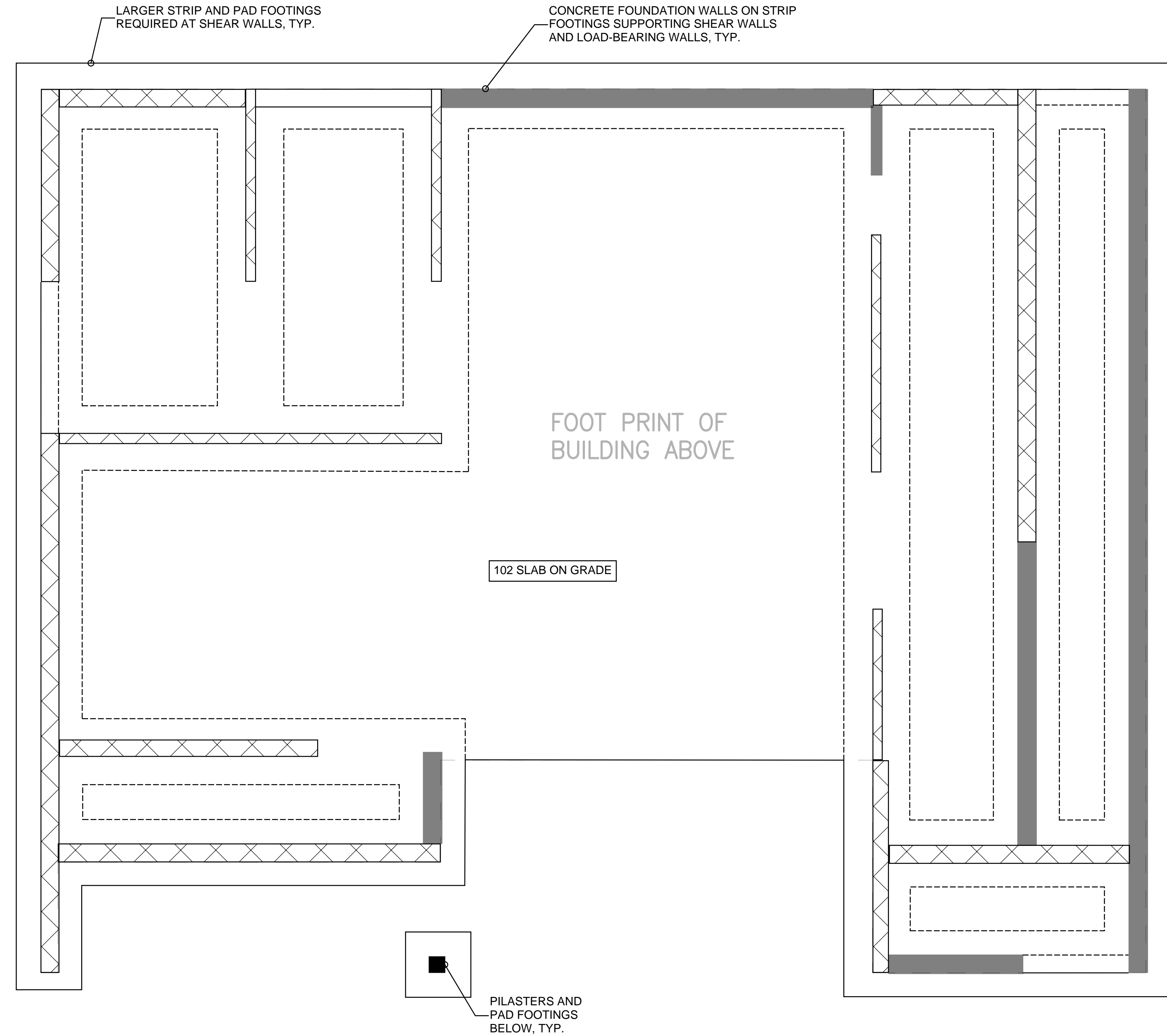
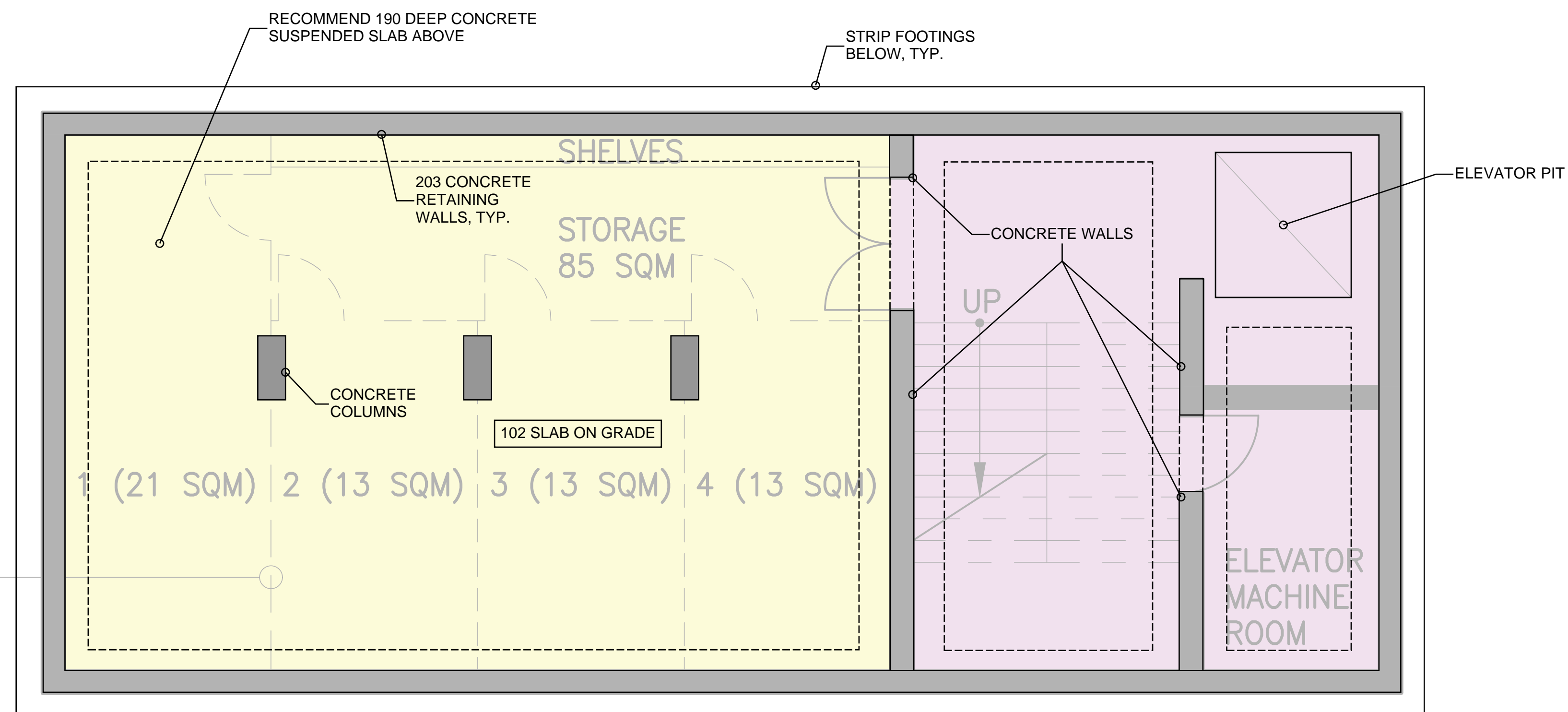
- LOAD BEARING WALL
- DOUBLE SIDED WOOD SHEAR WALL
- LOAD BEARING WALL OR SHEAR WALL TRANSFERS ABOVE

PILASTERS AND PAD FOOTINGS BELOW, TYP.



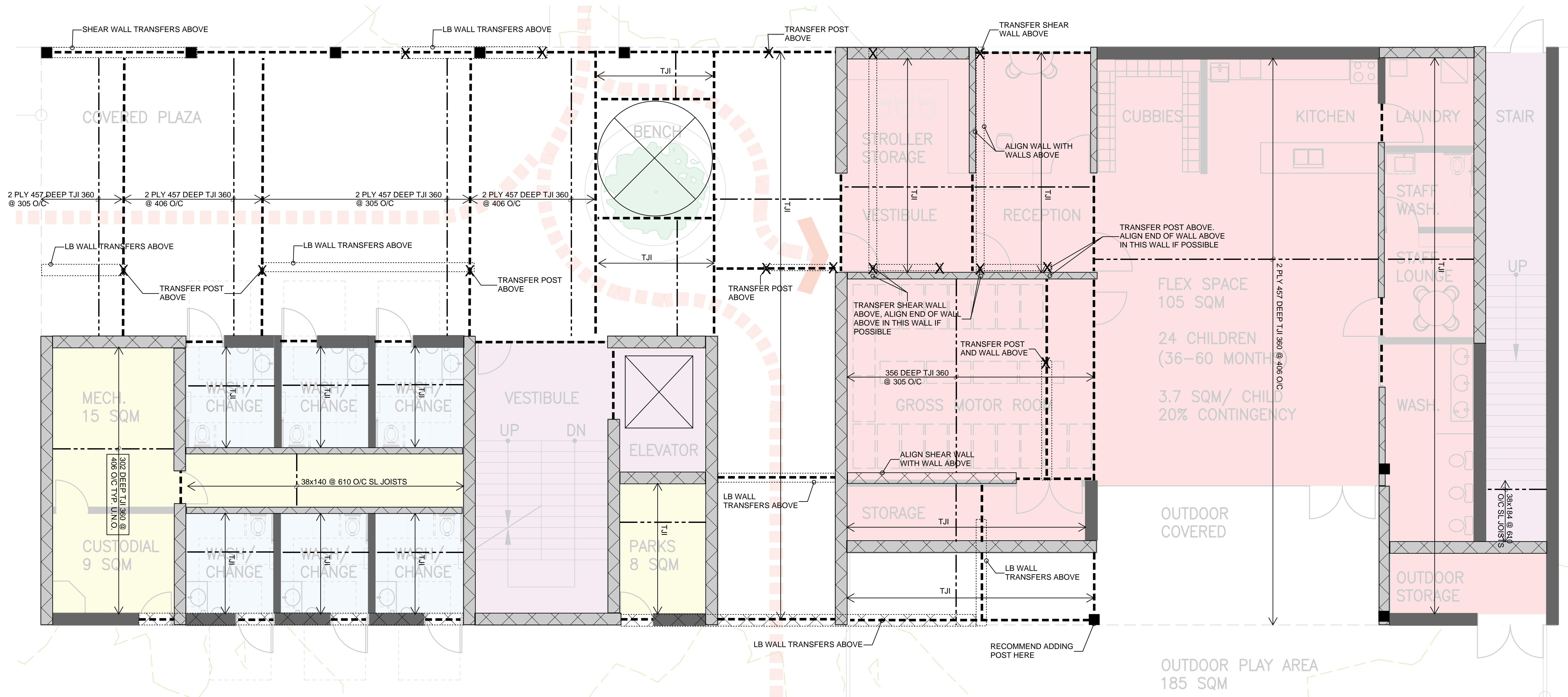
LARGER STRIP AND PAD FOOTINGS REQUIRED AT SHEAR WALLS, TYP.

CONCRETE FOUNDATION WALLS ON STRIP FOOTINGS SUPPORTING SHEAR WALLS AND LOAD-BEARING WALLS, TYP.

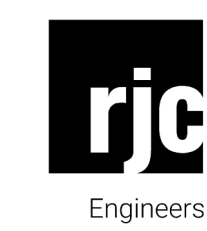


LEGEND

- LOAD BEARING WALL
- DOUBLE SIDED WOOD SHEAR WALL
- LOAD BEARING WALL OR SHEAR WALL TRANSFERS ABOVE



1 **OPTION 3.1 GROUND FLOOR PLAN WITH SECOND FLOOR FRAMING OVER**
SSK-04 N.T.S.

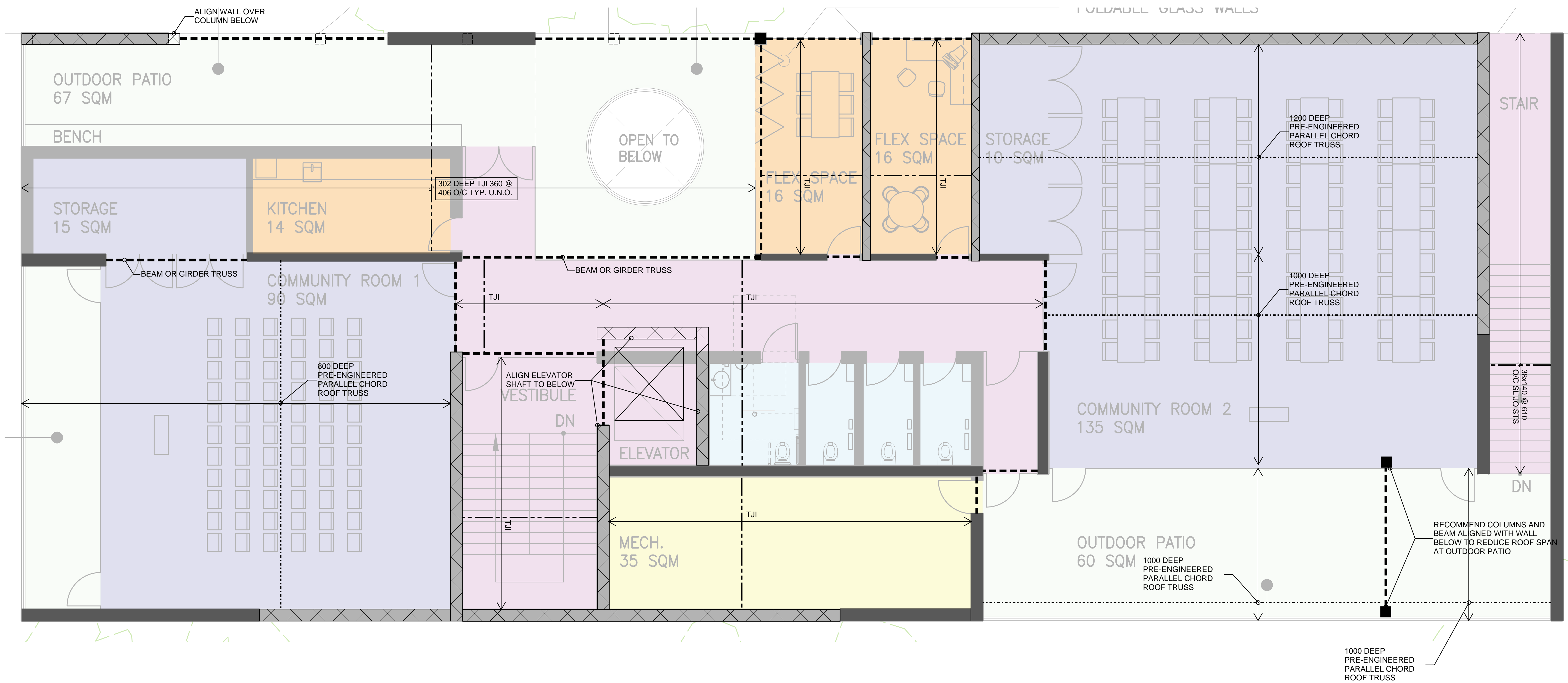


Project Name
OAK BAY - CARNARVON PARK
MASTER PLAN REFRESH
Sketch Title
OPTION 3.1 GROUND FLOOR PLAN WITH SECOND FLOOR FRAMING OVER

Dwg. Ref. -
Scale N.T.S.
Date 2024/11/04
Project No. VIC-137618.0002
Sketch Number
SSK-04
Rev. 00

LEGEND

- LOAD BEARING WALL
- DOUBLE SIDED WOOD SHEAR WALL
- LOAD BEARING WALL OR SHEAR WALL TRANSFERS ABOVE



1 OPTION 3.1 SECOND FLOOR PLAN WITH ROOF FRAMING OVER
SSK-05 N.T.S.



CARNARVON PARK MASTER PLAN REFRESH AND MAIN BUILDING OPTION ANALYSIS

Project No.: 040A-153-24

Mechanical Schematic Design R1

November 14, 2024

PREPARED FOR:

Carscadden Stokes McDonald Architects Inc.

ATTN:

Mark Hosford

ASSOCIATE ARCHITECT AIBC

PREPARED BY:

Nic Besseling, P.Eng., LEED AP BD+C

Principal

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This report has been prepared by the AME Consulting Group for the exclusive use of Carscadden Stokes McDonald Architects Inc. and the design team. The material in this report reflects the best judgement of the AME Consulting Group with the information made available to them at the time of preparation. Any use a third party may make of this report, or any reliance on or decisions made based upon the report, are the responsibility of such third parties. The AME Consulting Group accepts no responsibility for damages suffered by any third party as a result of decisions made or actions taken based upon this report.

1. INTRODUCTION

The AME Consulting Group was commissioned by Carscadden Stokes McDonald Architects Inc. on behalf of the Corporation of the District of Oak Bay to provide mechanical consulting services for the Carnarvon Park. The purpose of the report is to outline the basis of design for the mechanical systems and to identify options that will contribute to the design criteria outlined by all stakeholders. All information provided will meet current codes and standards and where applicable will identify future codes and standards being considered.

2. DESIGN CRITERIA

The mechanical, plumbing and fire protection systems will be designed in accordance with the intent of all applicable codes and standards, along with the practice guidelines provided by EGBC. Below is a list of some of the applicable codes and standards.

2.1 Applicable Codes and Standards

- .1 British Columbia Plumbing Code, current edition
- .2 British Columbia Building Code, current edition
- .3 National Model Energy Code for Buildings
- .4 ASHRAE 90.1, current edition
- .5 ASHRAE 62.1, current edition
- .6 Provincial Fire Marshall Regulations
- .7 Applicable NFPA Regulations
- .8 BC Boiler and Pressure Vessel Act
- .9 American Society of Heating, Refrigeration and Air Condition Engineers (ASHRAE)
- .10 American Society of Plumbing Engineers (ASPE)

.11 Sheet Metal Contractors Association of North America (SMACNA)

2.2 Acoustic Requirements

Acoustic requirements are provided by the project acoustic consultant. The HVAC system will be designed such that the noise level in the spaces will be maintained to meet those requirements, both internally and externally. Mitigation measures could include acoustically lining ductwork, provision for silencers and vibration isolation for mechanical equipment.

2.3 Sustainability Requirements

It is understood that the sustainability goals for this project are to follow the BC Step Code and National Energy Code for Buildings.

2.4 Plumbing Guidelines

The plumbing system will be designed to the National Plumbing Code (or newer version if required) requirements. At this time there are no anticipated specialty plumbing requirements.

2.5 Fire Suppression Requirements

The fire suppression system will be designed to meet all requirements in National Fire Protection Association (NFPA). Any alternate solutions defined by the Code Consultant will be incorporated into this design. In addition, the BC Fire Code will be followed (Section 2.5 Fire Suppression).

2.6 HVAC Design Guidelines

The HVAC system will be designed to meet all requirements in the current version of the BC Building Code and all required ASHRAE Standards: ASHRAE 90.1, Energy Standard for Buildings except Low-Rise Residential Buildings and ASHRAE 62.1 Ventilation for Acceptable Indoor Air Quality. The ASHRAE Standards will be updated if required to latest versions.

The design for the entire facility will include 10% safety factor for all primary heating systems and a 10% safety factor for cooling systems unless specifically noted otherwise within this report.

Indoor space temperatures will follow ASHRAE 55 standards. Where possible, higher airflow velocities may be used to allow for a higher room temperature setpoints (e.g., Fitness Spaces).

The building heating and cooling loads will be calculated based on the following outdoor conditions specified in the BC Building Code.

Design Temperatures		Degree Days
January	July 2.5%	

1 % Design	Dry Bulb °C	Wet Bulb °C	
-6°C	24°C	17°C	2650

Our design for the entire facility will include 10% safety for all primary heating systems and 0% safety for cooling systems unless specifically noted otherwise within this report.

2.7 Indoor Space Environmental Conditions

Space Type	Winter °C db	Summer °C db	Relative Humidity
Change Rooms	20	*	Not Controlled
Lobby / Admin	20	24	Not Controlled
Daycare	20	24	
Multi-purpose / Community Spaces	20	24	

* Note: No cooling is proposed for the change room spaces

As part of the climate resiliency strategy, considerations should be made for forest fire season. Air handling systems will be designed with provision for future addition of active filtration that will remove smoke. The filters will not be included in the equipment specifications, but there will be space provided for future addition if required.

3. PLUMBING SYSTEMS

3.1 Service Requirements

The building will be fully serviced with connections coordinated with the civil engineering and the The Corporation of the District of Oak Bay (Victoria, BC). The preliminary analysis indicates that the following site services are required. Piping connections for the mechanical contractor will extend to 1.0 meter from the building.

Option 2.1

- .1 100mm Ø service sanitary sewer: The sanitary will be drained by gravity and connected to civil services.
- .2 150mm Ø service storm sewers: The storm system will be drained by gravity and connected to civil services.
- .3 150mm Ø combined fire and domestic water supply.
- .4 50mm Ø water supply to splash park.

Option 3.1

- .1 150mm Ø service sanitary sewer: The sanitary will be drained by gravity and connected to civil services.
- .2 200mm Ø service storm sewers: The storm system will be drained by gravity and connected to civil services.
- .3 150mm Ø combined fire and domestic water supply.
- .4 50mm Ø water supply to splash park.

Post-Disaster Site Service Considerations:

Although not required by the BC Building Code, the following options should be considered to improve resiliency after a disaster:

- 1. Sanitary holding tank in case of service disruption
- 2. Domestic water storage tank in case of service disruption

3.2 Plumbing Distribution

- .1 The domestic cold-water system will consist of:
 - .1 Central pressure reducing valve.
 - .2 Distribution system to the building’s DHW tanks.
 - .3 Distribution system to service individual fixtures.
 - .4 Irrigation cap-off at the water entry room.
- .2 The domestic hot water system will consist of:
 - .1 Electric Domestic Hot Water Tanks
 - .2 Domestic hot water recirculation system with a pump
 - .3 Distribution system to service individual fixtures
 - .4 Temperature mixing valve and stations for local tempering to supply 40°C (105°F)

3.3 Storm Drainage System

- .1 The roof areas will be provided with roof drains, with Rainwater Leaders (RWLs) collected and brought down to the foundation. This line will then be connected to the storm system on site. All drains outside of the building footprint will be picked up as part of the civil scope of work.

3.4 Footing Drainage System

- .1 Footing drainage will be provided for this project where required to protect sub grade footings and structural slabs. The capacity will be determined by the Geotechnical engineer. This drainage will be routed through a sediment sump then connected to the site storm system. The drainage system will be provided with cleanouts for routine maintenance and cleaning.

3.5 Sanitary Waste and Vent Systems

- .1 All plumbing fixtures will have drains connected to the sanitary waste and vent system. Plumbing vents will be collected and terminate above the roof level (one vent per building segment/washroom group). The sanitary waste system will discharge to the building sewer below grade at the south side of the building.
- .2 If recommended by the Geotechnical Engineer, all sanitary piping below slab on grade will be supported with stainless steel hangers.
- .3 A grease interceptor will be provided to accept drainage from the concession sinks and floor drains. It will be located on the exterior of the building and its final location will be coordinated with facilities team and architect.

3.6 Plumbing Fixtures

- .1 All fixtures be selected with consideration for a high level of performance and durability. A detailed plumbing fixture selection package is not yet available but will be submitted as part of the Design Development package.
- .2 All public water closets will be automatic low flow flush valve type, wired and wall mount.
- .3 Urinals will be flush valve type for automatic flushes.
- .4 Lavatories will be equipped with single temperature sensor metering type faucets. This will reduce water consumption. Faucets will be wall mount.
- .5 Barrier-free fixtures, including drinking fountains, will be provided where required.
- .6 Sensor or button activated showers with narrow spray pattern will be provided. Institutional shower heads will be used.
- .7 Drinking fountains with bottle fillers will be provided in the in entry areas. The drinking fountain will be refrigerated. A water station will also be provided in each changeroom at the sink.
- .8 Non-freeze hose bibbs will be installed in areas subject to freezing (exterior landscaped areas and loading bay as required).
- .9 Interior hose bibs will be provided in change rooms mechanical rooms. Exterior hose bibs will be provided spaced at 60m maximum. Hose bib will also be provided in the vicinity of grease interceptor.
- .10 Floor drains will be provided in mechanical rooms, washrooms, changerooms and in any other rooms as required.
- .11 Emergency eyewash and shower will be provided in the chemical storage area.

3.7 Plumbing Accessories

The plumbing system will consist of the following accessories as required by codes and standards:

- .1 Backflow preventers will be provided as required by CSA B64.10-07 (ex: Hose bibbs in equipment rooms, connection to equipment, coffee stations, etc.).

4. FIRE PROTECTION SYSTEMS

The new facility will be fully sprinklered with a wet system and will be complete with supervisory and tamper switches on all main isolation valves, backflow prevention, flow switches, and sprinkler flow control valve assemblies on each floor. Dry sprinklers will be used under combustible overhangs and other areas subject to freezing.

All areas will be sprinklered unless otherwise directed by the authorities having jurisdiction.

All sprinkler heads located in the washrooms will be provided with sprinkler head guard.

4.1 Zoning

The building will be zoned as follows:

- .1 Each floor will have wet sprinklers designed to NFPA-13: Light Hazard and ordinary hazard.
- .2 Dry heads will be installed off of the wet system to protect areas where sprinkler heads are subject to freezing. Building overhangs exceeding 4.5m (where sprinklering is required) will be protected by a dry system.
- .3 Maximum zone sizes will be in accordance with NFPA-13.

4.2 Fire Protection Accessories

The fire protection system will consist of the following accessories as required by NFPA and local building code:

- .1 An exterior Siamese connection for the fire department and a test connection will be provided adjacent to the main entrance, consistent with the location of the enunciator panel as located by electrical. This connection location will be determined after coordination with the local fire department.
- .2 Fire extinguisher cabinets complete with a 4.5-Kg fire extinguisher will be provided in accordance with NFPA 10 and reviewed and approved by the authority having jurisdiction.
- .3 Test flow connections for the sprinkler system will be incorporated at the water entry room for each zone, and for testing each alarm device.

5. HEATING, VENTILATION AND COOLING SYSTEMS

5.1 Option 2.1 - Pavillion with Community Room

.1 Change Rooms

.1 The changeroom areas will be served by a single heat recovery ventilator. The unit will consist of supply and return fans with variable speed drives, 100% fresh air mixing box with two position occupied / unoccupied dampers, bag filters and heating coil. 100% of the exhaust air heat will be recovered before discharging outdoors. The unit will be provided with an electric heating coil to temper the air up to space temperature.

- Preliminary sizing for HRV: 900 CFM

.2 Each change room will have its own electric force flow heater to provide space temperature control. Exhaust air grilles will be located over toilets and fresh air supply at change area.

- Preliminary sizing for heaters: 1.5 kW each

.2 Community / Office

.1 Ventilation will be provided through an HRV with demand control.

- Preliminary sizing for HRV: 1200 CFM

.2 Heating / Cooling will be provided by a VRF system, with the condensing units installed on the roof (or screened area at grade).

- Preliminary sizing for VRF System: 5 tons

.3 Electric force flow heaters will be provided in each space

- Preliminary sizing for heaters: 1.5 kW each

.3 Concession

- .1 It is understood that the second floor concession will not be used for commercial cooking so will be provided with a 1.5 kW force flow heater and a standard non-grease exhaust fan (200 CFM).

5.2 Option 3.1 - Large Pavillion with Childcare

.1 Change Rooms

- .1 The changeroom areas will be served by a single heat recovery ventilator. The unit will consist of supply and return fans with variable speed drives, 100% fresh air mixing box with two position occupied / unoccupied dampers, bag filters and heating coil. 100% of the exhaust air heat will be recovered before discharging outdoors. The unit will be provided with an electric heating coil to temper the air up to space temperature.

- Preliminary sizing for HRV: 900 CFM

- .2 Each change room will have its own electric force flow heater to provide space temperature control. Exhaust air grilles will be located over toilets and fresh air supply at change area.

- Preliminary sizing for heaters: 1.5 kW each

.2 Flex / Childcare / Community / Office / Admin

- .1 Ventilation will be provided through an HRV with demand control.

- Preliminary sizing for HRV: 4200 CFM

- .2 Heating / Cooling will be provided by a VRF system, with the condensing units installed on the roof (or screened area at grade).

- Preliminary sizing for VRF System: 30 tons

- .3 Electric force flow heaters will be provided in each space

- Preliminary sizing for heaters: 1.5 kW each

5.3 Service Rooms

- .1 Custodial room to have dedicated exhaust fan

- .2 The mechanical / electrical room will be provided with an exhaust fan with reverse acting thermostat for heat rejection purposes.

5.4 Ductwork Material and Design

- .1 All supply and return air duct sizing will be based on 18 Pa (0.07" w.c.) pressure drop and a maximum air velocity of 6.0 m/s (1200ft/min.) for branch lines.
- .2 Fully ducted supply air systems will be used. Ceiling spaces will be used for return air plenums where applicable.
- .3 Duct systems will be designed in accordance with ASHRAE recommendations and SMACNA, HVAC Duct Construction Standards latest edition.
- .4 Concealed supply air ductwork will be insulated with minimum 25mm thick external insulation.
- .5 Internal surfaces of all plenum sections including mixing box, access sections, filter section, discharge plenums and fan casing will be covered with 50mm neoprene coated rigid duct line of 72.0 kg/m³ density.
- .6 Fire and smoke protection will be incorporated in the design of all air handling systems in accordance with local codes and standards.
- .7 On end of line diffusers, the line of branch will be extended by two neck diameters before dead ending.
- .8 For main duct and shaft take-off, conical fitting will be used for circular ducts, and prism shaped shoe fittings will be used for rectangular duct.
- .9 Manual balancing dampers will be installed at each branch take-off from a main duct on both supply and return air systems.

Access doors of adequate size will be provided within working distance of all volume dampers, fire dampers, fan coils, etc.

6. CONTROL SYSTEMS

6.1 Mechanical Building System

All major mechanical systems will be equipped with Direct Digital Control (DDC) systems. This will include all equipment located in mechanical rooms as well as any roof mounted systems.

The entire building will be controlled by BACnet compatible components. BACnet is an ASHRAE protocol that allows standardized data communication for complete automation and control of building systems, such as heating, ventilating, air-conditioning control, lighting control, access control and fire detection systems. Devices like chillers will use the BACnet protocol removing all redundant control points not applicable to the unit. All systems and equipment will be compatible with and operate with BACnet over IP protocols.

All devices installed into the facility will be completely BACnet compatible, i.e. thermostats, sensors, etc. Modbus, Lonworks, etc are not acceptable.

Zone temperature control devices, occupancy sensors and CO₂ sensors will typically be either duct-mounted or wall-mounted. Wall-mounted devices shall be provided with protective covers installed on the sensors within the public spaces. The administrative areas will allow a small amount of manual temperature control by the occupants. The rest of the sensors will be controlled centrally through the DDC interface.

Shower rooms and other applicable spaces will be equipped with humidity sensors in accordance with ASHRAE 55 standard, per the table noted above.



Schematic Design Report for

Carnarvon Park Pavilion

Electrical Engineering Services

Prepared for:
Carscadden Stokes McDonald Architects Inc.

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Project No.: 0224.0098
Date: 11/12/2024

**DESIGNING
A BETTER
TOMORROW**

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1. Introduction

This report provides a schematic design summary of the electrical systems planned for a new pavilion of Carnarvon Park in Oak Bay, BC.

Two building options are proposed for this master plan refresh. The first option (option 2.1) is a single-story building of 276m² area. The second option (option 3.1) is a 2-story building with a basement. It consists of an indoor and outdoor childcare area on ground level.

The following report is primarily intended to compare two building options and demonstrate the basis of the electrical system design. This report is preliminary in nature and is prepared to be used as a guide to ensure a fully functional electrical system design. The purpose of the information in this report is to establish scope, material, and installation quality, and does not provide detailed design instructions. Documents and drawings included within are diagrammatic, and not to scale unless otherwise indicated. This document is focused on, but not limited to, the following:

- Load estimation;
- PV system analysis;
- Main incoming electrical service;
- Power distribution system;
- Emergency power System (generator);
- Wiring system;
- Indoor and outdoor lighting including lighting control systems;
- Life safety system (emergency lighting, and exit lighting);

2. General Electrical Provision for Design

2.1 CONFORMANCE

The electrical and communications systems shall be designed in accordance with the intent of all applicable codes, ordinances, bylaws, standards, and regulations.

The following list of applicable codes and regulations apply to this design:

- 2024 British Columbia Building Code (BCBC)
- ASHRAE 90.1 – 2019
- Illumination Engineering Society of North America (IESNA)
- Applicable NFPA Regulations
- 2021 Canadian Electrical Code (CEC)
- Underwriters' Laboratories of Canada
- Code Consultant Report

2.2 LOAD ESTIMATE

Load estimations are performed for each option as below:

2.2.1 Option 2.1

Load Calculation				
Basic Load Calculation	W/m ² or W	m ²	Demand Factor	Total (W)
Basic load	30	245	80%	5,880
Domestic Hot Water	30,000		70%	21,000
Mechanical	77,998		70%	54,599
Canopy Lighting	1,500		100%	1,500
Total connected load				82,979
Minimum circuit Amps @ 208Y/120V				288

2.2.2 Option 3.1

Load Calculation				
Basic Load Calculation	W/m ² or W	m ²	Demand Factor	Total (W)
Basic load	30	1,200	80%	28,800
Domestic Hot Water Tank	60,000		70%	42,000
Mechanical	275,533		70%	192,873
Elevator (1x 25HP)	26,947		100%	26,947
Canopy Lighting	2,500		100%	2,500
Kitchen (2x60A@208V)	19,968		100%	19,968
Laundry	1,500		100%	1,500
Total connected load				314,588
Minimum circuit Amps @ 208Y/120V				1,092

2.3 STANDARDS OF MATERIALS, EQUIPMENT, AND INSTALLATION

Proposed acceptable manufacturers are as follows:

ITEM	ACCEPTABLE PRODUCTS / SUPPLIERS / MANUFACTURERS
Power Distribution System	Schneider, Eaton, Siemens,
Battery Operated Emergency Lights	Ready-Lite, Emergi-Lite or approved equal
Lighting Control System	Wattstopper or equivalent
Luminaires	Lithonia, Ledalite, Peerless, Architectural Lighting, Bega, Lightolier, Elliptipar, Liveable Cities or accepted equal
Wiring Devices (Outlets)	Bryant, Hubbell

Equipment from alternate & approved manufacturers list must be equal in quality and performance to the model specified.

3. PV System

The building aims to achieve Net Zero Carbon and Net Zero Energy. 500W PV panel will be provided to offset the energy consumption. The following table shows the estimated roof area coverage, number of PV panel and connected power to achieve Net Zero Carbon and Net Zero Energy for each options.

	Option 2.1	Option 3.1
Total Roof Area	430m ²	670m ²
Roof area coverage	152m ² (35%)	384m ² (57%)
Approximate number of PV panels	63	160
Total Connected PV Power	31.5kW	80kW

4. Electrical Services

4.1 BC HYDRO SERVICES

The existing facility is 100A, 208Y/120V, 3-phase serviced from BC Hydro overhead lines with pole mounted transformers, which will not be sufficient to service the new buildings.

4.1.1 Option 2.1

A 400A, 208Y/120V secondary service is required for the new building. This can be serviced with BC Hydro 150kVA Pad Mounted Transformer (PMT) via underground feeders.

4.1.2 Option 3.1

A 1200A, 208Y/120V, secondary service is required for the new building. This can be serviced with BC Hydro 350kVA PMT via underground feeders.

4.2 COMMUNICATION SERVICES

Incoming infrastructure will be provided for both Shaw and Telus in the form of three (3) 103mm direct buried ducts, two of which are designated for use by Telus. Pull boxes will be provided when more than two 90-degree offsets are installed. All work will be carried out to meet utility standards.

5. Power Distribution System

5.1 OPTION 2.1 MAIN DISTRIBUTION

The main service entrance equipment for the option 2.1 building consists of the following equipment:

- L-Shape BC Hydro Pull Box.
- 400A, 208Y/120V Circuit breaker.
- PT / CT cabinet and meter socket for BC Hydro Meter.
- One 400A, 208Y/120V CDP type entrance panel.
- Two 225A, 208Y/120V branch circuit panels

The L-Shape pull box, main disconnect, and metering equipment shall be located in a room with door open directly to exterior, as per BC Hydro Secondary Metering Guidelines.

5.2 OPTION 3.1 MAIN DISTRIBUTION

The main service entrance equipment for the option 3.1 building consists of the following equipment:

- L-Shape BC Hydro Pull box
- 1200A, 208Y/120V Circuit breaker
- PT / CT cabinet and meter socket for BC Hydro Meter.
- One 1200A, 208Y/120V CDP type entrance panel.
- Three 208Y/120V branch circuit panels.

The L-shape pull box, main disconnect, and metering equipment shall be located in a room with door open directly to exterior, as per BC Hydro Secondary Metering Guidelines.

5.3 GENERAL POWER CONNECTION

Power outlets will be strategically located and installed in the general areas, common areas, and service areas, to accommodate power requirements for electrical equipment, special equipment, appliances, and maintenance services.

GFCI outlets will be provided in all washrooms. The outlets shall be specification grade and shall be complete with stainless steel cover plates, with brushed nickel finish.

Power connections will be provided for mechanical systems equipment including electric heating, fans, pumps, etc., as required to facilitate mechanical systems installation. Weatherproof receptacles, with while-in-use covers shall be provided next to mechanical equipment in wet locations.

6. Grounding and Bonding

The grounding electrode will consist of three ground plates. Ground plates shall be buried below grade as per CEC. The electrode will be connected to the main ground bus at the via a #6 bare copper grounding conductor.

The water main and any metallic wastewater pipe will be bonded electrically to the main grounding system. A separate bond wire will be installed in each conduit for feeders. The bond wire will be sized based on the largest wires installed in the conduit. The conduit shall not be used as a means of bonding. All grounding and bonding shall be in accordance with applicable rules of the Canadian Electrical Code.

7. Emergency Power System

The building is required to operate as a post-disaster building. A generator will be required to backup the following loads:

- Lighting of all community area;
- Fire alarm system;
- Elevators;
- Emergency lighting and exit signs;
- Mechanical equipment;

For option 2.1, a 100kW gas/ propane fuel generator will be installed c/w weatherproof exterior rated enclosure.

For option 3.1, the generator required for the building operate as post disaster is 350kW, which is only available in diesel. However, diesel fuel generator would not comply with the sustainability requirements of "fossil fuel free" as listed in the RFP.

The generator will be completed with critical grade muffler/silencer, vibration isolations and fuel pumps. The storage on site shall provide 72 hours of operation at full load.

8. Wiring Systems

8.1 GENERAL

Wiring will be in accordance with the Canadian Electrical Code. Raceways for the project will be as follows, unless required otherwise by authority having jurisdiction:

- BC Hydro underground service. Utility requirements apply;
- PVC & ENT Conduit - In concrete slabs;
- EMT - for general use, and all exposed areas not susceptible to mechanical damage.
- Flexible conduit - a short length of flexible conduit will be provided for connection to each motor and transformer;
- Conduits and raceways will be concealed (include washroom with CMU walls) except in service spaces, ceiling spaces, elevator machine rooms, mechanical and electrical rooms.

Conduits and raceways will be concealed except in services spaces, ceiling spaces, mechanical and electrical rooms. All conduit and cabling will run parallel or perpendicular to building lines. Empty

conduit will have pull strings to facilitate future cable installations. Conduits that pass-through floors and fire-rated walls will be sleeved and fire-stopped.

Wiring for branch circuits in all areas will be minimum #12 AWG copper with 600V XLPE insulation.

Armored cable is allowed for final drops to luminaires, within partition walls and connection to devices such as receptacles from electrical zone boxes through the floor area.

The basis of design is copper conductors. Should the contractor offer aluminum with an associated cost reduction, the contractor will ensure equipment terminations, conduit sizing, core holes, etc. can accept the larger conductors, with a 75°C insulation rating.

Wiring for connection to all mechanical units shall be copper.

9. Lighting System

A complete lighting system will be provided for all areas of the development in compliance with codes, IESNA, ASHRAE and owner requirements. The supply, installation and connection of all interior and exterior lighting and related systems will be included.

The luminaires shall be suitable for the environment they are installed in, and suitable for the function of the space. The light sources of all luminaires will be LED.

The lighting system will provide the IESNA (Illuminating Engineering Society of North America) levels of horizontal and vertical foot-candle levels, without exceeding uniformity requirements (max. to min.).

All luminaires within public washrooms shall be vandal resistant.

Luminaires will be chosen based on accessibility, efficacy, and CRI (Color Rendering Index).

9.1 GENERAL LIGHTING

In general, the following illumination sources will be utilized:

Washrooms	4FT long surface mounted LED luminaire (Vandal resistant)
Service, storage, and equipment spaces	4FT long vapor tight luminaire with polycarbonate lens
Community area, childcare area	LED luminaires, LED downlight
Exterior wall	Wall mounted LED wall Pack
Canopy lighting	LED luminaire, LED downlight

9.2 LIGHTING CONTROLS

A combination of low voltage and line voltage lighting control system to comply with the requirements of BCBC 2024 will be provided. This will include a two-wire control solution for most of the luminaires in the space in conjunction with other controls as follows:

- All spaces will be fitted with vacancy sensors (manual on, auto off) or occupancy sensor (auto on, auto off).
- Automatic shutoff will be provided for spaces unoccupied for 20 minutes or more.
- Manual on and off switch for all service room (electrical room, and mechanical room).

Daylighting controls will be provided in all side lighted areas as described by BCBC 2024.

All exterior lighting will be controlled by photocell to operate only at dark times.

9.3 EMERGENCY LIGHTING AND EXIT LIGHTING

A complete exit signage system will be provided to clearly identify egress routes from the facility, in accordance with the requirements of the building code and the Local Fire Marshall. Exit signs will be LED type and comply with the requirements of CAN/CSA-C860 standards. All exit signs will display the “green running man” and be fed from the emergency distribution system.

Emergency lighting to the illumination levels and requirements of applicable standards will be provided in all public and egress routes throughout the building.

10. Fire Alarm System

The fire alarm system shall be installed and verified in accordance with applicable standards and requirements of CAN/ULC and the local authority having jurisdiction. The system shall be supplied and installed by an approved fire alarm equipment system installer in accordance with manufacturer's requirements.

The fire alarm system will be a single-stage, multi-zone, supervised, active graphic annunciated, addressable system. The annunciator will be located at the main entrance (firefighter's entrance) of the building. Exact location to be coordinated with the Architect and Code Consultant.

Fire alarm combination audio/visual devices shall provide audible/visual signals in accordance with the ULC requirements and local authority having jurisdiction. Fire alarm notification devices will be installed throughout the building to ensure that alarm is audible/visible in all areas of the building.

All fire alarm wiring shall be run in metal conduit. The system shall be monitored by base central monitoring agency as per CAN/ULC requirements.

Manual pull station shall be installed at all exit doors.

All sprinkler system flow switches and tamper switches shall be monitored via the fire alarm system.

11. Summary of Options

The following table compares the main electrical equipment required for 2 options.

	Options 2.1	Option 3.1
Incoming Services	400A, 208Y/120V secondary services	1200A, 208Y/120V secondary services
Main Distribution Panel	400A, 208Y/120V CDP	1200A, 208Y/120V CDP
Generator	100kW Gas/Propane Generator	350kW diesel Generator

Appendix C

Energy Modelling Report

Energy Modelling Schematic Design Report from RJC Engineers, November 13, 2024

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November 13, 2024



Mark Hosford
Carscadden Stokes McDonald Architects Inc.
1930 Pandora Street, Suite 310
Vancouver BC V5L 0C7

Dear Mark Hosford,

**RE: Schematic Design Report (R1)
Energy Modelling
Oak Bay – Carnarvon Park Master Plan Refresh
2801 Henderson Road Oak Bay BC**

RJC No. VAN.137618.0003

Read Jones Christoffersen Ltd. (RJC) has been retained by Carscadden Stokes McDonald Architects Inc. (the Client) to perform energy modeling for the above-noted project to meet both the requirements for Net Zero Energy and Net Zero Carbon in accordance with the CAGBC Zero Carbon Building Design Standard V4. The requirements to achieve Net Zero Energy and Net Zero Carbon are as follows:

- **Net Zero Carbon:** Demonstrate that the Coefficient of Performance (COP) of the mechanical system is at least a value of 2. COP is determined via Thermal Energy Demand Intensity (TEDI) divided by the energy requirement of space heating.
- **Net Zero Energy:** Demonstrate that the net energy consumption is equal to or less than the energy generation on site and that the total Energy Usage Intensity (EUI) is at most 80 kWh/m².

For Net Zero Carbon design the project incorporates two main measures: fully electric mechanical systems with no combustion on site and photovoltaic panels. Energy generation on site is completed via photovoltaic panels and needs to meet a requirement of at least 40% Gross Roof Area (GRA) or 5% of energy consumption of the building per “Impact and Innovation” Strategies in the CAGBC standard.

There are two building layouts noted in the architectural drawings. Energy models have been constructed and tested for both options by utilizing IES-VE 2024 software. Option 2.1 features two single story structures with a combined Modelled Floor Area (MFA) of 275 m². Option 3.1 features a combined two-story structure (with an additional basement area) for a total MFA of 1080 m². Model geometry is shown in Figure 1.

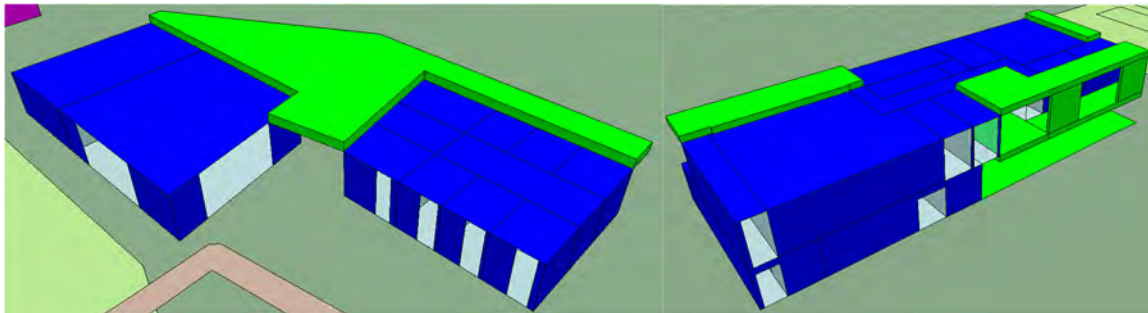


Figure 1 – IES-VE Energy Model Geometry for Building Layout Options 1 and 2

The inputs for energy modelling are based on the following:

- Architectural drawings dated October 17, 2024
- Mechanical schematic design report dated November 1, 2024
- Structural schematic design report dated November 4, 2024
- Electrical schematic design report dated November 12, 2024
- Conservative design assumptions when required

During the design process, it was found that the requirements of Net Zero Energy were inherently more stringent than the Zero Carbon Standard. As a result, this study represents the enclosure/mechanical/electrical systems that are required for each option to meet zero carbon or zero energy requirements. The results of the energy models for Net Zero Carbon are presented in Table 1.

TABLE 1: NET ZERO CARBON RESULTS		
Scenario	COP ¹	Achieves Zero Carbon
Option 2.1 – Zero Carbon	2.02	YES
Option 3.1 – Zero Carbon	2.44	YES
1. COP is calculated by dividing the TEDI by the annual space heating energy consumption per ZCB V4 Standard Guidelines.		

Table 2 presents the results for models for Zero Energy.

TABLE 2: NET ZERO ENERGY RESULTS				
Building Layout	Annual Electricity Consumption (MWh)	Photovoltaic Energy Generation (MWh)	EUI (kWh/m2)	Achieves Zero Energy
Option 2.1	19.80	32	78.9	YES
Option 3.1	72.97	80	69.85	YES



Given the schematic design stage of the project, relevant NECB 2020 values and schedules have been used in energy modelling calculations in conjunction with information provided by the mechanical and electric schematic design reports. Tables 3 and 4 provide energy modelling input comparisons for Zero Energy and Zero Carbon models for Options 2.1 and 3.1 respectively.

TABLE 3: ENERGY MODELLING INPUTS FOR OPTION 2.1		
	Option 2.1 – Zero Carbon	Option 2.1 – Zero Energy
<i>Envelope Thermal Performance</i>		
Roof	R-30 effective Wood Roof	R-30 effective Wood Roof
Exterior Wall Wood Framing	2x6@16" o.c. with R-22 batt – R-13 effective (includes reduction for thermal bridging)	2x6@16" o.c. with R-22 batt + 6" of Mineral Wool – R-29 effective (includes reduction for thermal bridging)
Exposed Floor	N/A	N/A
Slab on Grade	R-15 Full Slab Coverage Horizontal (F-0.3)	R-15 Full Slab Coverage Horizontal (F-0.3)
Windows/Glazed Doors	Vinyl double glazed (U-0.25; SHGC 0.35)	Vinyl Triple glazed (U-0.18; SHGC 0.35)
Air Leakage	0.25 (l/s/m ² fac)	Q _{75PA} = 0.5 l/(s/m ²) Infiltration Rate = 0.17 (l/s/m ² fac)
<i>Mechanical and Electrical Performance</i>		
Ventilation Rate ¹	Change Rooms = 150 CFM each (900 CFM combined) Community Area = 1100 CFM Concession Area = 200 CFM (4 hours per day) Office = 100 CFM	Change Rooms = 150 CFM each (900 CFM combined) Community Area = 1100 CFM Concession Area = 200 CFM (4 hours per day) Office = 100 CFM



TABLE 3: ENERGY MODELLING INPUTS FOR OPTION 2.1

	Option 2.1 – Zero Carbon	Option 2.1 – Zero Energy																								
Office	<p>Community Room: NECB 2020 Group B Heating & NECB 2020 Group B Cooling</p> <p>Concession: NECB 2020 Group B Heating, No Cooling</p> <p>Office: NECB 2020 Group A Heating & NECB 2020 Group A Cooling</p> <p>Change Rooms: 18°C Continuous, No Cooling</p> <p>Custodial, Storage & Mechanical: 15°C Continuous, No Cooling</p>	<p>Community Room: NECB 2020 Group B Heating & NECB 2020 Group B Cooling</p> <p>Concession: NECB 2020 Group B Heating, No Cooling</p> <p>Office: NECB 2020 Group A Heating & NECB 2020 Group A Cooling</p> <p>Change Rooms: 18°C Continuous, No Cooling</p> <p>Custodial, Storage & Mechanical: 15°C Continuous, No Cooling</p>																								
Heating/Cooling Mechanical System	<p>Change Rooms, Office & Community: Air source heat pump Heating (Min source temp = 0°F):</p> <table border="1"> <thead> <tr> <th>Source Temp (°F)</th> <th>COP</th> <th>Output (%)</th> </tr> </thead> <tbody> <tr> <td>5.00</td> <td>1.60</td> <td>71.91</td> </tr> <tr> <td>17.00</td> <td>1.80</td> <td>76.83</td> </tr> <tr> <td>47.00</td> <td>3.43</td> <td>100.00</td> </tr> </tbody> </table> <p>Cooling: EER = 11, Refrigerant = 1200</p> <p>Other Areas: 1.5 kW Force Flow Heater</p>	Source Temp (°F)	COP	Output (%)	5.00	1.60	71.91	17.00	1.80	76.83	47.00	3.43	100.00	<p>Change Rooms, Flex Spaces, Childcare, Community Room & Staff Lounge: Air source heat pump Heating (Min source temp = 0°F):</p> <table border="1"> <thead> <tr> <th>Source Temp (°F)</th> <th>COP</th> <th>Output (%)</th> </tr> </thead> <tbody> <tr> <td>5.00</td> <td>1.60</td> <td>71.91</td> </tr> <tr> <td>17.00</td> <td>1.80</td> <td>76.83</td> </tr> <tr> <td>47.00</td> <td>3.43</td> <td>100.00</td> </tr> </tbody> </table> <p>Cooling: EER = 11, Refrigerant = 1200</p> <p>Other Areas: 1.5 kW Force Flow Heater</p>	Source Temp (°F)	COP	Output (%)	5.00	1.60	71.91	17.00	1.80	76.83	47.00	3.43	100.00
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Heat Recovery Ventilator	<p>SRE: 75% LRE: 70% Fan Power: 0.45 W/cfm HRV Heating Coil Temp: 17°C</p>	<p>SRE: 85% LRE: 70% Fan Power: 0.35 W/cfm HRV Heating Coil Temp: 17°C</p>																								
Domestic Hot Water	<p>Heat Pump Water Heater (COP = 3) 100 US Gallon storage volume with 2" insulation</p>	<p>Heat Pump Water Heater (COP = 3) 100 US Gallon storage volume with 2" insulation</p>																								
Hot Water Demand	<p>Storage Areas = 300 W/person Concession Area = 120 W/person Office Area = 90 W/person Community Room = 60 W/person</p>	<p>Storage Areas = 300 W/person Concession Area = 120 W/person Office Area = 90 W/person Community Room = 60 W/person</p>																								

TABLE 3: ENERGY MODELLING INPUTS FOR OPTION 2.1

	Option 2.1 – Zero Carbon	Option 2.1 – Zero Energy
Lighting ²	Community Room = 6.3 [W/m ²] Concession = 11.7 [W/m ²] Mechanical = 4.6 [W/m ²] Washrooms ³ = 6.12 [W/m ²] Custodial ³ = 4.95 [W/m ²] Office ³ = 6.39 [W/m ²] Storage ³ = 3.69 [W/m ²]	Community Room = 6.3 [W/m ²] Concession = 11.7 [W/m ²] Mechanical = 4.6 [W/m ²] Washrooms ³ = 6.12 [W/m ²] Custodial ³ = 4.95 [W/m ²] Office ³ = 6.39 [W/m ²] Storage ³ = 3.69 [W/m ²]
Renewable Energy	152 m ² (35% GRA) monocrystalline silicon PV panels. Total Connected PV Power = 31.5 kW. Azimuth 180° clockwise from North. Inclination 30° from horizontal.	152 m ² (35% GRA) monocrystalline silicon PV panels. Total Connected PV Power = 31.5 kW. Azimuth 180° clockwise from North. Inclination 30° from horizontal.
Notes:		
1. Ventilation provided during assumed occupancy hours (8am – 8pm).		
2. Includes the use of daylight controls for applicable areas.		
3. Value incorporates the use of occupancy sensors.		

TABLE 4: ENERGY MODELLING INPUTS FOR OPTION 3.1

	Option 3.1 – Zero Carbon	Option 3.1 – Zero Energy
Envelope Thermal Performance		
Roof	R-30 effective Wood Roof R-20 effective Wood Patio	R-30 effective Wood Roof R-20 effective Wood Patio
Exterior Wall Wood Framing	2x6@16" o.c. with R-22 batt – R-13 effective (includes reduction for thermal bridging)	2x6@16" o.c. with R-22 batt + 6" of Mineral Wool – R-29 effective (includes reduction for thermal bridging)
Exposed Floor	Insulated Wood Joists R-20 effective	Insulated Wood Joists R-20 effective
Slab on Grade	R-15 Fully-Insulated Horizontal (F-0.3)	R-15 Fully-Insulated Horizontal (F-0.3)
Windows/Glazed Doors	Vinyl double glazed (U-0.25; SHGC 0.35)	Vinyl Triple glazed (U-0.18; SHGC 0.35)
Air Leakage	0.25 l/(s*m ² *fac)	Q _{75PA} = 0.5 l/(s*m ²) Infiltration Rate = 0.12 l/(s*m ² *fac)



TABLE 4: ENERGY MODELLING INPUTS FOR OPTION 3.1

	Option 3.1 – Zero Carbon	Option 3.1 – Zero Energy																								
Mechanical and Electrical Performance																										
Ventilation Rate ¹	Change Rooms = 100 CFM each (900 CFM combined) 2 nd Floor Flex Spaces = 100 CFM each Childcare (Gross Motor Room) = 900 CFM Community Room = 950 CFM each 1 st Floor Flex Space = 900 CFM Staff lounge = 100 CFM Laundry = 200 CFM Kitchen = 200 CFM	Change Rooms = 100 CFM each (900 CFM combined) 2 nd Floor Flex Spaces = 100 CFM each Childcare (Gross Motor Room) = 900 CFM Community Room = 950 CFM each 1 st Floor Flex Space = 900 CFM Staff lounge = 100 CFM Laundry = 200 CFM Kitchen = 200 CFM																								
Office	Flex Spaces, Childcare, Community Room & Staff Lounge: NECB 2020 Group B Heating & NECB 2020 Group B Cooling Change Rooms, Laundry, Corridor & Vestibule: 18°C Continuous, No Cooling Stairwells, Storage & Mechanical: 15°C Continuous, No Cooling	Flex Spaces, Childcare, Community Room & Staff Lounge: NECB 2020 Group B Heating & NECB 2020 Group B Cooling Change Rooms, Laundry, Corridor & Vestibule: 18°C Continuous, No Cooling Stairwells, Storage & Mechanical: 15°C Continuous, No Cooling																								
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TABLE 4: ENERGY MODELLING INPUTS FOR OPTION 3.1

	Option 3.1 – Zero Carbon	Option 3.1 – Zero Energy
Heat Recovery Ventilator	SRE: 75% LRE: 70% Fan Power: 0.45 W/cfm HRV Heating Coil Temp: 17°C	SRE: 85% LRE: 70% Fan Power: 0.35 W/cfm HRV Heating Coil Temp: 17°C
Domestic Hot Water	Heat Pump Water Heater (COP = 3) 100 US Gallon storage volume with 2" insulation	Heat Pump Water Heater (COP = 3) 100 US Gallon storage volume with 2" insulation
Hot Water Demand	Storage Areas = 300 W/person Kitchen Areas = 120 W/person Laundry, Flex Areas, multipurpose, community spaces, etc. = 60 W/person	Storage Areas = 300 W/person Kitchen Areas = 120 W/person Laundry, Flex Areas, multipurpose, community spaces, etc. = 60 W/person
Lighting ²	Kitchen Areas = 11.7 [W/m ²] Stairs = 7.4 [W/m ²] Washrooms ³ = 6.12 [W/m ²] Mechanical = 4.6 [W/m ²] Corridor Areas = 4.4 [W/m ²] Storage Areas ³ = 3.69 [W/m ²] Other areas = 6.3 [W/m ²]	Kitchen Areas = 11.7 [W/m ²] Stairs = 7.4 [W/m ²] Washrooms ³ = 6.12 [W/m ²] Mechanical = 4.6 [W/m ²] Corridor Areas = 4.4 [W/m ²] Storage Areas ³ = 3.69 [W/m ²] Other areas = 6.3 [W/m ²]
Renewable Energy	384 m ² (57% GRA) monocrystalline silicon PV panels. Total Connected PV Power = 80 kW. Azimuth 180° clockwise from North. Inclination 30° from horizontal.	384 m ² (57% GRA) monocrystalline silicon PV panels. Total Connected PV Power = 80 kW. Azimuth 180° clockwise from North. Inclination 30° from horizontal.
<p>Notes:</p> <ol style="list-style-type: none"> 1. Ventilation provided during assumed occupancy hours (8am – 8pm). 2. Includes the use of daylight controls for applicable areas. 3. Value incorporates the use of occupancy sensors. 		

Schematic Design Report (R1)
Energy Modelling
Oak Bay – Carnarvon Park Master Plan Refresh
2801 Henderson Road Oak Bay BC



Should you have any further questions or comments, or if we can be of further assistance, please contact our office.

Yours truly,

READ JONES CHRISTOFFERSEN LTD.

EGBC Permit to Practice No. 1002503 *Reviewed by:*

Liam Jowett-Lockwood, EIT, MASc
Design Engineer

Mohammad Fakoor, PhD, CEA, P.Eng., CPHD, LEED® AP, CEM
Associate

LJL/jpy