Cowichan Secondary School Replacement Project

Schedule 1 – Statement of Requirements

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APPENDICES

Part 1 Interpretation

1.1 General

1.1.1 This Statement of Requirements is written as an output specification and defines what the Design-Builder will achieve in the Design and Construction. Provisions of this Statement of Requirements are in some instances written in the imperative form. Except where otherwise expressly stated within this Statement of Requirements, the Design-Builder will carry out the Design and Construction as required and contemplated by each provision of this Statement of Requirements, including provisions stated in the imperative form.

1.1.2 While the provisions of this Statement of Requirements are intended to be complementary, if there is any conflict within the provisions of this Statement of Requirements or between any documents forming part of the Agreement, Section 1.5 of the Agreement will apply.

1.1.3 Where “cost effective”, “appropriate”, “sufficient”, “minimize” and related and similar terms are used in this Schedule 1, they will be construed and interpreted in terms of whether they are cost effective, appropriate, sufficient or minimize, from the perspective of a prudent public school district owner who balances capital costs against maintenance, operations, security, reliability and all of the costs over the life of the facility.

1.1.4 Where the Statement of Requirements requires the Design-Builder to use a specific product or material, the Design-Builder may request the Owner accept an equivalent product or material by submitting a written request to the Owner. Any such written request will include a detailed description of the proposed equivalent product or materials, together with such supporting documentation and information as the Owner may require. The Owner may accept or reject, at the Owner’s discretion, any request made by the Design-Builder under this Section.

1.1.5 Unless expressly stated otherwise, each reference in this Schedule 1 to a code or standard will be deemed to mean the latest version of that code or standard, including any amendments or supplements thereto, in effect as of the Financial Submission Date.

1.2 Definitions

1.2.1 In this Schedule, in addition to the definitions set out in the main body of the Agreement are the following:

"21st Century Learning" means learning environments and teaching methods which support pedagogical delivery to assist students in developing learning, literacy and life skills consistent with the BC Ministry of Education's Curriculum (available at https://curriculum.gov.bc.ca/curriculum/overview#21-century).

"Authority Having Jurisdiction" means any federal, provincial, municipal or local governmental authority or any regulatory, administrative or other agency having jurisdiction in any way over or in respect of any aspect of the performance of this Agreement or the Project.

"Building" means the building to be constructed by the Design-Builder under this Agreement, which building will include both the School and the Neighborhood Learning Centre.

"Building Envelope Consultant" means a building technology professional who specializes in the design and inspection of all elements of the building envelope, including roofs, walls, foundations, and their component parts.

"Category A FFE" means the furniture, fixtures and equipment listed as Category A in Appendix 1F – Furniture, Fixtures & Equipment List.

"Category B FFE" means the furniture, fixtures and equipment listed as Category B in Appendix 1F – Furniture, Fixtures & Equipment List.

"Category C FFE" means the furniture, fixtures and equipment listed as Category C in Appendix 1F – Furniture, Fixtures & Equipment List.

"**Commissioning Report**" has the meaning set out in Section 8.5.28.2(a).

"Communications Rooms" means the Main Telecommunications Rooms, the Telecommunications Rooms and the Entrance Facility.

"Component" or **"Functional Component"** means a cohesive grouping of activities or spaces related by service or physical arrangement. A Component may or may not be a department since the term "department" refers to an administrative rather than a functional organization of space.

"Data Drop" means a CAT6 cable terminated on one end to a patch panel located in the nearest Telecommunications Room and the other end terminated to a female RJ45 connector and faceplate connected to a junction box.

"Design Life" means the period of time for which a component, device or system is expected to function within its specified parameters without major repairs.

"Direct Visual Connection" means a line of sight between two spaces from any central area of a room or space, either measured from the central node of the room or space, from a workstation, or from the midpoint of the room or space's entry point. The line of measurement can be across floor plates, levels, corridors or through transparent glazing.

"Entrance Facility" or **"EF"** has the meaning set out in Section 8.6.4.1.

"Existing School" means the existing Cowichan Secondary School located at 2652 James St, Duncan, BC V9L 2X2, Canada.

"FFE" means collectively the Category A FFE, the Category B FFE and the Category C FFE.

"FM Network" has the meaning set out in Section 8.6.13.1(b).

"Gathering Stair" means a large tiered area for gathering, with access stairs meeting building code for use as a stair, and larger tiers for use as seating surfaces.

"Gender Neutral" means a space that is designed to be accessible by all peoples, regardless of gender identity or sexual orientation.

"Good Industry Practice" means the exercise of the degree of skill and care, diligence, prudence and foresight which would be reasonably and consistently expected from a skilled and experienced professional design-builder undertaking a project similar in size, scope and complexity of the Project.

"Gross Square Metres" or **"GSM"** means the sum of all Building floor areas measured to the outside face of exterior walls for all stories or areas having floor surfaces within a Building. The BGSM includes component gross area, general circulation, mechanical and electrical space and exterior walls.

"Indicative Design" has the meaning as described in Section 2.5.

"Main Telecommunications Room (Island Health Network)" or **"MTR (Island Health Network)"** has the meaning set out in Section 8.6.4.3.

"Main Telecommunications Room (School Network)" or **"MTR (School Network)"** has the meaning set out in Section 8.6.4.2.

"Main Telecommunications Rooms" or **"MTRs"** means both the MTR (Island Health Network and the MTR (School Network).

"Natural Light" means direct natural light sourced from the sun.

"Neighbourhood Learning Centre" means the portion of the Facility described in Part 2 (Neighborhood Learning Centre) of Appendix 1A(a) – Functional Program.

"Net Area" or **"Net Square Metres** or **"NSM"** means the horizontal area of space assignable to a specific function. The Net Area of space is measured to the inside face of wall surfaces.

"Occupant" means any Staff, student, visitor, contractor, service provider, or other person who is within the confines of the Building.

"Public Plaza" means a paved area used as the main access to the Building and is open to members of the community.

"Room Data Sheets" has the meaning set out in Section 2.3.4.

"**School**" means the portion of the Facility to be used as a school, as described in this

Statement of Requirements, including the areas described in Part 1 (School) of Appendix 1A(a) – Functional Program.

"**Staff"** means employees of the School or the Neighborhood Learning Centre.

"Telecommunications Room" or **"TR"** has the meaning set out in Section 8.6.4.4.

1.2.2 Capitalized room, space and Component names used in this Schedule 1 have the meaning as identified in Appendix 1A(a) – Functional Program.

1.3 Acronym List

AFUE - Annual Fuel Utilization Efficiency
ANSI - American National Standards Institute
AIBC – Architectural Institute of British Columbia
ASHRAE - American Society of Heating, Refrigerating and Air-conditioning Engineers
ASME - American Society of Mechanical Engineers
ASPE - American Society of Plumbing Engineers
ASTM - American Society for Testing and Materials
AV / IT – Audio Visual / Information Technology
AWMAC – Architectural Woodworker Manufacturers Association of Canada
AWWA – American Water Works Association
BCBC – British Columbia Building Code
BCICA - British Columbia Insulation Contractors Association
BICSI - Building Industry Consulting Service International
BMS - Building Management System
CATV – Community Access Television
CCTV – Closed Circuit Television
CEC – Canadian Electrical Code
CFC – Chlorofluorocarbon
CGA - Compressed Gas Association
CODEC – Coder/Decoder
CPTED - Crime Prevention Through Environmental Design
CPU – Central Processing Unit
CSA - Canadian Standards Association
DBA – Design Build Agreement
DDC - Direct Digital Controls
DHI - Door and Hardware Institute of Canada
EIA/TIA – Electronics Industry Association/Telecommunications Industry Association
EMT – Electric Metallic Tubing
ESC – Electronic Security Control
ESCS - Electronic Security and Communication System
ESS - Electronic Security Systems
FA – Fire Alarm
FACP – Fire Alarm Control Panel
FE – Fire Extinguisher
FM – Factory Mutual
GN – Gender Neutral
GSM – Gross Square Metres
GWB – Gypsum Wall Board
HEPA - High Efficiency Particulate Air
HP – Horsepower
HRC – High Rupting Capacity (fuse type)

HVAC - Heating, Ventilating and Air-Conditioning
IAQ-Interior Air Quality
IC - INT systems System
IDS – Intrusion Detection System
IEEE - Institute of Electrical and Electronic Engineers
IP – Internet Protocol
IT – Information Technology
IMIT – Information Management Information Technology
INT - Intercom
ISO – International Organization for Standardization
KV – Kilovolt
KVA – Kilovolt Ampere
LAN – Local Area Network
LCD – Liquid Crystal Display
LED – Light Emitting Diode
LEED® v4 -Leadership in Energy and Environmental Design Version 4.0
NLC – Neighborhood Learning Centre
NEMA - National Electrical Manufacturers Association
NFPA - National Fire Protection Association
NRC-National Research Council
NSM – Net Square Metres
PA – Paging Announcement / Public Address (Paging System)
PBX – Private Branch Exchange
PC – Personal Computer
PoE – Power Over Ethernet
PPE - Personal Protective Equipment
PTZ – Pan Tilt Zoom
PVC – Polyvinyl Chloride
RCDD – Registered Communications Distribution Designer
RCABC – Roofing Contractors Association of British Columbia
SHGC - Solar Heat Gain Coefficient
SLC – Security Level Classification
SMACNA – Sheet Metal and Air Conditioning Contractors National Association
SOR – Statement of Requirements
SPD- Surge Protective Device
STC – Sound Transmission Coefficient
STI – Sound Transmission Index
TAB – Testing, adjusting and balancing
TED – Technology Education
THD - Total Harmonic Distortion
TIA – Telecommunications Industry Association

TTMAC – Terrazzo and Tile Manufacturers Association of Canada
TVOC – Total Volatile Organic Compounds
ULC - Underwriters' Laboratories of Canada
UPS – Uninterruptible Power Supply
USGBC – United Stated Green Building Code
V – Volt
VFD - Variable Frequency Drive
VOC – Volatile Organic Compounds
VoIP – Voice Over Internet Protocol
WAN – Wide Area Network

Part 2 General

2.1 Standards

2.1.1 The Design-Builder will complete the Design and Construction:

2.1.1.1 in accordance with all applicable Laws;

2.1.1.2 in accordance with the requirements of this Agreement, including this Schedule 1;

2.1.1.3 in accordance with all applicable codes, standards, specifications and guidelines published by relevant standards organizations;

2.1.1.4 having regard for the concerns, needs and interests of:

(a) the Owner;

(b) all persons who will use the Facility, including the Owner, students, Staff, and other program users; and

(c) governmental authorities, including the Municipality of North Cowichan;

2.1.1.5 in accordance with Good Industry Practice; and

2.1.1.6 to the same standard that an experienced, prudent and knowledgeable long-term owner of a high quality secondary school facility in North America would employ.

2.1.2 If there is any conflict between any of the above, the standards or provisions that would produce the highest level of quality, safety, security, reliability, durability, performance and service will prevail.

2.2 Use of Wood

2.2.1 The Project will comply with the requirements outlined in the Wood First Act *(British Columbia).*

2.2.2 The Building will address the Wood First Act *(British Columbia)* in creative and innovative ways without compromising durability or causing maintenance concerns.

2.3 Rooms & Spaces

2.3.1 The Design-Builder will design and construct the Facility:

2.3.1.1 so that it accommodates the spaces, activities, functions, NSM, design features and adjacencies described in Appendix 1A(a) – Functional Program; and

2.3.1.2 in accordance with the requirements of Appendix 1A(a) – Functional Program, subject to any adjustments or refinements made in the user consultation process described in Schedule 2 – Review Procedure.

2.3.2 if the Design-Builder wishes to propose that the NSM for any room or space, (except for the Gymnasium Activity Space, Woodworking Shop, Classrooms, Learning Communities, Automotive / Mechanics, General Storage, Metals Shop, Administration, Health & Wellness Centre or Indigenous Language & Culture Centre) be less than 95% of the required NSM set out in Appendix 1A(a) – Functional Program, the Design-Builder must submit a proposed variance to the Owner for review, together with the rationale for the proposed variance and evidence to demonstrate to the Owner's satisfaction that affected rooms retain their functionality. The Owner may, at its discretion, accept or reject the proposed variance. If, in the Owner's opinion, the room or space does not meet the required functionality, the Owner will reject the proposed variance and the Design-Builder will provide the full NSM as stated in Appendix 1A(a) – Functional Program.

2.3.3 Notwithstanding anything in Appendix 1A(a) – Functional Program, the Design-Builder will design and construct the Facility to include all rooms and spaces as required to comply with the terms of this Agreement, including sufficient rooms and spaces as necessary for the operation and maintenance of the Facility.

2.3.4 Included in Appendix 1B are room data sheets ("**Room Data Sheets**") that set out certain architectural, mechanical, electrical, communications and other design features and building components that are applicable to rooms and spaces described in the Functional Program. The Room Data Sheets are not intended to include all design detail and, for illustration, in some instances do not include building components that would be included in such rooms or spaces in order to meet the standards described in Section 2.1 of this Schedule. Without limiting any other provision of this Statement of Requirements, the Design-Builder will design and construct each room and space in the Facility so that, unless expressly stated otherwise in this Agreement, at a minimum the room or space includes the design features and building elements specified on the applicable Room Data Sheet.

2.3.5 Area Planning Requirements

2.3.5.1 Calculation of the NSM of all Functional Components and the GSM for the Building will be done in accordance with the Ministry of Education's BC Schools Facilities Building Manual, Section 2.8.3 of Part 2.

2.3.5.2 The GSM total will include all wall areas, circulation areas and supporting service areas required for the Facility to conform to the requirements of this Schedule 1.

2.4 Furniture, Fixtures and Equipment

2.4.1 A list of furniture, fixtures and equipment (FFE) to be included in the Facility is attached as Appendix 1F – Furniture, Fixtures & Equipment List, which list includes 3 categories of FFE: Category A FFE, Category B FFE and Category C FFE. Responsibilities for each of these categories are described in this Section.

2.4.1.1 Category A FFE

(a) Category A FFE are existing items to be made available by the Owner at the Existing School, and relocated to and installed at the Facility by the Design-Builder.

(b) The Design-Builder will give the Owner 6 months written notice of the date the Design-Builder wishes to take possession of the Category A FFE for relocation and installation at the Facility, and the parties will cooperate to set a date for the Design-Builder to pick up the Category A FFE from the Existing School.

(c) The Design-Builder will pick up the Category A FFE on the date agreed to by the Owner and relocate and install the Category A FFE in the Facility. The Category A FFE will be under the care, custody and control of the Design-Builder and at the risk of the Design-Builder from the time the Design-Builder takes possession of the Category A FFE until Substantial Completion. The Design-Builder will exercise all reasonable care to avoid loss of, or damage to, the Category A FFE.

2.4.1.2 Category B FFE

(a) Category B FFE will be supplied by the Owner and installed in the Facility by the Owner after the Substantial Completion Date.

2.4.1.3 Category C FFE

(a) The Design-Builder will procure, supply and install all Category C FFE. The Design-Builder will cause all items of Category C FFE to:

(i) be new;

(ii) meet all requirements set out in Appendix 1F – Furniture, Fixtures & Equipment List;

(iii) comply with applicable Laws and standards; and

(iv) be approved by the Owner.

2.4.2 All systems, equipment, products, components, and other materials incorporated into the Building will be new, unused and of a type and quality intended for use in a permanent building, except for Category A FFE.

2.4.3 Notwithstanding Section 2.4.1 of this Schedule, reclaimed wood may be used with prior approval of the Owner, which approval may be granted or withheld by the Owner at the Owner's discretion.

2.5 Indicative Design

2.5.1 An indicative site design of the Facility (the "**Indicative Design**") is provided in the Disclosed Data.

2.5.2 The Design-Builder may refer to the Indicative Design in the development of the design, but the Owner makes no representation or warranty as to the reliability, accuracy, completeness or correctness of any aspect of the Indicative Design.

2.5.3 The Indicative Design is provided as a reference to demonstrate the functional and operational objectives for the project and is not intended to illustrate a singular design solution.

2.5.4 The Design-Builder will be completely responsible for all aspects of the design and construction of the Facility whether or not it uses all or any part of the Indicative Design.

2.5.5 The Design-Builder will independently verify the reliability, accuracy, completeness and correctness of any information contained in or inferred from the Indicative Design if the Design-Builder uses any such information in its design of the Facility.

2.6 Occupancy Capacity

2.6.1 Design the Building to have the following occupancy capacity at Substantial Completion, except where otherwise required by applicable Laws or Standards:

Occupant Type	Count
Students	1100
School Staff	100
NLC Staff	15
NLC Users	150
Total	1365

2.6.2 Refer to Section 4.3 regarding future expansion.

Part 3 Education Delivery Principles

3.1.1 The Design-Builder will design the Facility to enable the Owner to deliver its educational programs around the following principles:

3.1.1.1 21st Century Learning;

3.1.1.2 Ecology and the Environment: spaces will support a science curriculum which provides better representation of ecology and environmental learning through flexible laboratory, classroom and outdoor learning spaces;

3.1.1.3 Indigenous Perspectives and Knowledge: spaces will support place-based learning with an emphasis on Indigenous perspectives and ways of knowing; and

3.1.1.4 Flexible Learning Environments: spaces will provide teachers with greater flexibility in creating learning environments that are relevant, engaging, and novel. Flexible learning environments consider local context and place-based learning.

Part 4 Project Principles

4.1 Design Values and Vision

4.1.1 The Design-Builder will design and construct the Building to have a form and character that:

4.1.1.1 is an expression of forward-thinking education and architecture executed with a dynamic, elegant, west coast contemporary aesthetic; and

4.1.1.2 respects the influence of the Indigenous culture of the community and recognizes the unceded traditional territory of the Cowichan Tribes on which it is located.

4.1.2 Respect for Cowichan Tribes:

4.1.2.1 The Design-Builder will, throughout the development and design of the Facility, demonstrate respect for the values represented by Cowichan Tribes' groups.

4.1.2.2 The Design-Builder will incorporate strong visible representation of Cowichan Tribes' culture into the design of the Facility including at the exterior entrance to the Indigenous Language & Culture Centre and main entry to the School.

4.1.2.3 The Design-Builder will place the Indigenous Language & Culture Centre in a prominent location within the Building, with privacy afforded to events and gatherings.

4.1.2.4 The orientation of the main ceremonial entry to the Indigenous Language & Culture Centre will be to the south.

4.1.2.5 Site landscaping will incorporate cultural elements such as exposed cedar features, woven tule, wood sculptures, wood poles, and Indigenous plantings.

4.1.2.6 The language and names on major exterior and interior signage will reflect the local culture and be translated into local languages as appropriate.

4.1.3 The Building will be designed around an open centralized concept that visually connects the school community.

4.1.4 The Building will be by its nature a high-performance teaching tool, showcasing innovation and sustainability.

4.1.5 The Facility will be planned in accordance with guidelines outlined in the University Village Plan Bylaw.

4.2 Design Objectives

4.2.1 Without limiting any other requirement of this Agreement, the Design-Builder will design and construct the Facility to:

4.2.1.1 support education delivery principles outlined in Part 3 of this Schedule;

4.2.1.2 achieve LEED Gold Certification; and

4.2.1.3 provide a safe, comfortable and secure interior and exterior environment.

4.3 Future Expansion

4.3.1 The Design-Builder will design the School to support an initial capacity of 1,100 students and 100 School staff (refer to Section 2.6), with the ability to expand the School in the future to accommodate 1,500 students and an additional 24 staff members.

4.3.2 The School expansion will include an additional four Learning Communities and classrooms for 400 students of the same size and configuration outlined in Appendix 1A(a) – Functional Program

4.3.3 The Design-Builder's future expansion design will include design drawings and a narrative reflecting:

4.3.3.1 mechanical systems including:

(a) water entry room and main sizing to future expansion area;

(b) drainage / waste piping sizing, location and inverts for future connection;

(c) sprinkler main sizing and supply to future expansion area;

(d) fire pump sizing (if required); and

(e) DDC controls capacity;

4.3.3.2 electrical systems including:

(a) main electrical service sized for future expansion;

(b) sufficient spare panel area in main electrical room;

(c) fire alarm capacity; and

(d) sufficient Communications Rooms sizing for addition of racks as required;

4.3.3.3 architectural systems including:

(a) construction of the expansion within the "Project Building Area" of the Site shown in Schedule 10 – Site Plan;

(b) stair widths;

(c) continuous exit pathways throughout expansion construction; and

(d) exterior construction / ease of future connectivity;

4.3.3.4 site design including:

(a) conformance with the requirement for future on site storm water management;

(b) conformance on site for future required parking stalls; and

(c) expansion area clear of underground services;

4.3.3.5 structural systems including:

(a) future ground improvement compatibility; and

(b) column / shear system sizing.

4.3.4 Sizing of HVAC equipment for the Building will be based on the initial capacity.

4.4 Operational Sustainability and Integration

4.4.1 Design and construct the Building to achieve a minimum Design Life of 50 years, from Substantial Completion. Individual components and systems of the Building will have a Design Life which at minimum is consistent with Good Industry Practice or such period as may be expressly specified in Table 4.4 of this Schedule.

Table 4.4

Component	Minimum Design Life (years)
Heat Pumps	15
Boilers	25
Fans	
Centrifugal	25
Axial	20
Ventilating Roof-Mounted	20
Reciprocating chillers	20
Air-cooled condensers	20
Hardscape Finishes	20

4.5 Design Sustainability

4.5.1 Passive Design Strategies

4.5.1.1 Utilize passive design principles to guide the design of the Building to optimize Occupant health and comfort and minimize energy use by minimizing reliance on mechanical and electrical systems. Optimize the Building orientation, form and thermal performance of Building elements (including architectural, structural, envelope and passive mechanical) for interaction with the local microclimate.

4.5.1.2 Combine the following passive building design strategies to ensure inherent synergies produce optimal comfort and building energy performance:

(a) Site orientation of the Building:

(i) design the Building facades so that they will take advantage of passive solar heating during colder months and reduce overheating in warmer / hotter months; and

(ii) design the facades of the Building to minimize unwanted heat loss.

(b) Interior Space Planning:

(i) use the Building's orientation and massing to decrease energy use and increase thermal comfort; and

(ii) place Building functions with particular thermal requirements in areas of the Building that can provide those conditions with minimal mechanical intervention.

(c) Passive Heating:

(i) harness solar radiation and capture internal heat gains to add free thermal energy to the Building; and

(ii) provide passive solar heating strategies and a well-insulated envelope to minimize energy losses and harness and store solar gains.

(d) Passive Ventilation:

(i) incorporate passive ventilation strategies into the design of the Building to take advantage of naturally occurring airflow patterns around and in the Building to introduce outdoor air into the interior spaces; and

(ii) incorporate induced ventilation strategies by means of high spaces, such as atria, stacks and wind towers, to provide adequate ventilation by passive means.

(e) Passive Cooling:

(i) use passive cooling strategies to prevent the Building from overheating by blocking solar gains and removing internal heat gains; and

(ii) couple passive cooling strategies with passive ventilation strategies, such that the cooling function will be achieved by increased passive ventilation airflow rates during periods when the outdoor air temperature is low enough to flush heat from the Building.

(f) Natural Light:

(i) reduce the need for artificial electric lighting by distribution of diffused Natural Light throughout the Building's interiors.

4.5.1.3 Landscape

(a) Use mature, native vegetation and landscape features to reduce ambient temperatures, reduce the heat island effect of the Building, protect the Building from sun, wind and precipitation, and reduce solar intensity.

4.5.1.4 Buffer Spaces

(a) Buffer spaces will be located directly along-side the Building perimeter and will be used to improve Building energy performance by widening the range of outdoor temperatures in which thermal comfort can be maintained in the Building with low mechanical energy consumption.

(b) Integrate occupied buffer spaces as transition spaces to capitalize on the wider thermal comfort range in spaces like corridors and entryways, as opposed to other, more tightly conditioned spaces.

(c) Incorporate a main entry vestibule into the Building design, maintained at wider thermal comfort ranges, to help reduce the mechanical system energy consumption by limiting the loss of heated air during winter and cooled air during summer.

4.5.2 Windows

4.5.2.1 Design windows to achieve the optimal combination of heating, cooling and use of Natural Light in conjunction with security requirements.

4.5.2.2 Provide easily accessible means for window washing and maintenance.

4.5.2.3 Select glazing to maximize daylighting while minimizing SHGC unless this is proven to assist in meeting energy reduction targets.

4.5.2.4 Provide double or triple glazed, low-E coated, commercial or institutional quality window units.

4.5.3 Solar Shading

4.5.3.1 Use external shading devices and roof overhangs to intercept, absorb and/or reflect solar radiation before it reaches the exterior glazed surface of the building envelope as required.

4.5.3.2 Design shading devices to their relevant facade orientation and to be able to provide the appropriate performance to meet both winter heating and summer shading/cooling requirements while maintaining occupant comfort.

4.5.4 Air and Moisture Tightness

4.5.4.1 Use an air- and moisture-tight building envelope to eliminate unwanted air and moisture infiltration.

4.5.4.2 Design the Building to optimize air tightness and minimize air infiltration as required.

4.5.5 Thermal Bridging

4.5.5.1 Design and detail façade connections, window and door perimeters, roof and corner joints, foundations and walkway/building slabs to minimize thermal bridging.

4.5.5.2 Exterior structures will not create thermal bridges by way of envelope penetrations.

Part 5 Facility Principles

5.1 Building Location

5.1.1 The Building location will be within the “Project Building Area” of the Site as shown on the Site Plan. Refer to Schedule 10 - Site Plan.

5.1.2 The main Building floor level will be placed above the flood plain as mandated by the CVRD Floodplain map titled “COWICHAN-KOKSILAH FLOODPLAIN MAPPING PROJECT – 200 YEAR FLOOD WITH YEAR 2100 CLIMATE CHANGE SCENARIO FLOODPLAIN MAP, SHEET 2 OF 7” dated 17-FEB-2021 by Northwest Hydraulic Consultants.

5.1.3 The architectural design will optimize views to nearby mountains and waterways. The Building’s main entrance will be visible from the primary site entrance.

5.1.4 Outdoor service areas and the TED Compound will be shielded from public view.

5.2 Construction Phasing and Demolition

5.2.1 Demolition

5.2.1.1 The Design-Builder will demolish and remove the existing Duncan Junior Baseball concession stand on site prior to commencing construction activities for the Facility.

5.2.2 Existing Services

5.2.2.1 The Design-Builder will maintain all services to each of the Cowichan Place Facilities to ensure continuing operation during the construction period. Refer to Section 26 (Integration as Part of Cowichan Place) of the Agreement regarding requirements for any Work that may interfere with operation of the Cowichan Place Facilities.

5.2.2.2 Locate all existing utilities and service lines and protect from damage during construction.

5.2.2.3 New service locations, re-routing or tie-ins to current facilities must be approved in advance by the Owner and Authorities Having Jurisdiction.

5.2.2.4 When encountered, cap off inactive services at property line using methods approved by Authorities Having Jurisdiction. Remove inactive service lines, and stake and record location of the capped service.

5.2.2.5 Service tie-ins must be performed during times acceptable to the Owner and by Authorities Having Jurisdiction.

5.2.2.6 Record locations of all new, existing, relocated and removed service lines.

5.3 Access

5.3.1 Building Access

5.3.1.1 Locate primary student and community access from the Public Plaza, and through to the Lobby space.

5.3.1.2 The main Facility entry will be intuitive and welcoming for faculty, Staff, students and the public.

5.3.1.3 After hours entry will be provided by a doorway adjacent the Gymnasium Activity Space oriented to the Public Plaza. This point of entry will provide access to change room and washroom facilities. The School will be secure beyond this point.

5.3.1.4 The Neighbourhood Learning Centre will be accessible from the Public Plaza. Provide independent outdoor access to each of the following:

(a) NLC - Indigenous Language and Culture Centre; and

(b) NLC – Health and Wellness Centre.

5.3.1.5 Locate community access to the Gymnasium Activity Space from the exterior with secondary security to the remainder of the School.

5.3.1.6 Locate and configure access points to the School and the NLC to provide Direct Visual Connection to the Administration department.

5.3.1.7 Open space at Building entrances will be legible, identifiable, and relate to pedestrian and/or vehicular routes as applicable.

5.3.1.8 Open space design at entrances will convey the interior programming and intended users permitted in the Building.

5.3.1.9 Entries will be weather protected by canopies or building overhangs.

5.3.1.10 Interior and exterior finishes will complement one another, unifying the transition between exterior space and the built environment:

(a) entrance vestibules will be provided at each public entrance to the Building;

(b) entrance vestibules will have full transparency from the exterior and from the interior immediately in front of the vestibule; and

(c) entrance vestibules will be configured and sized to preserve the airlock effect for climate control in conformance with LEED Rating System requirements.

5.3.1.11 The following spaces will be accessible to the public for afterhours use by way of a separate entry:

(a) Multi-Purpose Room;

(b) Drama Room;

(c) Gymnasium Activity Space;

(d) Gymnasium Ancillary Space;

(e) Learning Commons (Library); and

(f) all NLC spaces.

5.3.1.12 Spaces for afterhours access use will be secured by lockable doors and/or security screens, all of which must allow for emergency exiting.

5.3.1.13 Where air handling equipment is located on the roof, it must be provided with direct access via a stairwell. Provide 450mm wide concrete pavers from the stairwell to and surrounding any rooftop equipment.

5.3.2 Parking, Loading and Vehicular Traffic

5.3.2.1 Provide pedestrian and vehicular site access as follows:

(a) Site access will prioritize pedestrian access.

(b) Primary site access for vehicles to the School and Neighbourhood Learning Centre will be from the round-about on University Way. Bus access will be from a new entrance on University Way.

(c) Service entry will be from University Way. Will include lockable swinging steel gate.

(d) Crosswalks will be located no less than 5m from corners or site entrances.

(e) Vehicular site access will allow for safe drop-off of bus, vehicular and Health Centre visitors.

(f) Design traffic circulation systems to minimize potential traffic conflicts at heavy traffic periods and to minimize traffic/pedestrian conflicts, both on and off site.

(g) Include a dedicated pick-up/drop-off for seven 80-passenger school buses in an end to end configuration associated with the primary site access and drop-off lane immediately in front of the school.

(h) Bus drop off will be provided with a 915mm high protective steel guard rail, painted red. Railings will be set into concrete, flush with the surrounding asphalt finish. The railing will continue the full length of the bus drop off, separating the bus drop off from the drive aisle while allowing for safe turning radii. Concrete filled-steel bollards will be provided at the entry and exit to the drop off lane.

(i) Bus drop off from the front of furthest bus will be no more than 100m from midpoint of the main entry plaza and will not require students to cross lanes of traffic.

(j) Bus drop off aisle will be no less than 3.66m wide, allowing for 10.36m length per bus.

(k) Provide smooth, level and accessible pedestrian paths a minimum of 2.1 metres in width, adjacent to vehicle passenger drop-offs, to connect to the entry plaza.

(l) Provide smooth, level and accessible pedestrian paths a minimum of 3 metres in width adjacent to the bus drop off.

(m) Clearly define the vehicular access points and drop-off zones to ensure safety and security of the students and users of the site.

(n) Separate the long-term parking from the drop-off area to ensure the traffic flows smoothly.

(o) Provide pathways per the University Village Local Area Plan By-law.

(p) Only bus exiting will be allowed on to Beverly Street.

5.3.2.2 Provide service access as follows:

(a) Provide a separate service vehicle access to the exterior enclosed compound of the Technology Education Centre, refuse and recycling enclosure from University Way.

(b) Provide vehicular service gate in fence near the corner of the Trans-Canada Highway and Beverly Street.

(c) Provide bollard protected pedestrian access at the shared running / walking path at the corners of the Trans-Canada Highway and Beverly Street and Trans-Canada Highway and University Way.

5.3.2.3 Parking

(a) General Requirements

(i) Vehicular and pedestrian routes will be clearly identifiable, intuitive and welcoming when arriving to, leaving from, and within parking.

(ii) Avoid a monolithic impervious surface. Create smaller lots that minimize impervious surface and maximize stormwater infiltration.

(iii) Provide measures that create safe and secure pedestrian access to, from, and within parking areas at all times of the day or night.

(iv) Parking zones will be designated as for the Neighborhood Learning Centre, School and emergency vehicles.

(v) Alternative Forms of Transport

See 8.5.25.2 for electric vehicle charging stations.

(vi) Provide a minimum of 168 parking spaces distributed as follows:

1. Provide a minimum 148 hard-surfaced student, visitor and Staff/faculty parking spaces accessed from the primary site entrance near the entrance to the School.

2. Provide a minimum of 2 spaces of hard-surfaced parking on the site adjacent the Technical Education (TED) Compound.

3. Provide a minimum of 18 spaces of hard-surfaced parking for the Neighborhood Learning Centre.

4. Accessible spaces will be distributed evenly between uses and will be counted as part of the 168 required spaces. Accessible spaces provided will be located nearest to building entries and will be provided with a 2.1m minimum sidewalk access without crossing roadways.

(vii) Provide secure bicycle parking spaces as per LEED requirements in addition to the requirements noted below:

1. secure bicycle parking will be located 10-50 metres from the main Building entrance;

2. 25% of secure bicycle parking spaces will be weather protected and enclosed with a securable black vinyl coat PVC chainlink fence; and

3. the area provided for bicycle parking is in addition to the required NSM area of the Entry Plaza.

(viii) Provide a concrete pad to accommodate a 7.4m x 2.4m x 3m school bus located in a less prominent location. Allow for the addition of future chainlink fencing to secure and provide visual screening.

(ix) Provide a concrete pad in a location suitable for post-disaster gathering area to accommodate a 6.1m x 2.4m shipping container for earthquake supplies.

5.4 Building Servicing

5.4.1 Locate equipment, fixtures and distribution systems to provide:

(a) convenient access for intended use;

(b) convenient access for ongoing maintenance;

(c) safe clearances around equipment, fixtures and distribution systems;

(d) flexibility for future changes; and

(e) minimum interference with functionality of spaces.

5.4.2 Concealment & Fitting

5.4.2.1 Conceal pipes, ducts and wiring in wall, floor and ceiling construction of finished areas using covering material consistent with room finishes. The Design-Builder may apply to the Owner for approval not to conceal pipes ducts or wiring in locations where such items are intended to be an architectural feature, or where denoted in Room Data Sheets, if coordinated architecturally with the room finishes.

5.4.2.2 Perform cutting, fitting and patching to make work fit neatly, cleanly and tightly together.

5.5 Movement Control

5.5.1 The circulation model for the Building will:

5.5.1.1 utilize each stairwell as open for circulation use;

5.5.1.2 exterior doors at stairwells will be exit-only;

5.5.1.3 clearly identify areas that are restricted;

5.5.1.4 minimize the need for wayfinding signage;

5.5.1.5 minimize the number of control points (doors); and

5.5.1.6 provide a minimum of one elevator.

5.6 Landscaping Design Principles

5.6.1 Landscape Design Criteria

5.6.1.1 General Requirements

(a) The landscape design will meet or exceed standards set out in the current Canadian Landscape Standard, except where modified by the requirements of this Statement of Requirements.

(b) The irrigation system design will meet or exceed standards set out in the current IIABC Standards for Landscape Irrigation Systems, except where modified by the requirements of this Statement of Requirements.

(c) The landscape and site design will be completed by qualified personnel:

(i) Preparation of the landscape design, construction documents and provision of field services during construction will be completed by a Landscape Architect registered in B.C. The Design-Builder will cause the BC Registered Landscape Architect to sign and seal all landscape construction documents and Landscape Schedules.

(ii) The irrigation design will be completed by an IIABC Certified Commercial Designer.

(d) Perform the landscape design and implementation to avoid any negative impacts on local waterways.

(e) Plant selections will be made with safe removal of discarded sharps in mind. Groundcovers and single or multi-stemmed plants that cannot be pruned to allow visibility below foliage are not to be used. Ferns may be judiciously used within the Indigenous Plaza only.

(f) The landscape will be designed so that activity areas align with maintenance level standards outlined in the Canadian Landscape Standard as follows: main entrances and plaza areas will be ‘Level 2 Groomed’; stormwater management areas will be ‘Level 5 Background & Natural Areas’; all other areas will be ‘Level 3 Moderate’.

(g) New planting will not include:

(i) Platanus x acerifolia (London plane);

(ii) Aesculus hippocastanum (common horsechestnut);

(iii) Aesculus x carnea (red horsechestnut);

(iv) Populus balsamifera & P. sp. (cottonwood and other poplars);

(v) Salix sp. (willow);

(vi) fruit bearing fruit trees;

(vii) bedding/seasonal plantings; or

(viii) groundcovers.

(h) The landscape design will include a minimum of 12 benches or 36m of seating walls placed throughout the Site. Exact locations will be determined in the user consultation process.

(i) There will be no vegetation located below the building overhangs and no grass areas located immediately adjacent to boulders. Grass should be located where there will be no or minimal need to trim around objects.

5.6.1.2 Tree Retention, Protection and Removal

(a) All trees protected under Municipal Tree Preservation /Protection Bylaws will be retained, protected against construction related damage, and maintained throughout demolition and construction.

(b) Tree protection zones will be enclosed with fencing including a solid wood frame and orange snow fencing or metal fencing. Signage noting 'Tree Protection Zone' will be posted on the above noted fencing.

5.6.2 Landscape Construction Criteria

5.6.2.1 General

(a) All plants will be nursery grown and comply with the requirements of the current Canadian Nursery Landscape Association (CNLA) Canadian Standards for Nursery Stock, except where modified by this Statement of Requirements.

(b) Landscape construction will be completed by qualified personnel:

(i) The irrigation installation will be completed by an IIABC Certified Irrigation Technician and the irrigation contractor will be a member in good standing of the Irrigation Industry Association of BC and have met the qualification standards currently applied to contractors by that organization.

(ii) All pruning will be completed by an ISA Certified Arborist or by a professional gardener trained in arboriculture or horticulture.

5.6.2.2 Topsoil, Compost and Mulch

(a) Growing medium will be Loamy Sand to Sandy Loam, as per the Canadian System of Soil Classification, for all areas except stormwater management areas.

(b) Growing medium in stormwater management areas will be Sandy Loam to Loam, as per the Canadian System of Soil Classification.

(c) Mulch will be used to reduce invasive and noxious plant growth, improve water retention in soil and improve the appearance of planting beds.

(d) Mulch will be organic. Plastic film, woven or non-woven fabrics and stone mulch is not acceptable. Mulches such as vegetative compost or leaf mulch will be used.

(e) Do not use bark mulch and/or shredded bark mulch.

5.6.2.3 Plants and Planting

(a) Minimum sizes of new freestanding trees and shrubs will be as follows:

(i) Coniferous trees – 2m height and 4cm caliper; # 15 pot;

(ii) Deciduous trees – 3.75m height and 6.5cm caliper; wire basket;

(iii) Ornamental trees– 2.75m height and 4cm caliper; #15 pot;

(iv) Evergreen shrubs – minimum #5 pot; container grown; and

(v) Deciduous shrubs – minimum #2 pot; container grown.

(vi) Herbaceous plants - minimum #1 pot with the following exception: rapidly growing plants may be planted as SP#4 if planted in spring and before the end of May. Plugs are not acceptable.

(vii) Live stakes and bulbs are acceptable if the bulbs and stakes are of non-invasive and drought tolerant species.

(b) All plants are to be guaranteed for the Warranty Period. The Design-Builder will replant any trees that, within the Warranty Period, are visibly dying, dead, leaning or have root balls where the root flare is not visible.

(c) Food bearing plants, except trees, may be used if they don’t attract rats or other rodents.

(d) Planting will be drought tolerant.

5.6.2.4 Sod Lawns and Multi-Purpose Field

(a) The Multi-Purpose Field will have drainage suitable for year-round use.

(b) There will be a minimum of 6 metres of sod perimeter between the Multi-Purpose Field and trees, planters and other landscape areas.

(c) The Multi-Purpose Field and all grass areas with significant sun exposure will be surfaced with large roll turf sod. Example: 'Sport Turf' sod supplied by Anderson Sod Farm.

(d) All other grass areas will be seeded as follows:

(i) Microclover/Low Maintenance & Wildflower Mix under Gary Oak Trees. Example supplier: Premier Pacific Seeds Ltd;

(ii) All Purpose Sun & Shade with Microclover Mix in bioretention areas. Example supplier: Premier Pacific Seeds Ltd; and

(iii) Envirolawn Mix in remaining grass areas on site (must be shade tolerant for shady areas). Any grass areas in shade will be seeded with shade tolerant seed mix. Shaded grass areas will be kept to a minimum. Example supplier: Premier Pacific Seeds Ltd.

(iv) Custom grass seed blends for specialty areas are acceptable. The seed mix must be composed of drought tolerant, non-invasive, native and adaptive species.

(e) Sod will be un-netted and soil based. Soil base will match, as much as possible, soil conditions of Site.

(f) Turfgrass sod will be Nursery (Cultivated) Turfgrass Sod No. 1 Premium grade in all areas designed for Level 2 'Groomed' maintenance, and No. 3 Commercial grade in all areas designed for Level 3 'Moderate' maintenance. Stormwater management areas will be sodded with No. 3 Commercial grade sod or seeded. Maintenance levels will be as outlined in the Canadian Landscape Standard and indicated in this document.

(g) The Multi-Purpose field will include:

(i) an underground drainage system consisting of an array of 100mm diameter perforated pipes with granular surround at minimum 6m offset;

(ii) pipes discharged into a suitable drainage system;

(iii) pipes with minimum 450mm cover and will not to conflict with the irrigation system;

(iv) a minimum 1% crown or cross fall on the field surface level and field subgrade; and

(v) field drainage design and installation to follow best practices for community and secondary school sports fields.

5.6.2.5 Irrigation

(a) Provide an automatic High Efficiency (HE) irrigation system that achieves 100% coverage for the Multi-Purpose Field. The system

will include a rain shut-off device and an exterior controller with a 365-day calendar.

(b) System components will be as follows, or equivalent as approved by the Owner:

(i) Heads: RainBird 8004 sprinklers with #12 or #14 nozzles at 50 square foot spacing, except where a smaller rotor is required, in which case RainBird 3500 heads will be used;

(ii) Valves: Rainbird;

(iii) Device Server: IQ Advanced Software;

(iv) Modem: IQ Ethernet comm Card;

(v) Cable: 25 pin to 9 pin;

(vi) Antenna: IQ Ethernet Antenna ;

(vii) Antenna: 'Lo Pro';

(viii) Industrial Flow Sensor: PV228-Size Data sized to fit mainline; and

(ix) Brass Master Valve: EFB-CP 1"-2" or BPES 3".

(c) The irrigation sprinkler system controller will be mounted on the Building exterior in a pad-lockable SS box at a location approved by the Owner, and providing maximum visibility of the Multi-purpose Field and grounds.

(d) Tree pits will be provided with drip irrigation loops. Drip irrigation will be zoned separately. Temporary irrigation will be acceptable where required for LEED credits.

(e) All pressurized lines will be copper, cross-linked polyethylene (PEX) or CSA approved Schedule 40 PVC pipe.

(f) All lateral lines will be SDR-21 PVC pipe (aka Class 200 PVC Pipe).

(g) Sleeves are required under all paved surfaces.

(h) All sprinklers will be installed on swing joints. One inch (1") swing joint will be an 'O' ring for the 640 heads. All other swing joints will be manufactured.

(i) All turf valves will be installed on swing joints using brass street elbows and brass nipples.

(j) All valves will be grouped in lockable steel boxes or vaults, that allow sufficient access to effect repairs and maintenance. Vaults are required for all Multi-Purpose Field valves. Vaults and boxes are

will be located in all other grass areas near water source and in low traffic lawn areas, not by doorways or gates.

(k) Sprinklers and turf valves will be flush mounted at finish grade.

(l) Valves will be in securable vaults which are flush with finish grade and parallel to the nearest wall or sidewalk, whichever is closer.

(m) Provide one complete 'blow down' (winterization) and one spring start-up after installation.

Part 6 Building Design Principles

6.1 Building Requirements

6.1.1 The Design-Builder will design the Building to reflect the school's hybrid organizational structure which combines Learning Communities with flexible learning environment components which can support a departmental approach for specialized curricular components if desired.

6.1.2 The Design-Builder will design the Building to allow students to see into various areas of interest.

6.1.3 The Design-Builder will design the Building to provide for collaborative, social learning through design of informal student social spaces, in various locations and configurations. Requirements for such spaces are as follows:

6.1.3.1 use spaces adjacent to exterior glazing in circulation spaces and areas overlooking the Multi-purpose Space;

6.1.3.2 as described in Appendix 1A(a), provide five Learning Communities of four classrooms, support spaces and Inclusive Education rooms each, to support the education of 100 students per Learning Community;

6.1.3.3 provide student social spaces for small group and independent study**;**

6.1.3.4 provide opportunities for outdoor learning areas at grade and/or upper floor levels; and

6.1.3.5 provide a seating space as a Gathering Stair for group learning, workshops, performances, special presentations and socialization.

6.1.4 Calculate student washroom requirements and distribute proportionally for each floor.

6.1.5 Provide a single GN washroom within each Learning Community for student use, as part of the total washroom fixture requirement.

6.1.6 Allow for visual supervision of all common areas through horizontal and vertical visual connections between circulation spaces, avoiding non-visible spaces and long, aligned, non-articulated corridors. Minimum requirements are as follows:

6.1.6.1 Provide Direct Visual Connections between all levels of the entry Lobby and Multi-Purpose Space.

6.1.7 Allow for visual connections within the School between spaces occupied by students and adjacent occupied learning areas to provide opportunities for supervision and exposure to new activities and ideas.

6.2 Architectural Design Principles

6.2.1 The following architectural design principles have been established for the Project:

6.2.1.1 The School will provide an environment suitable to celebrate activities and accomplishments. The School will recognize Cowichan Secondary School's traditions, Cowichan Tribes' heritage, spirit and sense of place.

6.2.1.2 The Building will optimize Natural Light and views in the regularly occupied interior spaces. Implement strategies to deliver Natural Light deeply into spaces and provide effective ties between the interior and the exterior while balancing heat loss, solar gain and glare.

6.2.2 Building Entrances and Exits

(a) The main School entry will be easily identifiable and provide a welcoming impression with views through to the Building interior.

(b) The main School entry will be universally accessible.

(c) All Building entrances and exits will be legible, identifiable, and relate to pedestrian and vehicular routes, as applicable.

(d) Where steps are used to access entrances and exits, accessible ramps will be provided adjacent to the stair.

(e) No access ramps or grades will be greater than 1:20.

(f) All Building entrances and exits will be weather protected.

6.3 Structural Engineering Principles

6.3.1 Buildings will be designed in accordance with the BCBC. Building material and construction will comply with all applicable standards of the Canadian Standards Association (CSA).

6.3.2 Structural Design Responsibility

6.3.2.1 The Design-Builder will retain:

(a) A Structural Engineer of Record (SER) who will:

(i) be a Professional Engineer, specializing in structural engineering;

(ii) perform the duties of engineer of record, responsible for the structural design of all structural elements and connections to the structures;

(iii) review all work by the specialty structural engineers and supporting registered professionals and certify that the design meets the requirements of this Contract and this Schedule 1; and

(iv) coordinate structural and geotechnical criteria required for foundation design and ground improvements as required.

(b) Any specialty structural engineers or supporting registered professionals who may be used for the design of components and connections will be directed by the SER. Designs by the specialty structural engineers or supporting registered professionals will be signed and sealed by the specialty structural engineers or supporting registered professionals registered in the Province of British Columbia.

6.3.3 Design Loads

(a) Design loads and load combinations are to comply with the BCBC.

6.3.4 Reinforced Concrete

6.3.4.1 Design Requirements

(a) Design and construct reinforced concrete structures including foundations to resist stresses produced by load combinations in accordance with BCBC and CSA Standards A23.1, A23.2 and A23.3.

(b) Concrete will use Portland-Limestone (GUL) Cements in accordance to CSA A3001.

6.3.5 Structural Steel

6.3.5.1 Strength Limits

(a) Design and construct all building structural steel structures to resist stresses produced by load combinations in accordance with BCBC and CSA Standards S16.

6.3.5.2 Vibration Limits

(a) Design and construct all building structural steel structures in accordance to vibration limits as per BCBC.

(b) Composite concrete and steel deck floors are not to be used for polished concrete floor finishes, due to the limited ability to control cracking.

6.3.6 Substructure

6.3.6.1 Foundations

(a) Design and construct all foundations to resist stresses produced by load combinations in accordance with BCBC and geotechnical recommendations.

6.3.6.2 Sub Grade Enclosures

(a) Note that the Building location is on a flood plain and consideration of this is required in substructure design.

(b) Sub grade enclosures for mechanical and electrical services and equipment will resist floor and traffic loading in accordance will BCBC Table 4.1.5.3 and 4.1.5.9.

(c) Design lateral soil pressure in accordance with geotechnical recommendations.

6.3.6.3 Slab on Grade

(a) Design slab on grade to resist uniform and point floor loading in accordance with BCBC.

6.3.6.4 Water and Gas Mitigation

(a) Provide dewatering and gas mitigation if required.

6.3.6.5 Substructure Related Activities

(a) Ground conditions are a significant design consideration as the Site is on liquefiable soils at depth. The Building is also located on a flood plain.

(b) The Design-Builder will retain a geotechnical engineer registered in BC for the purpose of geotechnical design of the selected foundation solution, in conjunction with the SER. The geotechnical engineer will review and approve implementation of their designed prior to installation of structural foundations.

(c) Excavation slopes will comply with the geotechnical recommendations prepared by the Design-Builder's geotechnical engineer and Worksafe BC requirements.

6.3.6.6 Future photo-voltaic system

(a) Include provisions including structural stub-connections in the structural design for the ability to connect future photo-voltaic frame and system equal to a 100kW system within the Facility's main distribution equipment for Net-Zero Ready strategy.

6.4 Mechanical Engineering Principles

6.4.1 Engineering Design Principles & General Requirements

6.4.1.1 Provide mechanical systems to serve the Facility that are designed to meet all programmatic requirements while considering long term maintenance

impact, equipment longevity and life cycle, energy efficiency, occupant comfort, and system response time.

6.4.1.2 Provide mechanical systems that respond to the needs of programmed space requirements described in Section 7 and Appendix 1B - Room Data Sheets, including the specialized mechanical systems which will be needed in various spaces to meet these needs.

6.4.1.3 All mechanical equipment will be installed in areas only accessible by maintenance staff. Where equipment is installed in public areas, such equipment shall be inaccessible to the public and located within the ceiling or in lockable cabinets.

6.4.1.4 Mechanical

(a) Mechanical and mechanical systems include fire suppression/protection, plumbing systems, HVAC systems and controls, including specialty systems within these disciplines.

(b) Mechanical and plumbing equipment will be configured and located in such a way that maintenance and repair can be performed without entering any classrooms, except that equipment serving a particular classroom is permitted to be located in the classroom it serves.

(c) The mechanical, plumbing and fire protection systems will be designed to ensure continual operation at levels required by this Schedule 1. Standby capacity and redundancy will be included in system design as required by Part 8 Facilities Services of this Schedule 1.

(d) The mechanical systems will be designed to provide a comfortable and productive environment for the Building users and provide the environmental and infrastructure needs of all equipment.

(e) The mechanical systems will be designed to minimize impact on the natural and physical environment and greenhouse gas emissions through energy efficiency, optimization of resource use, and simplification of the systems.

(f) The mechanical systems will be designed and located to be hidden or blend into the overall Building. The design and location of equipment will mitigate noise.

(g) All mechanical systems, equipment, material and installation will conform to the latest version of all Standards.

(h) The mechanical systems component selection, system design, and installation will incorporate the flexibility and adaptability for future repurposing without major disruption or alteration to the Facility. Mechanical systems will also be designed to include pathways for future services and space for future equipment for the expansion space.

(i) Mechanical systems will be designed to facilitate equipment maintenance and replacement. Easy access will be provided and shown on drawings for moving the new equipment in and out of the mechanical rooms and energy plant without disruption to Facility operations.

(j) Water, glycol and all other fluids used within mechanical systems will be treated to prevent corrosion, algae growth, buildup of deposits, disease, bacteria and to prolong the equipment life.

(k) The mechanical design will incorporate the following levels of redundancy:

(i) systems with hot water boilers will include a redundant arrangement of both pumps and boilers, such that one boiler or one pump can be taken out of service and repaired with the system still providing 75% capacity;

(ii) systems with hot water boilers will be sized assuming the largest heat recovery device such as a ventilator or heat recovery chiller is out of service;

(iii) for heating systems not containing boilers, the same levels of redundancy is required, N+1 arrangement;

(iv) heating systems within air handling units that include heat recovery will be sized to meet 100% capacity assuming the heat recovery is offline;

(v) no single fan system will serve more than 50% of a Building; and

(vi) fan systems will be zoned to accommodate the different program area schedules. Program areas with different schedules will be on their own fan system zone.

(l) Provide water, sanitary, storm and gas utilities as required and sized to suit the consumption and discharge needs of the Facility.

(m) Mechanical services in electrical and Communications Rooms will maintain a clear height of 2.13m (7’-0”) above finished floor. Hydronic and domestic piping will not be routed through these room types and sanitary piping will be prohibited. Slab penetrations above these rooms will be equipped with sleeves which terminate 75mm above the slab to prevent water from entering the sleeves.

(n) All pipes, ducts and fittings, with the exception of piping conveying fluids between 18 °C and 40 °C, will be insulated to conserve energy, prevent condensation, attenuate noise and prevent accidental burns, All pipes, ducts and fittings will be insulated as required by code.

(o) All building services and ductwork will be run inside the building envelope.

(p) Public, Staff and service entrances will be protected by auxiliary heating.

(q) No “drop in anchors” will be used to support, hang, or brace piping, ductwork, or other equipment.

6.4.2 Service Access Panel Door

6.4.2.1 Supply flush-mounted tamperproof and lockable access panel doors in non-accessible type ceilings and walls where necessary for access to service and/or to inspect mechanical equipment, accessories, and life safety devices.

6.4.2.2 Unless otherwise noted, access doors will be minimum 610mm x 610mm (24” x 24”) for body entry; 300mm x 300mm (12” x 12”) for hand entry; 200mm x 200m (8” x 8”) for cleanout access.

6.4.2.3 Locate access doors so that all concealed items are readily accessible for adjustment, operation, maintenance and inspection.

6.4.2.4 Access doors will not be located within Washrooms and will be in service areas or janitor closets.

6.5 Electrical Engineering Principles

6.5.1 All electrical systems and equipment required for the Facility will be provided and configured in line with the details and indicated in this Schedule 1.

6.5.2 Electrical systems, controls and energy management systems will be designed and constructed to minimize peak electrical demand load, utility demand charges and to eliminate power factor surcharges.

6.5.3 Provide electrical systems that are proven and are the most recent and up to date at the time of their installation.

6.5.4 Unless specifically prohibited, integrate systems where integration provides efficiency, operational advantages and/or cost savings.

6.5.5 Include systems and equipment coordinated to provide synergy and reliable electrical performance for the various functions within the Facility.

6.5.6 Incorporate into the design and construction the principle that change will be a constant and inevitable fact within the Facility. Completed electrical systems will permit change while minimizing the cost of change and the amount of disruption to the regular program activities and functions. Electrical rooms, equipment and systems control panels are to have extra space and provisions for future expansion. Spare capacities allowed for in the main equipment (transformers, generators, UPS, and associated switchboards and panelboards) for future flexibility will be separately identified in the equipment sizing calculations.

6.5.7 Locate electrical rooms, electrical system components and major pathways such that they are as close to the centre of the loads as possible to avoid potential interruption due to future changes, to avoid interferences with other services and equipment, to minimize the distances for feeder runs, and to minimize the cost impact of new requirements.

6.5.8 Electrical and Communications Rooms will not have drain pipes, plumbing pipes, water-cooled fan coil units or other sources of water located in the ceiling space.

6.5.9 Provide provisions to minimize the noise and vibrations of electrical equipment / components such as transformers, luminaires and cables to below acceptable levels which will vary within specific areas. Refer to Section 8.3.6.2 (Acoustic Treatment) of this Schedule and Appendix 1C – Acoustical Chart.

6.5.10 Electromagnetic interference (EMI) will be mitigated in design, selection and installation of electrical equipment. EMI reduction will be achieved by utilizing by using strategies including: electromagnetic shielding for transformers and switchgear; use of ferrous raceways such as EMT as required by electrical code; close spacing of conductors in feeders; running all the phases of a feeder together to cancel net magnetic fields; and locating all distribution transformers in electrical rooms and running feeders in service and ceiling spaces away from occupied areas. Bus duct is acceptable only when used in electrical rooms or in vertical risers from electrical room to electrical room but must be fully enclosed. Should there be an electromagnetic field that results in interference to equipment, the Design-Builder will mitigate the electromagnetic field with appropriate techniques.

6.5.11 Install electrical systems and equipment in a fixed, seismically restrained and permanent manner. Plan installation of equipment to economically occupy the available space, to allocate space for future additions and to facilitate easy access to other systems and equipment, including mechanical equipment, which may require inspection or maintenance.

6.5.12 Power throughout the Facility will comprise of a combination of 347/600V and 120/208V for all power, lighting and equipment loads.

6.5.13 Include provisions in electrical design and equipment for ability to connect a future 100kW photo-voltaic system for Net-Zero Ready strategy. Panel efficiency is to be calculated at present efficiency rates.

6.5.14 Provide conduit runs from the roof or parking lot to the main electrical room for a future photo-voltaic system. Provide spare area for distribution panels within the main electrical room for a future photo-voltaic system.

6.5.15 Service Access Panel Door

6.5.15.1 Supply flush-mounted tamperproof and lockable access panel doors in non-accessible type ceilings and walls where necessary for access to service and/or to inspect electrical equipment, accessories, and life safety devices. Lock hardware will be commercial-grade.

6.5.15.2 Unless otherwise noted, access doors will be minimum 610mm x 610mm (24” x 24”) for body entry; 300mm x 300mm (12” x 12”) for hand entry; 200mm x 200m (8” x 8”) for cleanout access.

6.5.15.3 Locate access doors so that all concealed items are readily accessible for adjustment, operation, maintenance and inspection. Locate in service, storage and Staff accessible areas only.

6.6 Energy Model Principles

6.6.1 Performance Criteria

6.6.1.1 See Schedule 8 – Energy.

Part 7 Facilities Construction

7.1 Division 1 - Procurement and Contracting – Not Used

7.2 Division 2 - Existing Conditions – Not Used

7.3 Division 3 – Concrete

7.3.1 General Requirements

7.3.1.1 All concrete work will conform to the requirements of CAN/CSA A23.1 and A23.2.

7.3.1.2 Design and construct cast in place and precast concrete of appropriate properties for the intended use in accordance with the requirements of all applicable codes and specifications for the applicable concrete exposure class and to maximize the fly ash content of the mix. All cast in place concrete will be vibrated or densified in accordance with CSA 23.1 Cl. 9.5.2 by a competent place and finish contractor.

7.3.1.3 Honeycombing and bug holes will be repaired immediately under the direction of the Professional Engineer.

7.3.2 Quality Requirements

7.3.2.1 Cast in place concrete and concrete materials will be inspected and tested by a CSA certified testing laboratory.

7.3.2.2 Precast concrete materials and workmanship will be inspected and tested by the precast concrete contractor as part of the Design-Builder's quality control program.

7.3.2.3 Concrete Building elements that will remain exposed to view from the exterior of the Building will be designed and constructed as architectural concrete, as defined in Section 8.3 of CAN/CSA A23.1.

7.3.2.4 Concrete surfaces, excluding exposed concrete floors not covered with Building finishes, will have a smooth-formed finish, as defined in Section 7.7.3.6 of CAN/CSA A23.1.

7.3.2.5 Exposed concrete walls and structure of the Building will have an anti-graffiti coating.

7.3.2.6 The use of any exposed concrete flooring will conform to the levels of finish as defined by the Concrete Polishing Council. Refer to the Concrete Polishing Council's Polished Concrete Appearance Chart and conform to the following minimum levels of finish:

(a) in utility spaces, the level of sheen will be Level 1 – flat, with a Class A – cream aggregate exposure; and

(b) in all other areas, the level of sheen will be Level 2 – satin or Level 3 – polished, with a Class B – fine aggregate or Class C – medium aggregate exposure.

7.3.3 Performance Criteria

7.3.3.1 Finish concrete floors with a smooth, dense, steel trowel finish with a Class A Flatness Classification in accordance with CSA A23.1. Overlay toppings to level floors are not permitted.

7.3.3.2 Repair cracks in concrete floors and walls to suit the floor finish and long-term serviceability requirements of the floor.

7.3.3.3 Waterproof foundation walls surrounding occupied spaces to prevent groundwater ingress. Construction joints will have purpose-made water stops. A perimeter footing drainage system will be installed around the exterior of the below grade spaces.

7.3.3.4 Slabs on grade will be designed and constructed to perform for intended use without deterioration under heavy loads, heavy traffic, abrasive wear and chemical attack and as a minimum will:

(a) be reinforced to control cracking;

(b) be designed for loading for all required Equipment and for a minimum live load of 4.8 kPa; and

(c) where no applied finish is required, be sealed to resist penetration and staining from items such as food products, bodily fluids and cleaning compounds.

7.4 Division 4 – Masonry

7.4.1 General Requirements

7.4.1.1 Masonry wall assemblies will only be installed by installers who are members in good standing with the Canadian Masonry Contractors Association in BC.

7.4.1.2 Masonry construction may be considered for exterior walls, foundation walls, exit stairs, elevator shafts, and walls systems where permanence of finishes, both visually and functionally, and ease of maintenance are primary considerations in the exterior fabric of the Building.

7.4.1.3 Masonry construction may be considered for interior walls and wall systems when priorities include permanence and maintenance, sound transmission control, fire resistance and separation requirements and security.

7.4.1.4 Face work will be laid plumb and true with all joints consistent in both width and colour.

7.4.1.5 Apply manufacturer recommended masonry sealers to all exterior masonry.

7.4.2 Concrete Masonry Units

7.4.2.1 Concrete masonry units will not be visible in any interior spaces, with the exception of Support Spaces.

7.4.2.2 Concrete masonry units are acceptable for both independent exterior walls and in exterior wall systems as a structural backing to other finish materials or systems.

7.4.2.3 Concrete masonry units for interior applications may be considered only as structural backing to other finish systems unless specifically noted otherwise in Appendix 1B – Room Data Sheets.

7.4.2.4 Masonry design and construction will comply with Canadian Masonry Contractors Association (CMCA) Masonry Practices Manual, CSA-S304, and all applicable Standards including CSA-A371.

7.4.2.5 Where concrete masonry units are used at exterior areas, internal cores will be grout filled.

7.4.3 Brick Masonry

7.4.3.1 Exterior wall systems comprising brick masonry as a finish veneer to concrete, concrete masonry or metal framing will be a rain screen or cavity wall system.

7.4.3.2 Brick masonry below grade for exterior applications is not permitted.

7.4.4 Stone Masonry

7.4.4.1 Stone masonry, subject to advance written acceptance by the Owner, may be used as a finish veneer to concrete walls or concrete masonry walls. Exterior wall systems in such applications will be a rain screen or cavity wall system.

7.4.4.2 Stone will be sound, hard and durable, well-seasoned and of uniform strength, colour and texture, and free of quarry sap, flaws, seams, sand holes, iron pyrites and other mineral and organic defects. Manufactured stone products are permitted if reviewed and accepted in advance by the Owner.

7.5 Division 5 – Metals

7.5.1 Performance Criteria

7.5.1.1 Design structural steel, steel deck, and cold-formed steel stud systems to comply with the deflection and vibration criteria outlined in this Section 7.5.

7.5.1.2 For steel floor and roof construction, the deflection of steel beams, joists, and girders due to the wet weight of concrete topping slabs will be accounted for. Topping slab thickness may have to vary to maintain floor levelness tolerances. The additional concrete ponding weight will be accounted for in the design of the Building.

7.5.1.3 All concrete topping slabs on steel deck will contain minimum reinforcing to mitigate random surface shrinkage cracking. There will be diagonal reinforcing placed at each reentrant corner and corners of floor openings to help mitigate radial cracking.

7.5.1.4 Curing of concrete topping slabs on metal deck will conform to Section 8.3 of CAN/CSA 23.1. In addition, the following details and procedures will be implemented:

(a) minimize wet weight deflections of steel decking and supporting structure;

(b) where practical, place concrete in alternate bays. Avoid placing large areas at one time;

(c) use concrete topping with a low design slump. Add superplasticizer if necessary to increase slump for placing and finishing; and

(d) provide extra topping slab reinforcement around openings, columns and at corners.

7.5.1.5 Steel roof decking will be wide rib profile for ease of attachment of current and future services, equipment, and fixtures using drilled insert expansion anchors into the bottom of the deck ribs.

7.5.1.6 Steel roof decking plus the concrete topping slab thickness will satisfy the requirements of a ULC-rated assembly meeting the BCBC fire rating requirements.

7.5.1.7 Fire proof structural steel roof framing and supporting members will be used to meet all fire rating requirements. Spray on fire proofing applications, which will be tamped while wet to densify product, will be used for floor and roof beams and girders, complete with an applied sealer creating a dense non-friable surface for ease of future attachment of services and equipment.

7.5.2 Structural Steel

7.5.2.1 Quality Requirements

(a) Material quality including sourcing and welding quality will be monitored by an independent testing agency provided and arranged by the Design-Builder.

(b) The specification for preparation and painting of structural steel components will conform to the Master Painters Institute (MPI) Standards.

(c) Exterior exposed light gauge steel structure will be designed in accordance with CSA S136-01 and hot dipped galvanized to G90 in accordance with ASTMA653 to a minimum 275 g/m^2 or painted with a two part epoxy paint system.

7.5.3 Cold-Formed Metal Framing

7.5.3.1 Overriding Principles

(a) Load bearing and non-load bearing steel studs may be considered as a component of the exterior wall systems to support exterior wall finishes and form an integral part of the perimeter envelope.

(b) Rain screen walls utilizing cold-formed metal framing will be non-load bearing.

(c) Load bearing steel studs will be independent of the principle structural system.

7.5.3.2 Quality Requirements

(a) Design, detail and construct load bearing steel stud structures to comply with all applicable CAN/CSA standards.

(b) The steel stud manufacturer will be certified in accordance with CSSBI Standard 30M-06 and all applicable CAN/CSA standards including CSA-A660.

(c) Conform to the Association of Wall and Ceiling Contractor's Specification Standards Manual (AWCC).

7.5.3.3 Performance Requirements

(a) Limit maximum deflection under specified wind loads to L/720 (including masonry veneers), unless a smaller maximum deflection is specifically required due to wall finishes.

(b) Design wind bearing stud end connections to accommodate floor/roof deflections.

7.6 Division 6 - Wood, Plastics and Composites

7.6.1 General Requirements

7.6.1.1 Products containing urea formaldehyde are not permitted in the Building.

7.6.1.2 Provide rough carpentry, wood backing materials, backing boards for mechanical rooms and electrical/Communications Rooms, roof sheathing, copings, cant strips, finish carpentry and architectural woodwork, including exterior fascia's, cabinets, casework, frames, paneling, ceiling battens, trim, installation of doors and hardware, and other wood-related products and applications as required:

(a) to meet the requirements of this Schedule 1 and as required for operation of the Building; and

(b) as required for wood products exposed to view in finished interior and exterior installations.

7.6.1.3 Provide acrylic plastic, stainless steel or epoxy products as required for wall cladding, wall protection, corner protection, casework finishing, trims, ornamental elements, and other applications to achieve a quality of interior finish suitable for use by Occupants.

7.6.2 Architectural Millwork

(a) General Requirements

(i) Conform to Architectural Woodwork Standards, First Edition, as issued by Architectural Woodwork Manufacturer's Association of Canada (AWMAC). Comply with Quality Standards Manual for minimum "Custom Grade," and Door and Hardware Institute (DHI) standards for the design, fabrication, materials, installation, and workmanship of finish carpentry and architectural woodwork.

(ii) All bottoms of sink cabinet boxes and areas that may come into contact with water will have a marine-grade plywood substrate. Fibreboard or particleboard are not permitted.

(iii) Use marine-grade plywood substrate for countertops. Fibreboard or particleboard are not permitted.

(iv) For millwork and cabinets, seal all wood surfaces and edges. All door, drawer and other exposed millwork edges will have applied an appropriately sized PVC edge strip, heat applied. There will be no P-Lam to P-Lam edges.

(v) Adhesives will be non-toxic, non-solvent glue to comply with AWMAC Quality Standards Manual, Canadian 'Eco-Logo' program, and USGBC.

(vi) All architectural woodwork hardware will meet the standards of AINSI/BHMA grade 1 Cabinet Hardware.

(vii) Provide two-year Architectural Woodwork Manufacturers Association of Canada (AWMAC) Guarantee Certificate.

(viii) Design will be simple in form with minimal moldings and trim. Millwork requirements are as required in Appendix 1B – Room Data Sheets.

(ix) AWMAC Custom Grade; submit detailed shop drawings for the required millwork for the Owner's review and acceptance following review by the Design-Builder and Architect of Record.

(b) Performance Criteria

(i) Provide architectural millwork including all counters, cabinet units, shelving, hardware, finishing and installation as follows:

1. all cabinets will be flush overlay construction;

2. design millwork so that no sharp edges are exposed, provide minimum 25mm radiused corner to countertops; and

3. incorporate all required mechanical, electrical and communication services into the millwork so that wires and pipes are hidden from view, provide access panels to all services to allow for future adjustment.

(ii) Hardwood plywood:

1. Domestic plywood only (no imported) to CSA 0.115-1967, 19 mm C2 Whole Piece Face (C2WPF) 7 ply NOVA #2SSG OS HPVA HP-1, select White Birch, good one or two sides as required.

(iii) Hardwood lumber:

1. Domestic hardwood only (no imported) to National Hardwood Lumber Association (NHLA) requirements, moisture content of maximum 6% for interior work, select White Birch, to AWMAC Custom Grade, selected to match Birch plywood.

(iv) Filler Strip:

1. All cabinets will be installed with filler strip where end contacts the wall.

(v) Interior trim:

1. AWMAC Custom Grade, select White Birch.

(vi) Finishing hardware:

1. Cabinet pulls will be 100 mm rectangular shaped, commercial grade, stainless steel. Example: C.G.S.B. 69-GP-8M and to match door hardware finish. 626D only.

2. Drawer slides:

   a. commercial grade full extension with soft close will be installed on all drawers.

3. Drawer / door locks: Commercial grade, finish to match adjacent hardware.

4. Door catches:

   a. Commercial grade, roller catch w/ plastic roller. Example: (large) Richelieu BP55292G and (small): Richelieu BP6032G or Owner-approved alternate.

(vii) Radius all exposed plastic laminated edges and corners.

(viii) Cabinet & shelf edging:

1. 3 mm Birch to exposed or visible edges of cabinets or shelves. 3mm PVC in colour to match cabinet or shelving where edging is not visible.

(ix) Cabinet Shelves:

1. will be adjustable unless specifically noted fixed. All adjustable shelves will be seismically restrained by the use of notches.

2. Shelf standards: metal finish in metal standard track, recessed into millwork.

(x) Cabinet Tops:

1. Except as noted below, all cabinets and bookcases with the top less than 1625 mm above finished floor will have the top surface finished with plastic laminate or equivalent wearing surface upon approval of the Owner.

2. Cabinet tops in Super Lab and Studios will be epoxy resin or phenolic, chemical and acid resistant.

3. Cabinet tops and countertops in Automotive, Wood Shop and Metals shops will be minimum 14 gauge stainless steel sheet metal with rolled edges over minimum ¾" plywood backing.

(xi) Glass and glazing:

1. glass in casework or millwork will be tempered or laminated and captured on all sides. Glass will be removable in case of breakage.

(xii) Finishing:

1. Shop finished in accordance with Section 1500 of the AWMAC Architectural Woodwork Quality Standards. Shelves and drawer fronts within cabinets will be considered "Exposed" for finish application.

   a. Millwork will be clear finished.

   b. Finish system: Conversion Varnish, Custom Grade.

2. Plastic laminate:

   a. Use high-pressure laminates on all horizontal surfaces.

   b. CAN3-A172-M79, 1.2 mm thick, (GPR), all smooth finishes.

3. Cabinet Locks:

   a. Commercial grade. Finish to match surrounding hardware. All keying as approved by the Owner.

4. Showcase Locks:

a. Premium track with metal rollers. Track lock and track finger pulls keyed alike.

(xiii) Mock-up: Provide full scale mock-up of typical cabinet complete with door, catch, drawer, shelving and pull.

(xiv) Loading: Design millwork to withstand edge load of 100 kg per lineal metre of counter. All perimeter counters will be wall hung.

7.7 Division 7 - Thermal and Moisture Protection

7.7.1 Basic Requirements

7.7.1.1 The Design-Builder will retain a recognized Building Envelope Consultant to review the envelope design, working directly with the Design-Builder's Architect on the construction and design of the building envelope.

7.7.1.2 Design construction assemblies to prevent the ingress of moisture or water vapor from the exterior through the building envelope and the passage of air through the building envelope from the interior spaces to the exterior and vice versa.

7.7.1.3 Design construction assemblies to prevent the ingress of moisture through foundation walls below grade, both subject and not subject to hydrostatic pressure.

7.7.1.4 Materials used in the building envelope assembly will be suitable for the use under the environmental conditions to which each will be exposed, including during the construction period.

7.7.1.5 Materials will be accessible for maintenance purposes provided that materials will not be removable without use of special tools.

7.7.1.6 All drawings will clearly and graphically depict the continuity of the weather-tight plane including air, moisture, and vapor barriers insulation, plus drainage and ventilation of assembly voids. Particular attention will be paid to foundation/wall, roof/wall, window/wall and structure/wall connections.

7.7.1.7 Face-sealed wall assemblies are not acceptable.

7.7.1.8 The Design-Builder will retain a Building Envelope Consultant to perform an independent building envelope review noting specific provisions for the control of moisture, mould growth and deterioration inside the wall assembly.

7.7.1.9 Consistent with the service life of the Building, all components of the exterior wall assemblies related to the weather-tight plane will be resistant to the deteriorating effect of exposure to the elements.

7.7.1.10 Use of overhangs to protect wall assemblies and glazing is encouraged; design roof to avoid unauthorized access to roof areas.

7.7.1.11 Exterior envelope assemblies will shed (drain away) water. Materials and assemblies that minimize deterioration when wet and that have good drying capability must be used.

7.7.1.12 Use insulation, air space, or other acceptable means to eliminate direct paths of heat conduction. Door and window frames will be thermally broken.

7.7.1.13 The building envelope will resist air leakage caused by static and dynamic air pressures across the exterior walls, soffits, roof assemblies, windows, glass, doors, and penetrations or interruptions of the envelope system or assembly, in accordance with BCBC requirements.

7.7.1.14 To provide maximum adaptability for future reconfiguration of interior spaces, the Design-Builder will not incorporate a vapour barrier on the interior face of exterior wall or rely on an 'air-tight drywall' approach.

7.7.2 Dampproofing

(a) Provide foundation wall surfaces with dampproofing coverage that is sufficient to repel and prevent moisture ingress in accordance with the BCBC where no hydrostatic pressure is present.

7.7.3 Waterproofing

(a) Provide waterproofing to prevent moisture ingress to occupied spaces below grade.

(b) All below grade foundation walls, at grade slab edges and footings will be waterproofed.

(c) Use membrane waterproofing to prevent water ingress over suspended slabs and decks and associated walls over habitable spaces where water collection is anticipated. Use traffic-bearing fluid-applied waterproofing for mechanical room floors.

(d) Provide waterproof membranes in exterior walls as part of the building envelope and integral with rain screen or cavity wall assemblies.

7.7.4 Vapor Barriers

(a) Provide continuity of vapor seal materials and assemblies in conjunction with adjoining exterior wall construction.

(b) Provide a single continuous vapor seal membrane as a secondary moisture shedding plane supported by wall structure; primary moisture shedding plane is the cladding.

(c) Provide full adhesion of vapor barrier membranes per performance values of membrane manufacturer's tested assemblies.

(d) Prevent water vapor transmission and condensation by means of a continuous vapor barrier membrane in wall assemblies, roofing assemblies, under concrete slabs-on-grade, and interruptions to the

integrity of wall and roof systems such as junctions with dissimilar assemblies, including:

(i) window and door frames;

(ii) mechanical and electrical penetrations;

(iii) structural and non-structural penetrations such as balconies, canopies, sunshelves and signage;

(iv) wall/roof connections;

(v) changes in plane; and

(vi) joints between like and dissimilar materials.

(e) At underslab conditions, provide continuous vapour barrier not less than 0.15mm thick plastic sheet complying with ASTM E1745, Class A.

(f) Conduct dew-point analys to determine correct placement of vapor barrier within wall and roof assemblies. Coordinate locations of thermal insulation, waterproof membranes, and air and vapor barriers to prevent creation of dew point, resulting in condensation within assemblies.

7.7.5 Air Barriers

(a) Provide continuity of air seal materials and assemblies in conjunction with adjoining exterior wall construction.

(b) Provide a single continuous air seal membrane as a secondary moisture shedding plane supported by wall structure.

(c) Provide full adhesion of air barrier membranes per performance values of membrane manufacturer's tested assemblies.

(d) Prevent air leakage caused by air pressure by means of a continuous air barrier membrane in wall assemblies, roofing assemblies, under concrete slabs-on-grade, and interruptions to the integrity of wall and roof systems such as junctions with dissimilar assemblies, including:

(i) window and door frames;

(ii) mechanical and electrical penetrations;

(iii) structural and non-structural penetrations such as balconies, canopies, sunshelves and signage;

(iv) wall/roof connections;

(v) changes in plane; and

(vi) joints between like and dissimilar materials.

(e) Provide air barrier assemblies that limit air exfiltration and infiltration through materials of the assembly, joints in the assembly, joints in components of the wall assembly, and junctions with other Building elements including the roof.

7.7.6 Thermal Protection

(a) Provide thermal insulation as part of the building envelope to prevent the transfer of heat both from the interior to the exterior and vice versa, depending on seasonal conditions, and to avoid the absorption of water, or development of condensation within the insulated assembly.

(b) Use thermal protection materials of a type and quality that will provide consistent environmental quality to enclosed spaces.

(c) Foamed plastic insulation will not be used.

(d) Primary building insulation will be outside exterior sheathing

(e) Wall cavity insulation will be installed and secured to prevent sagging over the lifetime of the product.

7.7.7 Sheathing

7.7.7.1 In any application sensitive to moisture exposure, condensation, or mould growth, do not use oriented strand board (OSB). Portland cement concrete, concrete masonry, treated exterior grade plywood, cement board, and glass-fibre-faced silicone-impregnated gypsum board are acceptable.

7.7.8 Cladding

7.7.8.1 Wall cladding materials will be durable, suitable for weather exposure and aesthetically integrated with the overall elevation appearance of the Building as a whole.

7.7.8.2 Masonry, fibre cement boards/panels, stone or smooth/polished face concrete masonry units will be used as the exterior material of the ground floor for no less than 4m from grade except at the entrance to the Indigenous Language & Culture Centre, which may have covered, exterior grade cedar paneling.

7.7.8.3 Steel cladding will be a minimum of 24 gauge.

7.7.8.4 Aluminum cladding will be composite, heavy duty gauge.

7.7.8.5 Fiber cement boards will be a minimum of 10mm thick.

7.7.8.6 Fiber cement panels will be a minimum of 11mm thick.

7.7.8.7 Where fibre cement is used below 4m, it will be provided with additional fastenings and back up support suitable for enhanced impact resistance.

7.7.8.8 The following wall cladding materials are not acceptable on this project:

(a) stucco / EIFS;

(b) fiber-cement panels less than 11mm thick;

(c) fiber-cement boards less than 10mm thick;

(d) wood cladding on surfaces exposed to weathering;

(e) smooth metal panels in locations where they may be susceptible to graffiti or physical damage; or

(f) smooth-faced concrete block or cast concrete walls except at service areas.

7.7.8.9 Cladding will be fastened to Building using manufacturer's recommended fastening intervals for commercial grade applications. Face-based fasteners are not to be used.

7.7.8.10 Girt systems will be utilized to maintain a minimum of 19mm air gap behind the rear-most face of cladding material, or greater as recommended by material manufacturer. Girts will be thermally broken as required for energy performance calculations.

7.7.8.11 Edges and corners will be detailed to minimize risk of tampering or breakage.

7.7.9 Roofing

7.7.9.1 General Requirements

(a) The roof assembly will:

(i) provide protection from weather;

(ii) resist the general and local effects of wind;

(iii) provide heat insulation and ventilation; and

(iv) be a low maintenance system in accordance with Good Industry Practice to minimize disruption to activities.

(b) All roofing systems will meet or exceed the manufacturer's specifications and the requirements of the Roofing Contractors Association of British Columbia (RCABC) Roofing Practices Manual.

(c) Installation (including monitoring, and reporting installation procedures, climatic conditions and unacceptable conditions) will be in accordance with Roofing Practices Manual published by RCABC (Roofing Contractors Association of British Columbia).

(d) Commissioning and acceptance testing of the roofing system will comply with all codes and the RCABC Roofing Practices Manual.

(e) Comply with the Roofing Contractors Association of British Columbia Guarantee Corp (RGC) latest standards and requirements for a 10 year Guarantee following Substantial Completion as published in the RGC Roofing Practices Manual.

(f) Alternative roofing warranties will be considered by the Owner if shown to be equivalent to the RCABC requirements in duration and quality.

(g) Warranty will be assigned to the Owner upon Substantial Completion of the Project.

(h) Comply with RGC Roofing Practices Manual “Acceptable Materials List,” including flexible membrane for reflective roofs – Elastomeric or Thermoplastic (single-ply system), Energy Star compliant (highly reflective) and high emissivity (of at least 0.9 when tested in accordance with ASTM 408).

(i) Roof assembly design including deck, vapor barrier, insulation, board stock, and membranes will comply with all applicable codes and fire classifications and with RGC requirements for wind uplift, live loads, dead loads, and snow loads. Comply with ULC Class 60 wind uplift classification.

(j) The Design-Builder will make all arrangements and pay all services to provide a 10 year RCABC guarantee for all roof systems.

(k) All roofs will prevent the penetration of water and snow, and will provide for the drainage or shedding of water and snow clear of the Building.

(l) Roofs, including those at canopies will not drain to or allow snow to slide onto sidewalks, plazas or other occupiable areas.

(m) Roof-tops will have man-door and ladder access to allow for mechanical and electrical equipment maintenance except where stair access is required. Minimum roof hatch size will be 915mm x 1220mm. Roof hatch will be curb mounted with a minimum of 300mm above the finished roof to enable proper flashing.

(n) Provide roof tie-offs where required for equipment maintenance as per WCB requirements.

(o) Install saddle flashings at box gutter ends and where parapets intersect walls.

(p) Ensure clips are used at unsupported plywood edges.

(q) Ensure windows on intersecting wall areas are of sufficient elevation to enable proper flashing, with a minimum of 300mm above roofing surface.

(r) Ensure louvered exhaust vents are of sufficient elevation to enable proper flashing. Allow a minimum 300mm height above the finished roof to enable proper flashing.

(s) Ensure proper sash sealants are detailed to prevent leaks into and behind wall flashing.

(t) Design for saddle flashings and diverters to prevent leaks at parapet/wall intersection.

(u) Ensure roof deck slopes away from doors, providing access to the roof deck.

(v) Acceptable roofing systems:

(i) 2-ply SBS membrane roofing system with 2.2 mm base & 3.0 mm cap sheets for roofs between 2 in 12 and 4 in 12 slope.

(ii) Adhered membrane roofing with vapor retarder base, insulation, decking, adhesive and PVC membrane at horizontal roof surfaces with slopes up to 10 degrees (2/12).

(iii) Modified bitumen built-up roof at horizontal roof surfaces with slopes up to 10 degrees (2/12).

(iv) Complete architectural metal roof system with hidden fasteners for slopes greater than 4 in 12.

(v) Green Roof:

1. General Requirements

a. Roof areas will be designed to provide energy performance benefits, fauna habitat and aesthetically pleasing views from surrounding indoor spaces.

b. Ensure green roof planting is visually appealing year-round and includes low-maintenance planting.

c. Green roofs are to support an intensive vegetated landscape, complete with growing medium, structural support and drainage.

d. Green roof will be provided with permanent irrigation.

e. Green roofs will include root barrier to protect waterproofing membrane. Minimum 60mil HDPE with welded laps will be used for trees and aggressive root systems. No bamboo will be planted in green roof assemblies.

f. The green roofs will be part of the Design-Builder's roofing subcontract and subject to the required RCABC Warranty. Fall protection, drains, and leak detection

systems will also be part of the roofing subcontract and must be coordinated with green roof system and planting installation.

2. Performance Criteria

a. Subgrade conditions, growing medium, and plant materials must be approved by the Owner prior to installation.

b. Plantings to occur only during the season or seasons normal for such work determined by weather conditions and or as approved by Consultant. Plants planted before or after any stipulated dates will be rejected.

c. Supply and install 'complete' plant support system above the roofing membrane (drain mat, filter, root protection layers), growing medium, hydroseeding (if applicable), planting, erosion netting, establishment watering, edging, gravel ballast, and one-year establishment maintenance.

d. Supply seed, cuttings, plant material and/or contract grow plant material in the required quantities and sizes minimally six months in advance of installation of the green roof and to approval of the Owner.

e. Furnish all labour, materials, equipment and operations to maintain all landscaped areas on the Project Site including the roof deck and irrigation system for a period of one year following Substantial Completion, at which time maintenance will be turned over to the Owner.

(w) Roofing systems will include:

(i) flashings and sheet metal;

(ii) Roof Edge Flashing and Copings: Capable of resisting wind forces applicable to Building according to FM Global Loss Prevention Data Sheet 1-90;

(iii) Quality Standard(s): SMACNA's "Architectural Sheet Metal Manual" and Roofing Practices Manual published by RCABC;

(iv) thermal insulation;

(v) roofing specialties and accessories required for completion;

(vi) interior access systems to roof areas; and

(vii) roof drainage, including overflow scuppers, the capacity of which will equal or exceed the capacity of the roof drains and be designed such that they cannot be blocked by debris.

(x) Provide sheet metal flashings that divert water away from membrane flashing termination and protect the membrane from deterioration due to the exterior elements and mechanical damage. Provide roofing membrane continuously under the metal flashings. Ensure that sheet metal components comply with wind uplift requirements established for roofing system.

(y) Metal roofing systems, if used, will provide clear internal paths of drainage to allow any trapped moisture to drain to the exterior and avoid the staining of architectural finishes, forming of puddles, forming of icicles, and dripping on pedestrians. In designing the Building, including any roof systems, ensure that entrance ways are protected from sliding snow and ice and that there are no accumulations of snow and ice in roof valleys.

(z) Near-Flat Roofs (slopes equal and less than 1:50):

(i) slope all roof surfaces to drains, including valleys and transverse slopes across top of parapets. Provide minimum slope to drain of 1:50 for field of roof or as required for roof material warranty;

(ii) use a minimum of two roof drains per contained drainage area. Overflow scuppers will be provided in an area visible for monitoring; and

(iii) overflow scuppers are not will be located where water flowing will effect walkways, entries or plazas.

(aa) Steep Roofs (slopes greater than 1:6):

(i) configure steep roofs and perimeters so that snow, ice and rainwater do not create safety, maintenance or appearance problems. Design to prevent ice and snow from sliding onto areas intended for use by vehicles or pedestrians;

(ii) size and design eaves troughs to accommodate water from contributory roof and wall areas and to resist expected snow and ice loads;

(iii) pitched roofs will be insulated at the sloped roof line such that the space below is heated;

(iv) provide collection gutters at the edges of all sloped roofs;

(v) where external gutters are used, they will be drained to the site stormwater management system by utilizing the maximum run possible to limit number of downspouts on the face of the Building; and

(vi) provide an engineered snow and ice restraint device to prevent snow and ice from sliding off sloped roofs where such a threat will exist. The design of the Building, including the roof systems will ensure that entrance ways are protected

from sliding snow and ice and will ensure that there are no accumulations of snow or ice in roof valleys.

7.7.9.2 Performance Criteria

(a) Deck:

(i) Follow all the manufacturer's instructions for roof deck preparation.

(b) Deck Overlayment:

(i) Follow manufacturer's instructions for roof deck overlayment preparation.

(c) Vapour Retarder:

(i) Follow manufacturer's instructions for vapour retarder preparation.

(d) Insulation:

(i) Ensure proper crickets or sloped insulation to prevent or minimize ponding, moss, lichens, early aging of roof. A minimum 2%, up to 5% slope will be used for crickets.

(ii) Specify roof blocking to prevent slippage.

(iii) Map under-deck roof conduit to prevent insulation screw penetration.

(iv) Ensure adequate spacing and number of insulation screws to prevent cupping; pulling away from parapets. Follow manufacturer's guidelines.

(e) Insulation Overlayment and Crickets:

(i) Sloped crickets will have an overlayment. Alternately, install crickets under the main insulation. Use variable length screws through nailable decks. Polyisocyanurate crickets will be used and adhered in adhesive over concrete decks.

(f) Membrane and Bitumen:

(i) Use only compatible materials for overlapping membranes.

(ii) Ensure stripping of insulation overlay joints to prevent burnout of EPS/EXPS.

(iii) Ensure thermometers on kettle to avoid improper heating of hot bitumen leading to poor interplay or adhesion.

(g) Curbs:

(i) All curb heights will be a minimum 300mm.

(h) Parapets:

(i) Do not use gravel stop edges except if permitted by an SBS manufacturer.

(ii) All parapets will be a minimum of 300mm.

(i) Equipment:

(i) Ensure a minimum of 300mm clearance is allowed for under elevated HVAC units or other equipment to enable inspection and maintenance of membrane.

(j) Smaller Equipment Resting on Roofs:

(i) Install 50mm thick EXPS under loose sleepers to spread and cushion load to prevent sleepers from sinking into the roof.

(k) Large Rooftop Equipment:

(i) Support large roof top units on:

1. structural pedestals or raised framework with at least 300mm clearance between the roofing system and the underside of the framework;

2. isolators to limit HVAC related noise and vibration to acceptable levels; and

3. on curbs where access under the unit for maintenance to roofing is not required.

(l) Drains and Scuppers:

(i) Install rainwater leader discharge splash pans to prevent erosion of roof membrane.

(ii) Drain grills will have lock-down clamps, straps, or other means of security to help prevent grill removal.

(iii) Water test drains for defective “O”-rings, U-flo.

(m) Metal Flashing:

(i) Use only double gumlips, or reglets.

(ii) Cross-break wide metal flashing to prevent oil-canning.

(iii) SBS Roofing:

1. Follow the detailed manufacturer’s specification.

2. Ensure adequate SBS torching to prevent blisters and lack of cap sheet bond.

3. Specify SBS roofs for slope over 2 in 12 and up to 4 in 12. Very small roof sections steeper than 4 in 12 can receive an SBS roof, applied parallel with the slope and fastened at the peak.

(n) Architectural Metal Roofing

(i) Metal roofing systems, if used, will provide clear internal paths of drainage to allow any trapped moisture to drain to the exterior and avoid the staining of architectural finishes, forming of puddles, forming of icicles, and dripping on persons.

(ii) Metal roofing and flashings will be watershedding and not waterproofing.

(iii) Provide a waterproofing membrane below all metal roofing and flashings.

(iv) Drain water will be collected to prevent slipping hazards from ice formation at drain discharges.

(v) Fasteners and roof penetration details that will accommodate thermal movement are required.

(vi) Installation system will use thermal breaks.

(vii) Ponding of water on roofs is not permitted.

(viii) Follow the detailed manufacturer’s specification.

(ix) Breadpan metal roofs and install foam closure strips.

(x) Design for hidden fasteners on metal roofs.

(xi) Design for concealed gutters.

(xii) Install adequate clips on metal coping flashings to prevent blow-off under high wind.

(xiii) Specify metal profile roof and KYNAR paint finish to prevent rapid fading, rusting (especially at raw cut edge), lichen build-up.

(o) Fall Protection / Maintenance Access

(i) Provide fall protection around the perimeter of the roof to allow for cleaning and maintenance of the façade and glazing.

(p) Control zones

(i) Roof markings will be provided permanently denoting control zones.

7.7.10 Fire and Smoke Protection

7.7.10.1 Where an assembly has a fire resistance rating, base assembly rating on tested assemblies from NBCC, NRC, ULC, UL or WH.

7.7.10.2 Use spray-applied cementitious fireproofing or intumescent painting if required, to achieve a fire resistance rating.

7.7.10.3 Spray-applied cementitious fire proofing will conform to all codes and ASTM E 605 and CAN/ULC –S102 standards.

7.7.10.4 Spray-applied cementitious fireproofing is not to be visible in any parts of the Building except service areas.

7.7.10.5 Integrate barriers into vertical and horizontal space separations to protect against the spread of fire and smoke. Apply protection to exposed building elements (structural and non-structural) susceptible to fire and subsequent damage.

7.7.10.6 Penetrations of vertical and horizontal fire-resistance rated separations will be fire-stopped.

7.7.10.7 Use firestopping and smoke seal systems that consist of asbestos- free materials and systems, capable of maintaining an effective barrier against flame, smoke, and gases.

7.7.10.8 Use firestopping that:

(a) is compatible with substrates;

(b) allows for movement caused by thermal cycles; and

(c) prevents the transmission of vibrations from pipe, conduit or duct to structure and structure to pipe, conduit or duct.

7.7.10.9 When more than one product is required for a firestopping assembly, use products that are compatible with one another and from the same manufacturer. Firestopping products will comply with requirements established for ULC tested assemblies.

7.7.10.10 Use firestopping sealants and coatings that are silicone-based and guaranteed not to re-emulsify if subject to wetting or standing water. Acrylic-based coatings and sealants are not permitted.

7.7.10.11 Field testing will be conducted by an independent testing agency provided and arranged by the Design-Builder.

7.7.10.12 All fire-stopping will be installed by an FM Global-approved firestop contractor or a UL-qualified firestop contractor.

7.7.10.13 The Design-Builder will engage an agency in accordance with ASTM E2174 to inspect all firestopping installation.

7.7.10.14 Firestopping and smoke seal systems will be capable of maintaining an effective barrier against flame, smoke, and gases when tested to CAN/ULC-S115 or ASTM E814 or UL 1479, be acceptable to all applicable Authorities Having Jurisdiction, and not exceed opening sizes for which they are intended.

7.7.11 Sealants

7.7.11.1 Sealant materials will be applied to:

(a) prevent water ingress through the building envelope systems and around openings in the building envelope systems;

(b) seal joints between dissimilar or similar materials and to allow smooth or even transitions; and

(c) seal expansion or controls joints in the building envelope systems and structural systems and to allow movement.

7.7.11.2 Apply sealant materials to achieve:

(a) seals to the building envelope systems and around openings in the building envelope systems as required to prevent water ingress;

(b) seals around and over cavities in or behind surface elements to allow effective infection prevention and control;

(c) sealant around door frames will include joints at bottom of door frames (between floor finish and frames);

(d) sealed expansion or control joints in the building envelope systems or structural systems to allow movement caused by thermal changes;

(e) prevention of concealment of contraband;

(f) prevention of the ability for students to disassemble materials or pick at materials;

(g) for the exterior; use sealants to completely and continuously fill joints between dissimilar and/or similar materials;

(h) for the interior; use sealants (at frames such as those at doors, and windows), to completely fill joints between dissimilar materials using one component, acrylic emulsion, paintable type;

(i) seal all top edge of equipment rails and hand, bumper and crash rails to wall;

(j) caulking to washroom plumbing fixtures will be silicone, mildew-resistant and impervious to water;

(k) sealants applied to expansion and control joints in concrete floors requiring self-levelling properties will be two-component epoxy urethane sealants for horizontal surfaces;

(l) use sealants with self-levelling properties for expansion and control joints in concrete floors using two-component epoxy urethane sealants;

(m) use sealants that allow for minimum 25% movement in joint width; and

(n) in corridors and other traffic areas used by equipment use traffic bearing type sealants suitable to support imposed load without deformation or failure.

7.8 Division 8 – Openings

7.8.1 Basic Requirements

7.8.1.1 Except where wired glass is required in accordance with the BCBC, construct interior windows and sidelights of tempered or laminated glass. For exterior glazing at doors and sidelights, use laminated glass.

7.8.1.2 Windows and doors will conform to the applicable code requirements.

7.8.1.3 All exterior frames will have the wall air, vapor, moisture membrane mechanically fastened into the frame by the means of a pressure plate.

7.8.2 Doors

7.8.2.1 Provide doors that suit the intended function of spaces or rooms requiring acoustic or visual privacy, security, special HVAC requirements, fire-resistance rated separations or other closures.

7.8.2.2 Provide door openings of adequate width to suit the intended purpose of rooms on either side of the doors and also allow the movement of people and equipment associated with those rooms.

(a) Mechanical and electrical room doors will be sized to move pieces of equipment in or out over the Design Life of the Building, and no less than 1067 wide and 2440 high.

(b) For spaces with equipment that would not fit through the door size noted above, provide alternate means for allowing equipment replacement for larger clearance requirements.

7.8.2.3 For all doors: floor mounted rails, slides and/or locking pins are not permitted (top mount only).

7.8.2.4 Glazing in doors (interior and exterior) will allow for proper security, sight lines and the use of Natural Lighting as per Appendix 1B - Room Data Sheets.

7.8.2.5 For acoustic requirements for doors: refer to Appendix 1C - Acoustical Chart.

7.8.2.6 Apply door sizes and designs consistently to rooms of similar use, location, and configuration.

7.8.2.7 Do not permit doors swinging into corridors in a manner that may obstruct traffic flow or reduce the corridor width or inhibit egress, except doors to spaces that are used infrequently and are not subject to occupancy such as small closets.

7.8.2.8 Door Glazing

(a) For exterior hollow metal door glazing, use sealed units with warm edge, argon filled space in thermally-broken frames to prevent heat loss.

(b) Exterior glazing at doors and side lights will be laminated.

(c) For interior door glazing use tempered or laminated glass.

(d) Frameless interior doors are not permitted.

7.8.2.9 Exterior Doors

(a) General Requirements

(i) Exterior doors will be commercial exterior-grade, glazed insulated pressed-steel doors except as noted below.

(ii) Pairs of Building entry doors will be a minimum of 915 wide each and 2750mm high.

(iii) Exterior doors will be hung in well-anchored pressed steel frames suited to the type of door.

(iv) Where entry doors are proposed to be installed in an aluminum curtain wall system or storefront glazing system, compatible aluminum doors may be used provided they are designed for high use areas and constructed with sufficient steel reinforcement to withstand the rigors of a high school environment.

(v) Main entry doors and those for Gymnasium access after hours will be provided with a minimum of one power-operated leaf, activated by accessible push plates.

(vi) Door frames will be complete with concealed conduit and strike plates for an access control system at the following locations:

1. Exterior doors – Main entry, entries to NLC Indigenous Language & Culture Centre and NLC Health & Wellness Centre, and the entry to the Gymnasium after-hours entrance.

2. Interior doors providing access control and/or separating School areas from community use areas.

(vii) Coordinate functions of multiple electronic systems where required to eliminate conflicts and ensure smooth operation.

(b) Performance Criteria

(i) Pressed steel doors and frames:

1. Fabricate to Canadian Steel Door Frame Manufacturers Association (CSDFMA) specifications for steel doors and frames.

2. Fabricate from commercial grade sheet steel, Class 1 with ZF075 zinc coating to ASTM A525-87. Knock down frames are not permitted.

3. Exterior doors will be 45 mm thick, fabricated from 14 gauge (1.6 mm) steel with core composed of rigid modified polyisocyanurate, closed cell type; minimum 32 kg/m3 and RSI 1.9. Top of door will be fitted with a weather cap. Frames will be insulated, thermally broken, fully molded type fabricated from 14 gauge (1.6 mm) galvanized steel. Provide weather-stripping.

4. Mortised, reinforced, drilled and tapped to fit hardware manufacturer's templates.

5. Galvanized steel frames with mitred, welded corner joints, ground, filled and dressed smooth. Provide additional reinforcing at door closer mounting locations.

6. Provide exit and egress doors with vision panels.

7. Provide half-light glazing to top and bottom (horizontal stile at access hardware level) to all exterior entrance doors.

8. Glaze with pre-formed, pre-shimmed butyl bedding tape.

9. Glaze with insulated laminated safety glass.

(ii) Aluminum Entrances and Storefronts

1. Aluminum entrances, curtain wall fabrications and doors may form part of the exterior envelope of the Building or provide glazed interior partitions.

2. Aluminum doors will be used within aluminum entrances and curtainwall framing.

3. Aluminum entrances and storefront framing and doors may form part of the exterior.

4. Provide glazed interior partitions as appropriate to comply with the functions of the spaces as defined by Appendix 1B - Room Data Sheets.

5. Use frames that are thermally-broken, flush glazed, aluminum sections, to accept insulating glass units.

6. Incorporate in the frames drained and vented, rainscreened system with a complete air and vapor seal, allowing any moisture entering the frame to drain to the exterior and allowing air into the pressuring chamber.

7. Apply aluminum finish for exposed aluminum surfaces. Finish will be permanent and resistant to corrosion caused by weather exposure and climate.

(iii) Exterior overhead doors:

1. Insulated steel sectional upward-acting type.

2. Design panels to withstand wind load of 0.83kN/m2 with a maximum horizontal deflection of 1/240 of opening width. Door sections will be roll-formed 0.76 mm continuous steel coil, hot-dipped galvanized (G-90), pre-painted with baked-on primer. Back panel will be 0.45 mm steel with baked-on primer. Insulate panels with AF530 Fibreglass or equivalent insulation 50 mm thick, RSI 1.4.

3. Box (hat) shaped muntins and end stiles will be formed of 0.91 mm hot-dipped galvanized steel.

4. Bottom sections will have a tubular neoprene astragal held by a continuous P.V.C. retainer filled to bottom section.

5. Provide full perimeter weather stripping.

6. Electrically operated with remote operation and chain-driven manual override. Track will be heavy duty trolley type lift, with high-cycle springs rated at a minimum 100,000 cycles. Doors will be locked with a cylinder lock compatible with other door hardware.

7. Required locations include Automotive / Mechanics Department, Woodworking Shop Department and the Metals Shop Department.

8. Doors will be tied to building control systems to deactivate mechanical system upon opening.

(iv) Provide exterior door type requirements as specified in Appendix 1B – Room Data Sheets.

7.8.2.10 Interior Doors

(a) Performance Criteria

(i) Interior doors and frames:

1. Wood doors:

a. Materials and fabrication to AWMAC Quality Standards, Section 1300, Custom Grade to CSA 0132.2 M1977 with 12 mm min. thick vertical edge strips to match face veneer.

b. Provide half-light glazing to all doors to administration and staff offices.

c. Wood doors will have hardware and finishes that suit the intended function and aesthetics of the Building. Use Grade A faces for transparent finish. Factory finish is required for doors with transparent finish; use UV-cured polyurethane finish system. All wood door edges will be sealed.

d. Provide heavy duty commercial grade wood doors in flush design, Custom Grade quality (as defined in the AWMAC standards referred to above), 5-ply bonded particleboard core.

e. All wood doors will resist malicious damage and damage from expected use.

f. All wood doors will be easily maintainable and repairable.

g. All wood doors will comply with fire resistance requirements when used in a rated wall assembly. Provide fire-resistance rated doors with a homogeneous incombustible mineral core and AWMAC Quality Standards Option 5 blocking.

h. Frames will wrap around the wall assembly they are installed into, such that the frame projects a minimum 13 mm proud of the face of the wall each side of the frame.

i. Frames will be compatible with adjacent wall assembly (in terms of anchorage, fire protection, weight of door and repetitive slamming).

j. Doors with an inactive leaf will not be floor bolted. Bolt into frame instead.

k. Install finish hardware securely. Fasten to solid wood backing, except where hardware is designed to be through-bolted.

l. Glue stiles, rails and faces to the core with Type II water-resistant adhesive to minimize de-lamination or disassembly as a result of moisture ingress.

m. Provide stainless steel door edge guards on wood doors in areas accessible to students and in areas where door abuse is expected.

2. Pressed steel doors and frames:

a. Fabricate to Canadian Steel Door Frame Manufacturers Association (CSDFMA) Specifications for steel doors and frames.

b. Fire ratings will be identified by labels in conformance with CAN4 S104-M80 (revised 1985) and CAN4 S105M-M85.

c. Minimum 45 mm thick, fabricated from minimum 1.21 mm (18 gauge) galvanized steel, with steel stiffeners at 150 mm on centre. Interior steel frames will be fully welded units, fabricated from 1.52 mm (16 gauge) galvanized steel.

d. Doors will be mortised, reinforced, drilled and tapped to fit hardware manufacturer's templates, and glazed where specified.

e. Transom glass sections should be no greater than 1200 mm in width and provided with additional mullions to ensure that the top door jamb is properly supported to minimize sagging and the associated door binding.

3. Interior Aluminum Sliding Doors and Sidelights

a. Interior sliding doors and sidelights will have recessed mounted track with sliding and fixed panel(s), and include single glazing with 6 mm clear fully tempered float glass or as required to meet acoustic requirements.

4. Coiling Counter Shutters – Metal:

a. Operation by hand. Provide continuous extruded aluminum lifting strap on inside face of shutter bottom.

b. Curtain: Extruded aluminum interlocking slat sections. Finish will be clear anodic finish, length and height as shown on drawings. Provide continuous vinyl bumper to bottom bar.

c. Guides: extruded aluminum, 5 mm thick, finished as curtain.

d. Hood: enclosed, counter balanced assembly with aluminum brake formed sheet hood finished as curtain.

e. Counter balance: Provide an enclosed torsion spring balance assembly with 25% overload factor, encased in steel tube to support curtain with a maximum deflection of 1/360th of opening width. Provide adjusting wheel, accessible for setting.

f. Locking: Equip shutters with lockable slide bolts on the inside.

g. The coiling counter shutter will provide fire ratings where and as required.

5. Coiling Security Screen:

a. Grill Curtain: aluminum, 7.9 mm horizontal rods and hinged vertical connecting links on 152 mm centres. The bottom bar will be tubular in shape. Curtain will be locked in closed position with self-activating lock.

b. Guides: Extruded aluminum with a return loop to prevent felt from pulling out of guides. Guides will be complete with wear strip to eliminate metal to metal contact.

c. Brackets: Fabricated from steel plate not less than 6.4 mm thick.

d. Barrel: To be not less than 152 mm diameter steel tubing and designed to limit maximum, deflection to 2.5 mm per lineal metre of opening width. Grille curtain will be counter balanced by oil tempered springs.

e. Operation: Electric motor operation with key-operated push button control. Motor size to suit size and weight of screen.

f. Hood: Will be formed to fit the curvature of the bracket.

g. Finish: Aluminum, clear anodized.

h. Keying cylinder will match the Owner’s system.

6. Solid motorized gym partition:

a. Material: Steel framed, solid-panels each side capable of withstanding impact from gymnasium objects including balls and people.

b. Guides: Top-hung, institutional grade.

c. Folding location: May be single or double-sided. When wall is fully open, stacks of panels will not impede playing courts of the Gymnasiums.

d. Operation: Electric motor operation with key-operated push button control. Motor size to suit size and weight of the wall.

e. Finish: Selected from manufacturers standards. To be approved by the Owner.

f. Doors: Will have operable doors for access between Gym A and Gym B when the partition is closed.

(b) Provide interior door types as specifies in Appendix 1B – Room Data Sheets.

(c) Sidelights will be 305mm wide minimum, and match the adjacent door in height.

(d) Door lights will be of maximum size to fill the upper half of the door.

(e) Where not specified in Appendix 1B – Room Data Sheets, provide doors as follows:

(i) common corridor doorways will have door lights to provide visibility except where prohibited by code.

7.8.3 Hardware

7.8.3.1 General Requirements

(a) The Design-Builder will engage a door hardware consultant to prepare representative hardware schedule which meets the quality standards for each type of hardware on the project. Door hardware schedule will list door number, operation, hand, name of the manufacturer, size, code number and finish. The Design-Builder will submit a fully-itemized complete hardware schedule, developed in consultation with the Owner to meet the requirements of the proposed design. A final copy of this schedule will be submitted to and approved by the Owner prior to construction.

(b) A master keyed system and a grand master keyed system to match the Owner's existing keying system will be provided, to the approval of the Owner.

(c) Provide all hardware necessary for security and the proper operation of the Facility.

(d) Use one manufacturer's products for all similar items.

(e) Galvanized steel bollards will be used as door stops to permit 129 degree opening on all exterior doors, complete with neoprene

stopper securely fastened to bollard at point of contact 100-150 mm below lockset, centered on lockset.

(f) All exterior door hardware will be through-bolted.

(g) Finish hardware will comply with all applicable Standards, including the quality standards of the Door and Hardware Institute (DHI).

(h) Provide all finish hardware from one supplier that is a member in good standing of the Door and Hardware Institute (DHI) and has in its employ one or more AHC (Architectural Hardware Consultant).

(i) Hardware will be integrated with the security requirements and coordinated with electrical wiring and power requirements.

(j) Select finishes providing maximum longevity and preservation of the finish.

(k) Provide, where applicable, ULC-listed hardware for the required fire rating.

(l) Provide all doors with bumper protection at walls to avoid damages.

(m) All doors are to have a minimum of three hinges.

(n) Door sweeps will be provided on all exterior doors.

(o) Provide glazing in doors and sidelights in such a way that they allow for appropriate operational requirements of the spaces they serve.

7.8.3.2 Performance Criteria

(a) Locks and Latches:

(i) Bored and pre-assembled locks to CAN/CGSB-69.17, heavy-duty commercial hardware to ANSI Series 4000, Grade 1, designed for appropriate function, with full return lever handles. Strikes: box type, lip projection not beyond jamb. Cylinders: keying system will be compatible with Schlage "Conventional" Series, with "ND" levers**.**

(ii) At exterior doors latches will be protected by a guard plate or other intrusion-shielding device.

(iii) The following lock types are not approved for outside doors: magnetic pins, padlock, non-supervised code operated, combination lock, and disc tumbler.

(b) Locksets, Latchsets and Cylinders:

(i) Electronic locksets are to be compatible with Schlage “ND” or “NDE” series, or approved equivalent.

(ii) Mechanical locksets are to be Schlage, “ND” Series levers with ‘Conventional’ cylinders, vandal proof, ASA 626, or approved equivalent.

(iii) All locksets will have the following:

1. Backset: All locksets and latchsets will have 69.8 mm backset.

2. Strikes: All locksets and latchsets will be supplied with Schlage ASA strikes, or approved equivalent.

(iv) All cabinet locks will be keyed the same throughout.

(v) Display cases to have track-mounted showcase lock.

(vi) Shutters: Provide key switch in public areas (not required in secure classrooms).

(c) Keying

(i) Provide access control door hardware to allow remote control and programming of any door on the system. In order to be acceptable, any proposed equivalent must be fully compatible with and be demonstrably capable of being seamlessly integrated with the system that is currently in use by the Owner.

(ii) Provide Schlage “Conventional” cylinders or as approved by the Owner. In order to be acceptable, any proposed equivalent must be fully compatible with and be demonstrably capable of being seamlessly integrated with the Schlage “Conventional” system that is currently in use by the Owner.

(iii) Basic Requirements

1. The Design-Builder will prepare and submit a proposed access control and key schedule for the Building, during the development of construction drawings. The proposed key schedule will include details of the master access control and keying system for the Building and will minimize the requirement for Staff to carry keys and the number and type of keys required for the Building.

2. Provide a restricted keyway system for all lock cylinders in the Building. The restricted keyway system will be obtained from the applicable lockset manufacturer(s) on behalf of, and in the name of, the Owner. The Owner will control the restricted keyway system, such that all spare keys and key blanks will be ordered by an authorized representative of the Owner.

(d) Butts: doors will be equipped with 1-1/2 pairs, 115 mm ball-bearing butt hinges, minimum, non-removable pins, to CAN/CGSB-69.18, brass or bronzed plated, finish C26D.

(e) Exit Devices: to CAN/CGSB-69.19, type modern and be surface mounted. Product will be: Von Duprin, Series XP 98 / 99 vertical rod, C26D finish or Owner-approved alternate.

(i) All exterior double doors will be provided with full height astragal.

(ii) Provide the hardware compatible with the security systems wherever electric strikes or door monitoring are required.

(f) Door Kick Plates to high use areas: 1.27 mm thick stainless steel, to CGSB 69¬GP-6M type 6-320, 250 mm high x width of door (less 40 mm on push side).

(g) Threshold: extruded aluminum, full width of door opening, mill finish at all exterior doors, and at interior doors at changes of floor finish and where otherwise required. To be suitable for handicapped accessibility where required. Product will be Pemko or Owner-approved alternate.

(h) Door Pulls: aluminum, finished to C26D, or stainless steel, finished to 630. Provide oversize push plates at each location.

(i) Weather-stripping:

(i) Exterior doors will be fully weather stripped.

(ii) Head and jamb seal: extruded aluminum frame and solid hollow closed cell neoprene insert, clear anodized finish.

(iii) Door and bottom seal: extruded aluminum frame and solid closed cell neoprene, surface mounted with drip cap.

(iv) Door bumpers: neoprene.

(v) All weather-stripping will be rodent-proof.

(j) Sound Seals: all doors through walls where significant sound isolation is required will be provided with:

(i) Perimeter seal will be magnetic weather stripping; and

(ii) Automatic door bottoms will be non-magnetic weather stripping.

(k) Door Closers:

(i) Will be a spring load door opening device. Size to suit doors, aluminum finish, with through bolts at wood doors. Delayed action will be provided where required for handicapped

accessibility.
Owner's standard: LCN 4111.

(ii) Door coordinating hardware is not required or acceptable on paired doors with closers.

(l) Astragals:

(i) Wood doors: Full height, fastened as required.

(ii) Metal doors: Full height, fully welded steel astragals.

(m) Automatic swing door operator:

(i) surface mounted, self-contained unit, in housing to match width of frame, electrically operated, with two square stainless steel push plate switches. Unit will function as a manual door closer in event of power failure, and will operate at all other times as either manual or automatic device. Provide key-operated on/off switch. Unit, accessories, and signs and labels to meet all requirements for handicapped accessibility.

(n) Magnetic hold-open devices for doors:

(i) Wall-mounted magnetic hold-open devices will be incorporated for all doors in general circulation and those leading to exit stairs.

(ii) Devices will be released upon actuation of the Fire Alarm system and able to be released manually.

7.8.4 Glazing

7.8.4.1 Glass and glazing will comply with all applicable Standards, including the Insulating Glass Manufacturers Association of Canada [IGMAC] Guidelines and the Glazing Contractors Association of B.C. [GCA] Glazing Systems Specifications Manual.

7.8.4.2 Provide assemblies that resist local seismic conditions as defined in the BCBC.

7.8.4.3 Provide assemblies that resist 1-in-100 year climatic events.

7.8.4.4 Use laminated safety glass in entry doors and sidelights, or as the inboard light of a double-glazed skylight.

7.8.4.5 Exterior Glazing

(a) General Requirements

(i) Provide as required to meet building energy targets.

(ii) Exterior glazing will be a minimum of 20% of the Building exterior calculated as an average of all floors above and including the main entry level.

(iii) Optimize daylight and/or Natural Light and views to regularly occupied interior spaces. Use strategies to deliver Natural Light deeply into spaces and provide meaningful ties between the interior and the exterior while balancing heat loss, solar gain and glare.

1. Employ sun shading devices/light-shelves for southwest facing glazing.

2. Reflective or darkly-tinted glass is not permitted.

3. Applied solar films are not permitted.

(iv) Unless noted otherwise, provide vertical exterior glazing to each required space at a ratio of 1.5 m^2 glazing per 10 m^2 of floor area of the associated space.

(v) Unless noted otherwise, glazing will start no higher than 1000mm and will end no lower than either 3000mm above the floor level or at the ceiling height (whichever is lower) of the associated space.

(vi) Follow "Glazing Systems Specifications Manual" recommendations as published by the Glazing Contractors Association of B.C. for glazing systems selection, specifications and installation. Minimize heat gain within the rooms by use of screening and sun-shading.

(vii) Provide at least two operable windows per typical Classroom (Classroom 22.02 and Exploration Classroom 22.03) space, as required by Appendix 1B – Room Data Sheets with limiters on operable windows where required for security or safety reasons as determined by the Owner.

1. Locate operable windows on the exterior of the Building to provide natural ventilation for building occupants except operable windows to interior central space may be used where such windows provide natural, passive ventilation and borrowed daylighting.

(viii) Glazing will provide for excellent optical clarity with ease of maintenance over time.

(ix) Design glazing and interior surrounds to allow uniform, unobstructed movement of conditioned air across the glass and frame.

(x) Select glazing in consideration with the lighting and mechanical systems to prevent glare and solar overheating.

(xi) Provide uniform glazing sizes for the purposes of maintenance and ease of replacement.

(xii) Based on known local climatic data provide windows to Good Industry Practice that comply with the following standards:

1. CAN/CSA-A440-00/A440.1-00, Windows and its appended Special Publication;

2. User Selection Guide to CSA Standard CAN/CSA-A440.1-00;

3. Windows: Aluminum Association Standards (AAS), and the American Architectural Manufacturers Association (AAMA) field testing specifications;

4. Air-tightness – per CAN/CSA-A440.0 and CGSB Requirements 82.1;

5. All exterior glazing will be installed and maintained from the exterior of the Building; and

6. Provisions will be made in the building cladding for maintenance of the exterior glazing.

(xiii) Operable windows will be a minimum of 400 mm high; be top hung, and have outward opening lights.

(xiv) All operable windows must be lockable and secure when not open.

(xv) When width of opening exceeds 610 mm, provide operable windows with a minimum of two handles.

(xvi) Extended Warranty

1. Sealed glazing units will be warrantied for a minimum of five years.

(xvii) Field Testing

1. Representative samples of installed glazing systems will be field tested by a building envelope specialist for conformance to required performance criteria.

(b) Performance Criteria

(i) Glazing systems will be commercial grade, meeting requirements of CAN/CSA-A440-M90. Minimum allowable rating for windows will be as required for the location under applicable regulations. Light weight residential quality windows will not be used.

(ii) System Design:

1. Allow no water infiltration into the Building.

2. Ensure no condensation forms on interior surfaces of aluminum before exposed areas of sealed glazing units reach dew point.

3. Thermal and structural expansion and contraction will be accommodated.

4. Through-joints at window sills, heads, jambs, and interconnections will be avoided.

5. It is unacceptable to rely on caulking for weatherproofing.

6. Maintain continuity of air and vapour seals as part of wall construction.

7. Glazing in doors and sidelights will be 200 mm above finished floor.

8. The use of glass block walls in any wall system is not permitted.

9. Provide glazing systems that ensure ease of glass replacement and maintenance.

10. Use High Performance (double or triple pane, low "e" glass with argon fill) glazing or better.

11. Laminated safety glass will be used at all exterior doors, sidelights, and transoms, and to glaze openings within 900 mm above the finished floor. Tempered glass is not acceptable.

(iii) Analysis of energy requirements and environmental loading on HVAC systems will be performed in conjunction with glazing design.

(iv) Translucent, insulated fiberglass panel systems are acceptable for use in spaces where day-lighting is required but glare will be avoided.

(v) Window/wall interface:

1. Completely seal off the perimeter of the window’s rough opening with a rubberized asphalt peel-and-stick membrane. Ensure the integrity and drainage of the weather-tight plane of the wall assembly is enhanced, rather than impeded by, the membrane. Use glass fibres or foam insulation to finish all voids.

2. Flashings will be of a suitable corrosion-resistant material, and pre-finished metal will be used where exposed.

3. Exterior window sills will be flashed and sloped away from the window and will have a projection drip. The backs and ends of sill will be turned up to form a three-sided pan. Make ends, laps and intersection of sill flashings watertight. Treat flashing edges so as not to form a safety hazard at the exterior.

4. Provide flashing at window heads.

(vi) Operable Windows

1. Meet requirements of IGMAC (Insulating Glass Manufacturers Association of Canada).

2. Glazing tape, where employed, will be pre-formed, pre-shimmed butyl, and have corners sealed with acrylic-based sealant.

3. Use neoprene or EPDM glazing gaskets.

4. Weather-stripping:

a. Operable windows will be fully weather-stripped using neoprene material or heavy-duty EPDM.

(c) Aluminum Curtain Walls

(i) Aluminum curtain walls will comply with all applicable Standards, including the Aluminum Association Standards (AAS) and the American Architectural Manufacturers Association (AAMA) field testing specifications.

(ii) Incorporate in the curtain wall framing a drained and vented system complete with air and vapor seal, allowing any water entering the framing/system and the glazing detail cavities to drain to the exterior and also allow air into the pressuring chamber.

(iii) Provide curtain wall framing that incorporates a thermal-break.

(iv) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

(v) Provide assemblies that resist local seismic conditions and 1-in-100 year climatic events.

(vi) Applied solar films are not permitted.

(d) Aluminum Windows

(i) Aluminum windows will comply with all applicable standards, including the Aluminum Association Standards (AAS) and the American Architectural Manufacturers Association (AAMA)

field testing specifications. Provide Architectural Grade windows unless otherwise noted.

(ii) Incorporate in windows a drained and vented system complete with air and vapor seal, allowing any water entering the framing/system and the glazing detail cavities to drain to the exterior and also allow air into the pressuring chamber.

(iii) Provide windows that incorporate a thermal-break.

(iv) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

(v) Provide assemblies that resist local seismic conditions and 1-in-100 year climatic events.

(vi) Applied solar films are not permitted.

(e) Aluminum Framing Systems

(i) Anchors for the framing will be located within the vertical tube sections or on the sides of the tubes as strap anchors. The anchors will be designed to allow for thermal expansion and contraction of the frame. The design of the anchors will not interfere with the adhesion of the air, vapor, and moisture membranes from the wall directly to the tube face of the section.

(ii) Mechanically retain the air seal membrane to the tube face of the section with the use of an aluminum anti-rotation channel or equivalent.

(iii) Gaskets and weather seals will be mechanically keyed in dry glazing systems for both interior and exterior applications.

(f) Clerestory Glazing

(i) For exposed aluminum surfaces, provide a finish that is permanent and resistant to corrosion resulting from weather exposure and climate.

(ii) Clerestory windows will be fully accessible for maintenance and cleaning from the interior and exterior of the Building without disruption to the Building operations.

(iii) Air seal and water seal connections to curbs and walls will be fully accessible and will not be dependent on construction sequence.

(iv) Provide drainage of water entering the glazing system to the exterior under all conditions.

(v) Design glazing to prevent condensation on the interior face of the glazing or framing system. Provide interior gutters to catch water in the event condensation occurs. Drain condensation gutters to the interior.

(vi) Provide dry glazing.

(vii) Glazing framing systems will provide for the mechanical attachment of air, vapor, and moisture membranes.

(g) Tubular Natural Lighting Devices (light tubes)

(i) Tubular natural lighting devices are permitted where required to provide necessary Natural Light to interior spaces.

(ii) Provide tubular natural lighting devices as follows:

1. transparent roof mounted skylight dome and self-flashing curb, reflective tube and ceiling level diffuser assembly;

2. complying with the International Code Council ICC AC-16; and

3. minimum tube diameter will be 530mm.

(h) Exterior glazing requirements are specified in Table 7.8.4.5-1. Provide glazing types as specified on Appendix 1B – Room Data Sheets.

Table 7.8.4.5-1

Window Type	Requirements (minimum size)
EG1	SILL – 915 HEAD – 2440 WIDTH – Full Width of Room
EG2	SILL – 915 HEAD – 2440 WIDTH – 3040
EG3	SILL – Floor HEAD – Ceiling WIDTH – Full Width of Room
EG4	SILL – 915 HEAD – 2440 WIDTH – 1524
EG5	SILL – 4000 HEAD – 7000 WIDTH - 7500
EG6	SILL – 4000 minimum HEIGHT – 1m minimum WIDTH - 7500

Note:

- Sills will be located as required for millwork / counters.
- Head dimensions shown are minimums to be maintained and when taken with the sill height, designate the minimum overall

window height to be provided.

- Where noted head, sill or width dimension requirements cannot be achieved, the total glazing area calculated from the requirements will be substituted.
- Locations of full width glazing may include doors or sidelights where required.

7.8.4.6 Interior Glazing

(a) General Requirements

(i) Provide interior glazing in locations and quantities to meet the intent of the building principles related to maximization of Natural Light, daylight, views, meaningful ties between the interior and the exterior and visual connections between interior spaces for supervision.

(ii) Interior glazing will be laminated safety glass and fire-rated where required.

(iii) Except for glazing in wood doors, glazing will be in pressed steel frames to same requirements as door frames.

(iv) Interior glazing sill heights and sidelights will be a minimum 200 mm height above finished floor. Sidelight head height to match adjacent door.

(v) Where not specified, size, configure, and adequately construct windows to suit rooms that require Natural Light, views and/or natural ventilation.

(vi) Coordinate glazing heights with adjacent wall protection, handrails, and other accessories to achieve functional and aesthetic cohesiveness.

(b) Performance Criteria

(i) Interior glazing will:

1. be conventional commercial grade window construction; and

2. provide normal security and resistance to abuse.

(ii) Interior Glazing Selection Criteria

1. All windows will be able to be re-glazed in place.

(iii) Interior Glazing Schedule

1. Doors & Borrowed lites: minimum 6mm tempered and as required to maintain overall wall acoustic requirements.

2. Exit and corridor doors: 6mm tempered.

(c) Interior glazing requirements are specified in Table 7.8.4.6-1. Provide window types as specified on Appendix 1B – Room Data Sheets.

Table 7.8.4.6-1

Window Type	Requirements (minimum size)
IG1	SILL – 915 HEAD – 2440 WIDTH – Full Width of Room (wall to wall at entry)
IG2	SILL – 915 HEAD – 2440 WIDTH – 2440
IG3	SILL – Floor HEAD – Ceiling WIDTH – Full Width of Room (wall to wall at entry)
IG4	SILL – Floor HEAD – Ceiling WIDTH – Full Width of Room FOLDING GLAZED PARTITION
IG5	SILL – 915 HEAD – 2440 WIDTH - 1830
IG6	SILL – Floor HEAD – Ceiling WIDTH – 2440

Note:

- Sills will be located as required for millwork / counters.
- Head dimensions shown are minimums to be maintained.
- Where noted head, sill or width dimension requirements cannot be achieved, the total glazing area calculated from the requirements will be substituted.
- Locations of full width glazing may include doors or sidelights where required.

7.9 Division 9 – Finishes

7.9.1 Basic Requirements

7.9.1.1 Select the appearance of finishes and colours to create and promote a calm and respectful environment, prevent glare, and minimize artificial lighting requirements**.**

7.9.1.2 Final selections for finish colours will be approved by the Owner.

7.9.1.3 Custom colors and finishes are not to be used.

7.9.1.4 Materials and assemblies will be designed and constructed to minimize maintenance requirements.

7.9.1.5 In areas where finishes and systems of installation will occur and water is anticipated to be present as part of cleaning or other procedures, allow water to collect and exit without causing damage to the finishes or substrate.

7.9.1.6 In areas where finishes or systems of installation may come in contact with water, chemical agents or other liquids as part of cleaning or other procedures, water, chemical agents or other liquids will be allowed to collect and exist without causing damage to the finishes or substrate.

7.9.1.7 Interior finish materials will have surface finishes either as manufactured and integral to the finish material or as applied to the surface of the finish material by paint or special coating.

7.9.1.8 Interior materials will be of a high performance quality to withstand regular and repeated abuse and cleaning.

7.9.1.9 Interior materials subject to corrosion from exposure to moisture or other corrosive agents and where painting is insufficient to protect from corrosion/damage will receive a special protective coating sufficient to protect against corrosion. Such materials include interior masonry in Shower, structural and miscellaneous steel and galvanized steel.

7.9.1.10 Provide acoustic wall treatment as required to meet the acoustic requirements specified in Appendix 1C - Acoustical Chart and Section 8.3.6.2 (Acoustical Treatment) of this Schedule 1.

7.9.2 Interior Walls and Partitions

7.9.2.1 Basic Requirements:

(a) Design and construct the interior components of the Building in accordance with the following:

(i) provide acoustic separations as required to account for the specific functions to be carried out in the relevant spaces affected as specified in Section 8.3.6.2 of this Schedule 1; and

(ii) design and select interior walls and partitions, partition systems and interior finishes:

1. for ease of cleaning and maintenance;

2. to maximize permanence and durability, including impact resistance;

3. to maximize flexibility and adaptability of services;

4. with low VOC emissions so as to minimize adverse impact on indoor air quality and indoor environmental quality;

5. to meet acoustic requirements as specified in Appendix 1C - Acoustical Chart and Section 8.3.6.2 (Acoustic Treatment) of this Schedule 1; and

6. to accommodate required building services without compromising security and safety.

(b) Use of steel framing

(i) Interior wall framing will comply with all applicable Standards, including the Canadian Sheet Steel Building Institute Standards (CSSB1) and the Association of Wall and Ceiling Contractors of B.C. (AWCC) Wall & Ceiling Specification Standards Manual for materials and workmanship for interior walls, including steel studs and furring and GWB ceiling suspension systems.

(ii) Use prefabricated non-load bearing steel studs for interior partitions and furring with no axial load other than its own weight, the weight of attached finishes, and lateral loads of interior pressure differences and seismic loads.

(iii) Construct steel stud framing to accommodate electrical, plumbing and other services in the partition cavity, and to support fixtures, wall cabinets, and other such wall-mounted items. Provide reinforcement and backing.

(iv) Account for in design, the differences in air pressure that may result on opposite sides of the wall or partition due to factors such as wind and other lateral pressures, stack effects, or mechanically-induced air pressurization.

(v) Design assembly to accommodate construction tolerances, deflection of building structural members, and clearances of intended opening.

(vi) Where GWB systems are required to provide fire resistance ratings, design wall assemblies tested by fire testing laboratories acceptable to Authorities Having Jurisdiction.

7.9.2.2 Performance Criteria

(a) The interior walls will be designed and constructed to provide a safe and secure place for Occupants, and provide the required level of fire rated protection stipulated by the BCBC.

(b) Materials and work quality for interior walls, including steel studs and furring and GWB ceiling suspension systems, will be to Good Industry Practice. Non-load bearing channel stud framing will conform to ASTM C 645 and CAN/CGSB-7.1-98.

(c) Interior walls and partitions system design and components will meet the seismic restraint requirements of the BCBC.

(d) The interior walls and partition systems will provide acoustic separations of internal walls and partitions in accordance with Appendix 1C - Acoustical Chart and requirements of this Schedule 1.

(e) All walls will be constructed floor to underside of structure above.

(f) Interior walls will be designed and constructed using durable materials and will be secured in a fashion.

7.9.3 Wall Finishes

7.9.3.1 General Requirements

(a) Refer to Appendix 1B – Room Data Sheets for wall finish requirements.

(b) Provide wear-resistant, low maintenance wall finishes appropriate for various uses of the interior spaces; use of gypsum board is not encouraged in areas prone to wear. However, if gypsum is used in areas prone to wear, 2 layers are required.

(c) Painted concrete or painted concrete masonry is an acceptable finish in storage rooms.

(d) Wall coverings are not permitted.

(e) Use systems from the single manufacturer and dye lot etc. to suit performance level required, and selected from readily available stock.

(f) Paint all gypsum board surfaces. Concrete and concrete masonry surfaces will be filled as necessary.

(g) For MDF and gypsum board surfaced wall assemblies, provide a 100 mm high (x thickness of wall finishes) strip of pressure treated fir plywood at the wall/floor interface except where gypsum wall board is required to meet fire rating of wall assembly.

(h) Provide solid wood backing in all frame walls for solid connection to all room fixtures and equipment including chalkboards, tackboards, monitors, etc. Minimum backing will be 19 mm fir plywood. Final locations will be reviewed with the Owner prior to covering.

7.9.3.2 Performance Criteria

(a) Gypsum board:

(i) Gypsum board work to CSA A82.31 1977 except when specified otherwise.

(ii) Gypsum board: to CSA A82.27 M1977, Type X, 15.9 mm is minimum standard.

(iii) Finish gypsum board in accordance with the Levels of Finish as prescribed in Section 9.6 of the AWCC manual as follows:

1. Level 1 finish: use for completely hidden areas including under plywood wall protection.

2. Level 2 finish: use in Storage and Service Areas.

3. Level 4 finish: use for areas receiving eggshell or semi-gloss finish.

(b) Ceramic and Porcelain Tilework:

(i) Ceramic tiles will be applied on walls only.

(ii) Porcelain tiles will be applied to floors only.

(iii) Dynamic Coefficient of Friction (DCFO) will be minimum:

1. 0.55-0.56 for outdoor applications; and

2. 0.42 for indoor Public Spaces.

(iv) Ceramic tilework will comply with all applicable Standards, including the Terrazzo Tile and Marble Association of Canada (TTMAC) Specification Guide 09 30 13 Tile Installation Manual.

(v) For installations on wet and exterior surfaces, use floor tiles that have the following static coefficients of friction as per the American Society for Testing and Materials International (ASTM):

1. Level Surfaces: Not less than 0.50 for wet and dry conditions.

2. Stair Treads: Not less than 0.60 for wet and dry conditions.

3. Ramp Surfaces: Not less than 0.60 for wet and dry conditions.

(vi) For exterior installations, provide frost-resistant exterior tiles with a moisture absorption rating of 3.0% or less.

(vii) Provide control joints and expansion joints in conformance with the recommendations of the TTMAC Tile Installation Manual.

(viii) Provide crack isolation membranes to resist crack transmission from the substrate due to lateral movement; design for use in thin-set applications of tile over a cracked substrate. Use elastomeric sheets or trowel-applied materials suitable for subsequent bonding of ceramic tile.

(ix) Set ceramic tile with latex modified mortar and all grout will be epoxy based.

(x) Fix tiles with low toxicity cement. Grout will be of a colour complementary to the tiles and easily maintained. White grout will not be used.

(xi) Ceramic tile will be CAN-75.1 M77, Type 5, class MR4, minimum 108 x 108 x 6.4 mm size, cushioned edges, glazed pattern, colour as approved by the Owner.

(xii) Cementitious backer board:

1. will be used instead of gypsum board (except where Gypsum board is required for fire rating) over studs in wet areas. Install backer boards in accordance with the manufacturer's written instructions to the full height of the tiling or other wall finish. Protect the substrate with a 0.15 mm thick sheet of polyethylene installed behind the backer board, and extending the full area of the backer board without joints. Cementitious backer board will be:

   a. Rigid lightweight concrete board;

   b. Glass fibre reinforcing mesh each face;

   c. Thickness: 16mm; and

   d. Dimensions: Largest practical sheets to minimize joints.

(xiii) Tilework:

1. Wall tiles to TTMAC detail 200-5-B. Floor tiles to TTMAC detail 200-15.

(c) Plywood paneling:

(i) to CSA 0115, 11mm thick unless noted otherwise, plain sliced veneer face, veneer core, good one side, AWMAC Custom Grade, warehouse matched, Select White Birch, for clear finish.

(d) Medium density fibreboard paneling:

(i) to ANSI A208.2; 12.5 minimum or thickness indicated, for paint finish. Flame spread rating less than 150.

(e) Acoustic wall panels:

(i) Requirements:

1. composite wood fibre bonded with cement binders such as Tectum Panels; or

2. semi rigid fibre glass with hardened edges and wrapped in an acoustic transparent vinyl fabric.

(ii) Cementitious wood fibre acoustic units:

1. to CAN2-92.1 M77. Standard units: 1213 mm wide, thickness as required for NRC requirements (minimum 38 mm), bevel, edged, standard white, NRC designation of 0.40. Flame-spread rating of 25, smoke developed 50 or less. Adhesive: type recommended by acoustic unit manufacturer.

7.9.4 Wall Protection and Wall Coverings

7.9.4.1 Wood Feature Wall

(a) Solid or veneered wood, meeting smoke / fire rating requirements as required.

(b) If open jointed wood systems will be used, a black fabric backer will be used to conceal services / structure behind.

7.9.4.2 Vinyl Acrylic Wall Covering

(a) Where vinyl/acrylic wall covering is used, provide vinyl/acrylic high impact rigid sheet, minimum 15mm thickness with colour-matched vinyl/acrylic trim for joint/transitions.

(b) Furnish complete packaged system containing all primers and adhesive. Use water-based and non-hazardous primer and adhesive materials.

7.9.4.3 Dry Erase Wall Covering

(a) Provide pigmented gloss vinyl wall covering presentation surfaces for dry erase markers, including .61 kg/m2, non-woven backing as specified in Appendix 1B - Room Data Sheets.

(b) Provide trim and other accessories including wall covering trim of anodized aluminum, low profile trim.

(c) For the rooms listed in Appendix 1B – Room Data Sheets as having whiteboards; the Design-Builder will provide either a whiteboard or dry erase wall covering will be determined pursuant to the Review Procedure.

7.9.4.4 Interior Window Film

(a) General: 4.7mil vinyl, frosted;

(b) Apply to inner face of glazing. Edges will not be captured within window stops to enable replacement of film as necessary; and

(c) Privacy film: 50% opacity to obscure recognition of interior / exterior features.

7.9.4.5 Wall Protection

(a) Provide white birch plywood protection on all walls and exposed corners within corridors to prevent damage due to impact from occupant traffic.

(b) Apply sheet wall protection and bumper guards in other locations where the there is a potential for impact damage.

(c) Minimum wall protection height is 1220mm above the floor.

(d) Wall protection will continue above any handrail/wall bumper to fully protect the wall from damage.

(e) Applied Sheet Wall Protection

(i) Sheet wall protection will be:

1. PVC free;

2. Fire and smoke performance: Class A per CAN/ULC-S102.1; and

3. Smooth or minimally textured without visual fasteners.

(ii) Colour to compliment or match surrounding wall colour.

(f) Corner Guards

(i) Provide 50mm x 50mm x 1220mm (to match height to top of typical wall protection) 18ga stainless steel corner guards at all outside corners where wall finishes are exposed to wear conditions.

(ii) To be installed over finish, not with flange beneath finish to allow for future replacement.

(iii) To be tamper proof.

7.9.5 Painting

7.9.5.1 General Requirements

(a) Materials containing lead or mercury are not permitted.

(b) Paints and coatings will meet the applicable flame spread requirements of applicable governmental authorities and the BCBC.

(c) Use only materials having a minimum MPI 'Environmental Friendly' E2 rating or better based on VOC (EPA Method 24) content levels.

(d) If seamless epoxy wall coatings are used, provide a two component, high solids, zero or low VOC, solvent free, epoxy glaze wall coating which will be seamless, abrasion and chemical resistant, and UV resistant. Coatings will have been tested in accordance with ASTM

D1308-Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.

(e) All interior and exterior painting and decorating work will be in accordance with MPI Painting Manual premium grade requirements and will be inspected by the local MPI Accredited Quality Assurance Association's Paint Inspection Agency. The Design-Builder is responsible for the cost for such inspections, and for either the local MPI Accredited Quality Assurance Association's Guarantee, or the Maintenance Bond.

(f) Unless noted otherwise, walls and exposed ceilings will be painted throughout with High Performance Architectural Latex.

(i) Paint Gloss: Paint gloss is defined as the sheen rating of applied paint, in accordance with the following values:

1. Gloss Level 1: Flat or matte: max. 5 units @ 60 degrees to a maximum of 10 units @ 85 degrees. NOT PERMITTED;

2. Gloss Level 2: High Sheen Flat (Velvet-like): max. 10 units @ 60 degrees to a maximum of 10 - 35 units @ 85 degrees. NOT PERMITTED;

3. Gloss Level 3: Eggshell: max. 10 - 25 units @ 60 degrees to a maximum of 10 – 35 units @ 85 degrees. LIMIT USE TO ADMIN OFFICE AND CEILINGS;

4. Gloss Level 4: Satin-like Finish: max. 20 - 35 units @ 60 degrees to a minimum of 35 units @ 85 degrees. ALL SPACES;

5. Gloss Level 5: Semi-gloss Finish: max. 35 - 70 units @ 60 degrees. DOORS AND FRAMES AND OTHER INTERIOR METAL WORK, EXPOSED STRUCTURE;

6. Gloss Level 6: Gloss Finish: max. 70 - 85 units @ 60 degrees. NOT PERMITTED; and

7. Gloss Level 7: High Gloss Finish: More than 85 units @ 60 degrees. NOT PERMITTED.

(g) Painting systems will conform to Table 7.9.5.1-1.

Table 7.9.5.1-1

Interior Material	**MPI Finish System**
Concrete vertical surfaces	INT 3.1C High Performance Architectural Latex
Concrete floors - sealed	INT 3.2F Concrete floor sealer
Concrete Masonry	INT 4.2D High Performance Architectural Latex

Glue Laminated Beams and Columns	INT 6.1F W.B Acrylic, clear
MDF, and wood paneling - opaque	INT 6.4S High Performance Architectural Latex
MDF, wood paneling and trim	INT 6.3Q W.B. Acrylic, Clear
Miscellaneous high contact metal and steel components such as hand railings	INT 5.1E Alkyd
Structural steel such as web joists	INT 5.1C W.B. Dry Fall G5 Semi-Gloss Note: two finish coats required.
Steel piping such as fire sprinkler and gas lines	INT 5.1T Alkyd (over surface tolerant primer)
galvanized metal such as Q-Decks , ductwork	INT 5.3H W.B. Dry Fall
Metal doors and frames	INT 5.3K W.B. Light Industrial Coating (over w.b. primer)
Wood doors	INT 6.3Q W.B. Acrylic , Clear
Gypsum Board	INT 9.2B High Performance Architectural Latex
Exterior Material	**MPI Finish System**
Concrete	EXT 3.1C W.B. Light Industrial Coating
Concrete masonry	EXT 4.2C W.B. Light Industrial Coating
Structural steel such as web joists	EXT 5.1B W.B. Light Industrial Coating (over inorganic zinc)
Miscellaneous high contact metal and steel components such as hand railings	EXT 5.1L Polyurethane (pigmented) over inorganic zinc rich primer and high build epoxy.
Galvanized metal such as Q-Decks	EXT 5.3J W.B. Light Industrial Coating (over w.b. primer)
Metal doors and frames	EXT 5.3J W.B. Light Industrial Coating (over w.b. primer)
Glue Laminated Beams and Columns	EXT 6.1H Polyurethane, Clear, 2 component.

(h) All interior and exterior painted concrete surfaces will be sand-blasted and primed to ensure proper finish adhesion. All cast-in-place or precast concrete to receive abrasive blasting within 25-72 hours after concrete is poured, depending on curing requirements. The Design-Builder will designate minimum 10 square metre sample panel complete with finish for Owner review and acceptance prior to proceeding.

(i) All exposed exterior structural and architectural steel will be sandblasted to the appropriate MPI requirements for the finish system.

(j) Use exterior paints of a quality designed to protect substrate materials from weather and climate conditions.

(k) Colour palette will be selected from a single manufacturer approved by the Owner.

(l) Provide line painting for exterior parking and traffic areas, and other exterior miscellaneous hard surface playing areas.

(m) Paint all piping and conduit exposed to view in all spaces except in mechanical rooms with the following exceptions: fire-sprinkler piping in mechanical rooms will be painted red and gas piping in mechanical rooms will be painted yellow.

(n) Ensure O&M Manuals include a complete colour & product schedule.

(o) Achieve a visually harmonious and aesthetically coordinated appearance across all areas of the Building.

(p) Use exterior and interior finish materials with surface finishes either as integral to the finish material or field-applied separately to the surface of the finish material.

(q) Treat exterior masonry materials such as brick and concrete block with water-repellent coatings to prevent water ingress into or through the material.

(r) Paint handrails, doors, and frames with a contrasting colour from walls in consideration of the visually impaired.

7.9.6 Ceilings

7.9.6.1 General Requirements

(a) Refer to Appendix 1B – Room Data Sheets for ceiling finish and height requirements.

(b) Provide compatible finishes and select from readily available stock.

(c) Ceiling reflectance will complement the lighting design.

(d) All ceiling systems and ceiling finishes will:

(i) provide permanence and durability appropriate;

(ii) comply with the acoustic requirements specified in Appendix 1C - Acoustical Chart and requirements of this Schedule 1;

(iii) promote ease of cleaning and maintenance in order to minimize disruption;

(iv) be compatible with mechanical, plumbing, electrical, building security and communications and ESCS services and fixtures;

(v) be compatible with ceiling attached equipment; and

(vi) be suitable for the function of the space.

(e) All ceiling systems and ceiling finishes will comply with the following:

(i) fire and smoke separation and fire resistance ratings will conform to the requirements of all applicable codes;

(ii) suspended ceilings will comply with seismic resistance as required by all applicable codes; and

(iii) requirements of the Specification Standards Manual as published by the Association of Wall and Ceiling Contractors of British Columbia (AWCC).

7.9.6.2 Performance Criteria

(a) Suspended Acoustic T-Bar Ceiling:

(i) Ceiling tiles will be used as specified in Appendix 1B - Room Data Sheets.

(ii) Acoustic Panel: Non-directional, white ceiling panel, trim edge detail to fit a standard T-bar grid panel size.

(iii) Provide accessibility to the ceiling spaces where access is required to mechanical, electrical or other service systems.

(iv) Provide acoustical panels that are appropriate for the normal occupancy condition range and maximum 70% relative humidity. When the service use temperature and relative humidity are expected to exceed these ranges, use acoustical units specifically designed for such applications.

(v) Use tiles with scratch-resistant surfaces in any area where lay-in ceiling panels frequently need to be removed for plenum access.

(vi) Interior sound levels will be controlled to facilitate a comfortable environment for Occupants and a safe working environment for Building Staff and so as to achieve the requirements of Appendix 1C - Acoustical Chart.

(vii) Acoustic ceiling tiles in a suspension system will be installed to provide the levels of sound attenuation to suit the intended function of the room and so as to achieve the requirements of Appendix 1C - Acoustical Chart.

(viii) Ceilings installed in Kitchens and any Washrooms will be capable of being cleaned without wear.

(ix) Suspension system:

1. Completed suspension system to support superimposed loads. Maximum deflection of suspended acoustical ceiling assembly: 1/360th of span to ASTM C635 deflection test.

2. Intermediate duty system to ASTM C635, commercial quality cold rolled steel. Type 1 suspension system: non-fire rated one-directional exposed 19 mm T-Bar grid. Die cut components with interlocking connections. Exposed T-bar grid components to have pre-finished satin sheen. Hanger wire: galvanized soft annealed steel wire to diameter required by loading.

(x) Accessories:

1. Hanger isolator: 25 mm minimum with rated loads and spring selection in accordance with manufacturer's design tables.

2. Acoustic insulation: Sound Attenuation Blankets as required to meet STC or NRC "Noise Stop" Requirements.

3. Access doors: panels of bonderized steel, prime painted, 1.519 mm thick frame, 97 mm thick door, flush door hinge design.

(xi) Edge Trim where suspended ceiling system is separated from adjacent walls: Aluminum vertical edge trim systems will be compatible with suspension system.

(xii) Acoustic tile:

1. Mineral fibre, non-directional, with a minimum NRC of 50-55 and CAC 30-34 (ASTM E84). Light Reflective LR-1, rated Class 25 (non-combustible) under Flame Spread Index Section of Federal Specifications SS-S-118a, Class 1 Flame Spread Rating to ASTM E84 (Tunnel Test Method). Labeled and listed by Underwriter's Laboratory Inc. or ULC for a Flame Spread of 0-25 under the Hazard Classification.

(xiii) Vinyl-faced acoustic tile:

1. Mineral fibre, non-directional, with a minimum NRC of 50-55 and CAC 30-34 (ASTM E84). Light Reflective LR-1, rated Class 25 (non-combustible) under Flame Spread Index Section of Federal Specifications SS-S-118a, Class 1 Flame Spread Rating to ASTM E84 (Tunnel Test Method). Labeled and listed by Underwriter's Laboratory

Inc. or ULC for a Flame Spread of 0-25 under the Hazard Classification.

(xiv) ACT - Acoustic Ceiling Tile – Midgrade

1. Material: Mineral fiber with acoustically transparent membrane.
2. Finish: Smooth Finish.
3. Size: 24” x 24” x 1” or larger.
4. Edge: Square Tegular.
5. Grid: 15/16 or 9/16”.
6. Colour: White.
7. NRC: 0.85 or greater.
8. Light Reflectance: 0.86 or greater (per ASTM E1477).
9. Anti-Mold/Mildew coating.
10. Fire Performance: ASTM E84 and CAN/ULC S102 – Flame Spread.
11. Index 25 or Less.
12. Sag Resistance: High.
13. Recycled Content: 75% or higher.

(xv) ACTT - Acoustic Ceiling Tile - Top grade

1. Material: Mineral fiber with acoustically transparent membrane.
2. Finish: Smooth Finish.
3. Size: 24” x 60” x 1” or larger.
4. Edge: Square Tegular.
5. Grid: 9/16”.
6. Colour: White.
7. NRC: 0.85 or greater.
8. Light Reflectance: 0.86 or greater (per ASTM E1477).
9. Anti-Mold/Mildew coating.

10. Fire Performance: ASTM E84 and CAN/ULC S102 – Flame Spread.

11. Index 25 or Less.

12. Sag Resistance: High.

13. Recycled Content: 75% or higher.

(xvi) ACTH - Acoustic Ceiling Tile - High STC

1. Material: Mineral fiber with acoustically transparent membrane.

2. Finish: Smooth Finish.

3. Size: 24” x 24” x 1” or larger.

4. Edge: Square Tegular.

5. Grid: 15/16 or 9/16”.

6. Colour: White.

7. NRC: 0.95 or greater.

8. Light Reflectance: 0.86 or greater (per ASTM E1477).

9. Anti-Mold/Mildew coating.

10. Fire Performance: ASTM E84 and CAN/ULC S102 – Flame Spread.

11. Index 25 or Less.

12. Sag Resistance: High.

13. Recycled Content: 75% or higher.

(xvii) ACTC - Acoustic Ceiling Tile – Cleanable

1. Material: Mineral fiber with mylar surface.

2. Finish: Smooth finish.

3. Size: 24” x 24” or larger.

4. Edge: Captured in grid.

5. Grid: As appropriate for ceiling system.

6. Colour: White.

7. NRC: 0.50 or greater.

8. Anti-Mold/Mildew Coating.

9. Fire Performance: ASTM E84 and CAN/ULC S102 – Flame Spread Index 25 or Less.

10. Sag Resistance: High.

(b) Suspended Gypsum Board Ceiling:

(i) Suspension system:

1. Completed suspension system to support superimposed loads. Maximum deflection of suspended gypsum board ceiling assembly: 1/360th of span to ASSTM C645 deflection test.

(ii) Main runners will be cold formed steel channels, protected with rust inhibited coating not less than 38 mm 12.7 mm x 1.37 mm thickness. Cross furring will be hot shaped furring channels. Inserts will be able to develop full-strength of hangers, suitable for attachments to surfaces where required. Hander wire: galvanized soft annealed steel wire to diameter required by loading.

(iii) Accessories:

1. Access doors: panels of bonderized steel, prime painted, 1.519 mm thick frame, 1.897 mm thick door, flush door hinge design.

2. Screws to ASTM C646.

3. Stud adhesives to CGSB-1 GP-25M.

(iv) Gypsum board:

1. Gypsum board to CSA A82.27, Type X, 16 mm thick x 1218 mm wide x maximum practical length, ends cut square, edges tapered, with round edge to internal finishes.

2. Finish gypsum board in accordance with the Levels of Finish as prescribed in Section 9.6 of the AWCC manual as follows:

a. Level 1 finish: use for completely hidden areas; and

b. Level 4 finish: use for areas receiving paint Semi-Gloss Level 3 & 5.

3. Paint in accordance with Section 7.9.5.

(v) Wood Ceilings:

a. Wood panel systems.

b. Linear wood ceilings.

c. Solid or veneered wood, meeting smoke / fire rating requirements as required.

d. Acoustics: NRC 0.35 minimum.

e. Independently hang ceilings from structure.

f. If open jointed wood systems will be used, an integral black fabric backer will be used to conceal services / structure above.

7.9.7 Floor Finishes

7.9.7.1 General Requirements

(a) Refer to Appendix 1B – Room Data Sheets for floor finish requirements.

(b) Provide floor and finishes that are compatible and consistent one another and suit the level of finish and performance required.

(c) The floor and floor systems will be complementary and integral to the functional and aesthetic requirements of the interior space.

(d) Use systems from the single manufacturer and dye lot to suit performance level required and selected from readily available stock.

(e) Floor systems will not be installed on any floors until the conditions as required by the manufacturer's recommendation for that particular floor system have been achieved. The Design-Builder will provide testing result to the Owner to verify that the appropriate moisture levels and conditions required by the manufacturer have been achieved prior to flooring installation.

(f) Provide a flooring solution that uses colour and pattern changes to break-up large expanses of areas, helps to define zones, and creates a visually interesting spaces.

(g) Floor finishes will be used where required for one or more of the following reasons:

(i) protect the structural floor from wear or corrosion;

(ii) provide an attractive appearance; or

(iii) for the comfort and safety of the user.

(h) Floor finishes will be slip resistant in both wet and dry conditions.

(i) Where epoxy flooring is used in wet areas, use water and slip-resistant grade and prevent water or moisture transmission to the substrate. Terminate flooring at the walls in the form of 150mm high flash coved bases. Above 150mm high flash cove, taper flooring material to allow smooth transition of the wall protection over the flooring.

(j) Use permanent, heavy-duty integral materials such as seamless quartz epoxy flooring in areas subject to moisture and heat over extended periods of time.

(k) The transition between epoxy flooring and sheet wall protection will be smooth. The wall protection will overlap the flooring.

(l) Use water resistant and slip-resistant flooring in all washrooms.

(m) Use anti-static flooring materials for MTRs and TRs.

7.9.7.2 Performance Criteria

(a) Resilient Sheet flooring:

(i) Conform to ASTM F2034 Type I to minimum gauge 2.45 mm (.096").

(ii) Weld seams using approved products to manufacturer's directions. Welded seams to run parallel to longest wall space.

(iii) Arrange sheets to ensure fewest seams.

(iv) Standard: Comply with Specification Standards Manual published by NFCA (National Floor Covering Association).

(v) Linoleum sheet flooring will have a homogenous core of primarily natural materials, consisting of linseed oil, wood flour, and resin binders mixed and calendared onto a natural jute backing. Weld all seams.

(vi) Rubber flooring will be solid cushioned sheet or tile formulated with 100% virgin elastomers, reinforcing agents, soil-resisting agents, and migrating waxes compounded to create durability, excellent cleaning characteristics, and 0.08 dry coefficient of friction ad defined by ASTM D204-04. Stud designs to have chamfered edges with a sharply-defined edge at the top for higher slip resistance, easier cleaning, superior maintenance and low vibration design to minimize vibration and noise.

(vii) Heat weld all seams.

(viii) Finish flooring with high speed buffing as per manufacturer's operational specifications. Do not apply sealer or wax.

(b) Slip Resistant Sheet flooring:

(i) Slip-resistant sheet flooring will have a static coefficient of friction of not less than 0.6 on level surfaces and not less than 0.8 on ramps.

(ii) Conform to ASTM F 1913 to minimum gauge 2.00 mm (.080").

(iii) Weld seams using approved products to manufacturer's directions. Welded seams to run parallel to longest wall space.

(iv) Arrange sheets to ensure fewest seams.

(c) Polished Concrete:

(i) Steel trowel finish: to CSA CAN3-A23.1 with a final finish to suit covering or treatment as per Appendix 1B - Room Data Sheets.

(ii) The use of any exposed concrete flooring will conform to the levels of finish as defined by the Concrete Polishing Council. Refer to the Concrete Polishing Council's Polished Concrete Appearance Chart and conform to the following minimum levels of finish:

1. The level of sheen will be Level 2 – satin or Level 3 – polished, with a Class B – fine aggregate or Class C – medium aggregate exposure Sealed Concrete.

(iii) Concrete Stain:

1. Subcontractors used to install/apply concrete stains will have minimum 10 years verified experience in the installation of concrete floor treatment finishes.

2. Moisture: Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer prior to applying.

3. Quality of products and workmanship: In accordance with the Specification Standards Manual as published by the National Floor Covering Association [NFCA].

4. Manufacturer's Technical Representative: The Design-Builder will cause the flooring manufacturer to provide a technical representative to inspect the surfaces to which a flooring treatment will be applied to confirm that the substrate is acceptable for the application of flooring treatment. The Design-Builder will cause the manufacturer's technical representative to carry out regular Site inspections to ensure that the installation is carried out in accordance with manufacturer's installation instructions and that deficiencies are corrected.

(d) Porcelain tile:

(i) Will meet the performance standard of the Terrazzo Tile & Marble Association of Canada, c/o the Ceramic Tile Design-Builder's and Industry Association of B.C.

(ii) Fix with low toxicity cement. Grout colour should complement that of the tiles, and be easily maintained. White grout will not be used.

(iii) Porcelain floor tile: cushioned edges, matte finish, with matching coved base and other special shapes as required. The Owner will approve colours.

(iv) Where used on floors, porcelain tile will have a slip coefficient rating of ≥ 0.42or higher.

(e) Wood Flooring (Drama Room)

(i) Flooring makeup:

1. Masonite: 12.7mm thick.

2. Sheathing Plywood: 0120DFP Sheathing grade, 15.9mm thick, to CSA 1210M1978, layers placed diagonally and secured by staples and adhesive.

3. Cushion Pads: 199mm pads at 300mm OC rubber or EPDM standard of acceptance: BIOCUSHION ISOLATOR PAD as manufactured by Robbins Sports Services or Owner approved alternate.

4. Polyethelene Membrane: 0.15mm polyethelene film, to CGSB 70-GP-1A, type 2.

5. Floor Finish: to MPI Painting Specifications Manual, Latex INT 6.4R.

(f) Wood Flooring (Woodworking Shop)

(i) Flooring makeup:

1. Finished Plywood: 15.9mm thick, good one side.

2. Sheathing Plywood: 0120DFP Sheathing grade, 15.9mm thick, to CSA 1210M1978, layers placed diagonally and secured by staples and adhesive.

3. Cushion Pads: 199mm pads at 300mm OC rubber or EPDM standard of acceptance: BIOCUSHION ISOLATOR PAD as manufactured by Robbins Sports Services or Owner approved alternate.

4. Polyethelene Membrane: 0.15mm polyethelene film, to CGSB 70-GP-1A, type 2.

5. Floor Finish: clear seal.

(g) Sports Wood Flooring:

(i) Flooring makeup:

1. Hard maple flooring: 19.8 mm thick x 57 mm wide continuous strip XL Finger-Jointed, tongue and groove edges, No. 2 and better grade to MFMA-FJ grading rules.

2. Cushion system: Will be: Bio-Channel Classic as manufactured by Robbins Sports Surfaces or Owner-approved alternate. Omit pads and solid block as recommended under stacked bleacher locations.

3. Vented base: 75 x 100 mm, molded rubber, with ventilation holes.

4. Membrane: 0.15 mm polyethylene film, to CGSB 70-GP-1A, Type 2.

5. Finish: Clear moisture-cure two-part polyurethane to CGSB 1¬GP-180M, Type 1, MPI gloss level 6; MPI #31 for Gymnasia, MPI gloss level 5; MPI #202 for Dance Room / Yoga Studio. Minimum 4 coats, sanded between coats. Allow Owner access for review between each coat. Provide MPI QAA 2 year Guarantee or Maintenance Bond.

(ii) Painted games lines will be included; Epoxy game line marking to MPI 6.5F, MPI #77. The feature competition basketball court's centre circle will include the School logo. Games lines layouts will be approved by Owner, performing two reviews (draft and final) and will include badminton, volleyball and basketball.

(iii) Provide a written guarantee that wood flooring system is guaranteed against faulty material and workmanship for two years after Substantial Completion.

(iv) Prior to installation of the hardwood flooring system, all interior environmental requirements will be confirmed as per the manufacturer's written instructions.

(h) Rubber Flooring (Sports Flooring):

(i) System Description: Recycled rubber interlocking tile system.

1. Subfloor: Concrete subfloor will be waterproofed beneath the slab and at perimeter walls and on the earth side of below-grade walls. System will be installed over concrete slab depression, 11 mm. No curing agents or sealers will be applied to the concrete slab.

(ii) Product: Will be 12mm thick x 940mm x 940mm interlocking sport mat flooring recycled rubber tile floor system.

(iii) Flooring will be installed according to manufacturer's specifications.

(i) Rubber Sheet Flooring:

(i) System Description: Heat-welded Rubber Sheet flooring system.

1. Subfloor: Concrete subfloor will be waterproofed beneath the slab and at perimeter walls and on the earth side of below-grade walls. No curing agents or sealers will be applied to the concrete slab.

(ii) Product: 3 mm thick x 1500 mm wide heat-welded rubber sheet flooring system installed according to manufacturer's specifications. Colour selection as approved by the Owner.

(iii) Sheet rubber, prefabricated, calendared and vulcanized

1. Unbacked Rubber Sheet Floor Covering: ASTM F 1859.

2. Rubber Sheet Floor Covering with Backing: ASTM F 1860.

3. Make transitions between two adjoining areas, new-to-new, flush.

(j) Stair Coverings

(i) Provide tactile warning strips and stair nosings to assist the visually impaired.

(ii) Abrasive Stair Nosings: Provide slip-resistant stair and landing nosings.

(k) Rubber Stairs:

(i) Commercial grade.

(ii) Treads: heavy duty, diamond pattern, 6 mm thick, square nose.

(iii) Risers and stringers: sheet rubber material to match rubber base.

(iv) Tactile warning strips: 3 mm thick, 1000 mm x 1000 mm tile.

(l) Carpet Tiles

(i) Carpet tile is acceptable where shown in Appendix 1B – Room Data Sheets.

(ii) Use carpet tile that is certified under Canadian Carpet Institute/Canadian Rug Institute (CCI/CRI) Indoor Air Quality Program and having CRI/IAQ Label.

(iii) Use a carpet tile designed to accept wheelchair traffic.

(iv) Static Level: Maximum 3.5 kV static generation at 21ºC and 20% relative humidity per AATCC-134, throughout life of product.

(v) Emissions: Maximum 0.5 mg/m2/hr TVOC, after installation per Carpet and Rug Institute CRI Green Label Plus™ Indoor Air Quality Carpet Testing Program.

(vi) Provide non-solvent, non-toxic, odorless adhesive that, when installed, maintains an acceptable VOC concentration and emission rate. Carpet tile cannot have a PVC backer.

(vii) Carpet tiles will:

1. be 100% solution dyed nylon;
2. have minimum Tarr rating of 3.0;
3. have CRI green label plus for carpet tile and adhesive;
4. have non-PVC backing; and
5. have a minimum 10 year wear, stain, structural integrity and delamination warranty.

7.9.8 Base

7.9.8.1 General Requirements

(a) Refer to Appendix 1B – Room Data Sheets for floor finish requirements.

7.9.8.2 Performance Criteria

(a) Coved rubber base:

(i) Rubber base will be commercial grade, top set coved, 3 mm thick, 100 mm high. Colour will be approved by the Owner.

(b) Porcelain tile coved base:

(i) To match floor tile.

(ii) Include special tile shapes to satisfy corner condition and inside corner conditions.

(iii) Provide bullnose top where there is no wall tile above.

(c) Ventilated molded rubber base:

(i) As supplied by floor manufacturer.

(ii) All wood floors to have ventilated rubber or wood base.

(d) Wood Base:

(i) Kiln dried (KD), sanded 4 sides (S4S) Birch or other hardwood, 19x100, Clear Finish.

7.9.9 Guardrails

7.9.9.1 General Requirements

(a) Guardrails at stairs, landings and openings in floors will be constructed of glass panels.

(i) Vertical pickets are acceptable at Shop mezzanines and egress stairs only.

7.9.10 Acoustic Treatment

7.9.10.1 General Requirements

(a) Refer to Appendix 1C – Acoustical Chart for STC and reverberation time requirements.

(b) Provide absorptive and/or reflective materials to instruction spaces to provide acceptable acoustic conditions for instruction.

(c) Select acoustic treatment to have appropriate impact and wear resistance for each intended location.

(d) Field testing is required to confirm conformance of as-built conditions with specified minimum standards for acoustic requirements for sound reverberation time. The Design-Builder is responsible for any remedial work required to meet specified minimum standard.

7.10 Division 10 – Specialties

7.10.1 Signage

7.10.1.1 Interior Signage

(a) General Requirements

(i) The user consultation process will be used to confirm all room names, numbering systems and similar supporting signage.

(ii) Room numbering, signage and drawings / documentations are to utilize matching numbering for purposes of as-built

documents, maintenance manuals, fire safety plans and equipment labeling.

(iii) All Building signage will provide identification, information and assist in wayfinding and orientation.

(iv) Include name and number plates for each room entry door.

(v) Include accessibility signage for all rooms with accessible features.

(vi) Interior signage will be designed and constructed such that no signage materials can be removed by the students.

(vii) Interior signage will be designed to provide direction for Occupants, and to inform students of rules.

(viii) A large feature element in the form of an interior mural that welcomes visitors at the main entry will be provided that incorporates Hul'q'umi'num, English and French languages.

(ix) Washroom signage will have male and female international symbols including international accessibility symbol, GN washrooms will have appropriate signage.

(x) Provide a schedule showing type, configuration, numbering and wording for all rooms. Schedule will be submitted for approval by the Owner. The Design-Builder to coordinate room numbering with mechanical and electrical equipment numbering and labeling.

(xi) The detailed requirements for signage language/terminology will be determined pursuant to the user consultation process and Review Procedure.

(xii) Provide a simple configuration of the Building circulation systems and functions so that way finding is inherently easy for members of the public who are not familiar with the Building.

(xiii) Design the internal directional signs to include:

1. installation of signage at each point at which a directional decision is required;

2. using consistent terminology with consistent and predictable locations of signage;

3. signage will identify every space in the Building and all directional information. Where required, additional braille language will be provided as determined in consultation with the Owner;

4. signage required at each stairwell level; and

5. final signage wording will be determined pursuant to the Review Procedure.

(xiv) Coordinate final locations of all interior signage to satisfy Building operational requirements.

(b) Performance Criteria

(i) Name and number plates will be cast acrylic, with screen-printed numbers or symbols, sandwich paneled units with integral slots.

(ii) All School and NLC rooms are to have a room number or a room name. That name or number will be on a sign 100mm high, length to suit. Numbers will be agreed to with the Owner. Room names will be in Hul'q'umi'num (Indigenous language, where relevant), English and French, with exact names determined in consultation with the Owner.

(iii) Teaching spaces will receive a teacher's name sign with exchangeable paper inserts. These will be 50mm high, 250mm long.

(iv) All interior doors will receive a 'lamacoid' label on the door header that identifies the adjacent room using a four digit numbering system. Those room numbers will be the same numbers that were used throughout the Drawings and the Specifications. Labels will be 25mm high, 75mm long.

(v) Pictogram signs will be provided for those spaces where and as required by code. Style to match other signage.

(vi) Mounting methods and locations will be specified for different situations. Provide mounting methods and locations schedule.

(vii) Tactile language will be provided on all room signage.

7.10.1.2 Exterior Signage

(a) General Requirements

(i) Exterior signage will be required to clearly identify the following: Main and secondary entries, bus entries and exits, bus zones, TED Compound access, vehicular entries, parking areas, dedicated NLC parking, accessible parking stalls, emergency vehicle parking, smoke and vape free campus signage, surveillance notice, loading areas, drop-off areas and no stopping areas and all exterior loading and service areas for the School.

(ii) Use universal symbols and graphics.

(b) Performance Criteria

(i) School Name Sign:

1. Provide name sign with location and design will be approved by the Owner, in minimum 300 mm high letters, with street address in minimum 200 mm high letters, and the Owner's logo to the Owner's standards and approval.

2. Reference construction:

a. Cast aluminum letters and numbers in anodized finish, with school name installed in a location as approved by the Owner.

(ii) Reader Board / Pylon Sign:

1. Relocate the current School's pylon-mounted electronic reader board exterior sign to the Site. Provide power and data. Remove and cap existing power and data at the Existing School.

2. The new pylon sign will be approximately 2.5 metres high and in accordance with municipal Bylaws. Location will be associated with main site entry point near University Way; include School name and Logo.

3. Provide data connections to the School network.

4. Design will be submitted for approval by the Owner.

7.10.2 Room Dividers

7.10.2.1 General Requirements:

(a) Refer to Appendix 1B – Room Data Sheets for locations.

7.10.2.2 Performance Criteria

(a) Operable Solid Partition:

(i) Steel, paired hinged panels, motorized operated, expandable jamb closure.
Finish: primed and painted steel face panel.

(b) Glass Wall Partition:

(i) Sliding aluminum top suspended glass wall partitions.

(ii) Manually operated.

7.10.3 Washroom Accessories:

7.10.3.1 General Requirements

(a) Install washroom accessories in all washrooms of the Building.

(b) Determine the type, size, and number of accessories with regard for the numbers and categories of users.

(c) Use accessories free from imperfections in manufacture and finish.

(d) Shower curtains will be on breakaway track or breakaway rod as appropriate.

(e) Coat hooks will be anti-ligature.

7.10.3.2 Performance Criteria

(a) Flat mirrors:

(i) Install continuous mirror of 6 mm select polished float glass complete with stainless steel frame for full width of wall above lavatories in Washrooms.

(ii) Mirror to extend from top of back splash or 100mm above wall mounted vanities to minimum of approximately 2 metres above finished floor level.

(iii) Electrical fixtures and other wall mounted fixtures are not to be installed through the mirrors.

(iv) Provide specialty products manufactured for the specific purposes intended and installed in strict accordance with the manufacturer's directions.

(v) For full wall unframed mirrors, use 6mm thick minimum float glass backed with electrolytically-applied copper plating. Grind smooth and polish all edges.

(vi) For wall mounted posture mirrors, use framed type; one piece, stainless steel channel frame with a No. 1 quality, 6mm thick float glass mirror backed with electrolytically applied copper plating. Back with galvanized steel.

(vii) Safety glazing is required in all washroom areas. Apply laminate to back of mirror. Tempered glass is not permitted.

(b) Grab bars:

(i) Stainless steel, exposed screw attachment beneath escutcheon plate. Will withstand pull of 2.2 kN minimum in any direction.

(c) Tilt-up shower grab bar:

(i) Stainless steel, exposed screw attachment beneath escutcheon plate. Will withstand pull of 2.2 kN minimum in any direction.

(ii) Design will prevent grab bar from falling back down to full horizontal position once grab bar is raised more than 45 degrees from horizontal position.

(d) Hand Dryers:

(i) Hard-wired, heated with touchless control. Surface-mounted style. Die-cast zinc alloy or stainless steel body. Sound level not to exceed 75db on highest setting. Velocity to be adjustable, with minimum velocity of 13,000LFM. HEPA filter.

(e) Shower Curtain:

(i) Opaque anti-bacterial nylon reinforced vinyl shower curtain in widths to suit shower stalls, complete with hooks, hold back hood and chain.

(ii) Shower curtains will be anti-ligature.

(f) Paper towel dispenser:

(i) Touchless operation, hard-wired. Roll dispenser, to be coordinated with the Owner's standards.

(ii) The Design-Builder will provide blocking and coordinate locations with the Owner.

(g) Shower Rod:

(i) Stainless steel tube of required length, 25 mm diameter with satin chrome finished flanges. Commercial grade. Shower rod and anchorage to withstand a downward pull of 0.9 kN.

(ii) Curtain rods will be anti-ligature.

(h) Shower Seat in accessible shower stall:

(i) Folding shower seat with solid plastic laminated slats secured to frame with stainless steel bolts and nuts. Set size: approximately 876 mm x 559 mm.

(ii) Frame 18-8 type 304 stainless steel tubing. Commercial grade. Complete with all mounting flanges.

(i) Install and provide adequate space and backing for the following accessories supplied by the Owner:

(i) Toilet paper dispensers: At every toilet.

(ii) Soap dispensers: At every washroom, minimum 1 per every 2 lavatories.

(iii) Refuse containers: Provide adequate space in every washroom.

(iv) Sanitary Napkin Disposal: Provide at all single GN washrooms.

7.10.4 Washroom Partitions:

7.10.4.1 Partitions in Gender Neutral washrooms will be solid partitions, full height from floor to ceiling.

7.10.4.2 Partitions in gender specific washrooms will be solid partitions or manufactured toilet partitions.

(a) Performance Criteria (manufactured toilet partitions)

(i) Sheet steel:

1. commercial grade, stretcher leveled sheet steel to ASTM A526-71 [1975] with G 90 zinc coating to ANSI/ASTM A525-70. Minimum base steel thickness: 0.1 Panels and doors: 0.8 mm 0.2 Pilasters: 0.9 mm 0.3 Reinforcement: 3.0 mm 0.4 Head rails: 1.0 mm Stainless steel sheet: To ASTM A-666-72 1979 type 3.6 with No. 4 finish.

(ii) Attachment:

1. Stainless steel tamperproof type screws and bolts.

(iii) Hardware:

1. Hinges: continuous hinge running full height of door. Stainless steel, satin finish, 1.6 mm (16 ga.) self-closing.

2. Latch set:

a. surface mounted, extra-heavy-duty institutional sliding door latch with shock-resistant nylon track, one-piece 4.4 mm (8 ga.) stainless steel keeper.

3. Wall and connecting brackets:

a. chrome casting or anodized aluminum extrusion.

4. Bumper, chrome plated, non ferrous.

5. Door pull: chrome plated, non ferrous, institutional grade

6. Hinges: continuous institutional grade hinge running full height of door. Chrome plated, non ferrous, 1.6 mm (16 ga.) self-closing.

7. Hook: chrome plated, non ferrous, institutional grade, anti-ligature

(iv) Doors and panels:

1. 25 mm overall minimum thickness; 22 ga. sheet steel with welded seams, faces bonded using waterproof thermal setting adhesive to honeycomb core, minimum 610 mm wide x 1473 mm high for standard compartment.

(v) Pilasters:

1. Minimum 32 mm thick, 1830 mm high, constructed same as door.

(vi) Head rails:

1. Extruded Aluminum 25 x 41 mm. w/6063-T5 finish clear anodized.

(vii) Pilaster shoes:

1. 75 mm high, die formed stainless steel.

(viii) Provide internal reinforcement at areas of attached hardware and fittings.

7.10.5 Shower Partitions:

7.10.5.1 Performance Criteria

(a) Materials:

(i) Partitions between shower and change compartments will be tiled solid walls.

(ii) Shower change area doors will be solid phenolic melamine H.D.

(b) Hardware:

(i) Hinges: continuous institutional grade hinge running full height of door. Stainless steel, satin finish, 1.6 mm (16 ga.) self-closing.

(ii) Latch set: surface-mounted extra-heavy-duty institutional sliding door latch with shock-resistant nylon track, one-piece 4.4 mm (8 ga.) stainless steel keeper.

7.10.6 Whiteboards:

7.10.6.1 Performance Criteria

(a) Whiteboard:

(i) semi-gloss white porcelain enameled 24 gauge. Steel, laminated to 11.1 mm fiberboard with 0.04 mm minimum sheet aluminum backing sheet;

(ii) provide whiteboards with full width extruded aluminum frames, accessory trays, paper holder, maprails and maphooks;

(iii) use non-toxic, water based lamination adhesive for whiteboards;

(iv) will be manufactured for the specific purposes intended and installed in strict accordance with the manufacturer's directions;

(v) will be sized appropriately for purpose; and

(vi) Surface Finish: For use with dry-erase markers wipe clean with dry cloth or standard eraser, and suitable for use as a projection screen.

(b) Tackboards:

(i) vinyl fabric laminated to 14.3 mm fiberboard. Panels will be UL certified flame with spread rating not exceeding 75.

(c) Vinyl faced fiberboard panels:

(i) vinyl fabric, laminated to 14.3 mm fiberboard with long edges wrapped for butt jointing. Panel size 1220 mm high x length required. Panels will be UL certified with flame spread rating not exceeding 75. Colors will be approved by the Owner.

(d) Perimeter trim:

(i) extruded anodized aluminum channel weight 280 g/m minimum.

(e) Pen-tray:

(i) extruded anodized aluminum section with rounded ends, weight 446 g/m minimum.

(f) Map hook and Paper holder:

(i) extruded aluminum section. Supply and install one hook for each 600mm of map rail.

(g) Horizontal or vertical sliding whiteboards:

(i) sliding panels in tubular aluminum frames, 50 mm x 100 mm for installation on millwork items. Whiteboards will be suspended from track with adjustable roller assemblies and be complete with a continuous aluminum chalk-rail and cover over top mounted track.

(h) Screws: countersunk.

(i) Adhesives: as recommended by manufacturer.

7.10.7 Bicycle Storage

7.10.7.1 Provide both long term and short term bicycle storage:

(a) Bicycle racks will be institutional, exterior grade, stainless steel, fixed to concrete pad with tamper proof fasteners.

7.11 Division 11 – Equipment

7.11.1 General

7.11.1.1 Refer to Section 2.4 (Furniture, Fixtures and Equipment) and Appendix 1F – Furniture, Fixtures & Equipment List.

7.11.2 Appliances

7.11.2.1 Refer to Appendix 1F – Furniture, Fixtures & Equipment List.

7.11.3 Maintenance Manuals:

7.11.3.1 Supply operating and maintenance instructions, including spare parts list and optional accessories for all items specified within this Schedule 1 in accordance with this Agreement.

7.11.3.2 Identify each item, arranged in sequence and ensure the numbers correspond to the specifications and drawings.

7.11.3.3 Provide an itemized lead sheet at the front of the manual with a list of the contents and the name and phone number of the 24/7 available local service providers.

7.11.4 Gymnasium equipment:

7.11.4.1 General Requirements

(a) For full-sized courts in the Gymnasium and for backstops on wall with bleachers, provide:

(i) Ceiling-mounted retractable basketball backstops and goals: heavy duty squared steel tubing frame, electric operation, regulation size glass rectangular board to full-size courts, regulation size solid arced board to cross courts, with regulation size goal of 15.9 mm diameter round steel, painted with orange enamel, and heavy duty nylon net. 3.05 metres above floor.

(ii) Basketball backstops that conform to the following:

1. Glass and breakaway goal and padding, meeting the following requirements:

a. ceiling suspended backboards will be motor operated units;

b. wall mounted backboards will be foldaway units manually operated; and

c. product: Viking Alexander Metal Products Ltd or acceptable equivalent.

2. Side swing basketball backstops will be equipped with heavy duty squared steel tubing fame.

3. Provide seismic cable stays complete with pulleys.

a. Product will be Viking Alexander Metal Products Ltd. Model Sandy B #140 or acceptable equivalent; and provide backboard mounted to backstop with adjustable frame which allows adjustment of goal height from 2.4 to 3.0 metres above floor.

(b) Cross courts except as noted above:

(i) wall-mounted retractable basketball backstops and goals: heavy duty squared steel tubing frame. Solid arced board, regulation size, with regulation size goal of 15.9 mm diameter round steel, painted with orange enamel, and heavy duty nylon net. 3.05 metres above floor, manual operation.

(c) Floor sockets:

(i) cast bronze, machined, post socket with anchor projections and bronze cap, 1 7/8” for badminton, 3 ½” for Volleyball, suitable for installation in applicable floor system. Provide equal number of sockets in equipment storage room floor.

(d) See Appendix 1F – Furniture, Fixtures & Equipment List for digital scoreboards, clocks and shot clocks.

7.11.5 Bleachers

7.11.5.1 Performance Criteria:

(a) Retractable bleacher seating

(i) Provide telescopic platforms designed to support and resist, in addition to their own weight, the following minimum forces:

1. Uniform live load; 7.7 kN per metre;

2. Parallel sway load; 350 N per metre; and

3. Perpendicular sway load; 146 N per metre.

(b) Cause the seating supplier to submit an engineering report signed by a Professional Engineer involved in the design and fabrication of telescopic seating.

(c) All structural connections will be made with S.A.E. stress related bolts and self-locking nuts. The use of self-topping screws, or bolts locking nuts, is not acceptable.

(d) Submit shop drawings and product data, including detailed plans and sections and details indicating construction, connections, propulsion system, and installation requirements for review and approval by the Owner.

(e) Provide full operation and maintenance instructions and manuals in accordance with this Agreement.

(f) System description:

(i) Telescopic bleacher system will be comprised of multiple tiered, closed deck seating rows. Bleachers to operate on the telescopic principle, stacking vertically in minimal floor area when not in use.

(ii) First moving row will be secured with both friction and mechanical locks. All other rows will be mechanically locked, operable only upon unlocking and cycling of first row. Each bleacher row will be comprised of risers, deck components and a complete set of supportive columns and braces.

(iii) The operating system will incorporate a lock system permitting the discretionary securement of one, several, or all rows in use or stacked position.

(iv) Dimensional and physical characteristics of the bleachers and the seating plan will be in accordance with all applicable codes, the specifications and approved drawings.

(g) Accessories:

(i) provide guards and rails as required for safety and to meet applicable codes. Supply and install non-slip adhesive backed abrasive tread surfaces to intermediate aisles.

(h) Propulsion:

(i) furnish and install integral power operator controlled by removable pendant control unit plugging into front of seating bank.

(i) Closed-deck telescoping bleachers, wall attached type, 303 mm rise x 609 mm run, complete with heavy duty understructure & seat modules, 457 mm long x 305 deep unitized interlocking plastic modules or alternate as approved by the Owner in advance.

7.11.6 Outdoor basketball goals:

7.11.6.1 Performance Criteria:

(a) The outdoor basketball courts will include pole-mounted basketball backstops and goals: heavy duty round arced galvanized steel tubing frame, regulation size rectangular board with regulation size goal of 15.9 mm diameter round steel, painted with orange enamel, and heavy duty nylon net. 3.05 metres above court.

7.11.7 Metal Lockers

7.11.7.1 General Requirements

(a) The Design-Builder will provide and install 605 lockers within the School, including:

(i) not used;

(ii) not used;

(iii) 6 full height lockers in the 1.14 Itinerant Staff Locker Room;

(iv) 5 full height lockers in the 5.04 Gymnasium Staff Washroom;

(v) 30 stacked, half height lockers in the 5.01 M Change Room;

(vi) 30 stacked, half height lockers in the 5.02 F Change Room;

(vii) 30 half height lockers associated with the 5.09 GN Locker Space;

(viii) 1 full height locker in the 8.05 Itinerant Room;

(ix) 1 full height locker in the 17.06 Office;

(x) 1 full height locker in the 19.06 Office; and

(xi) 1 full height locker in the 20.06 Office.

(b) Half height lockers may either be stacked or non-stacked.

(c) Where stacked lockers are not recessed into walls or do not have a bulkhead above them, sloped locker tops are required.

(d) Non-stacked banks of half height lockers are to incorporate a millwork countertop above the lockers. The sides of the ends of rows of lockers will be completed with millwork or half-height walls with edge protection.

7.11.7.2 Performance Criteria

(a) Bodies:

(i) Fabricated from minimum 0.61 mm cold rolled steel. Back and sides will be provided with continuous lock forming, running the complete height of the locker. Door frame will be minimum

1.4 mm formed steel channel, welded for a one piece construction, complete with heavy duty padlock hasp.

(ii) Hinges: two 1.8 mm 5 knuckle hinges for each door.

(b) Doors:

(i) outer panel 1.5 mm cold rolled steel, inner panel 0.91 mm cold rolled steel. Sandwich panel construction fully welded with vent louvers and complete with honeycomb core for strength and sound proofing. Door complete with recessed handle box to accept locking device and two rubber bumpers.

(c) Include chrome plated, flush inset handle box, and black plastic number plates with white numbers inset in finger pull. Numbering plan will be approved by the Owner.

(d) Accessories:

(i) Provide 1 shelf and 2 coat hooks in each tier of full height lockers.

(ii) Provide 1 coat hook in each half height locker.

(iii) Equip lockers with 3.1 mm thick cold rolled steel padlock hasp.

(iv) Provide metal trim, and finished end panels except where recessed into walls or finished with millwork end panels.

(v) Provide rubber door bumpers.

(e) Finish: two coats high quality alkyd baked enamel.

(f) Locker Size:

(i) Type 1: Half height, 381mm W x 381 mm D x 914 mm H.

(ii) Type 2: Full height, 305mm W x 457mm D x 1524 mm H.

(iii) Type 3: 1/3-sized, 305mm W x 381mm D x 610mm H.

(g) Base: Provide 100 mm plywood base platform on raised framing to all lockers.

7.11.8 Projection Screens

7.11.8.1 General Requirements

(a) Refer to Appendix 1F – Furniture, Fixtures & Equipment List for requirements.

7.11.8.2 Performance Criteria

(a) Operation: Per Room Data Sheet
Finish: Matte White
Size: 1830mm x 2440mm unless noted otherwise in Appendix 1B - Room Data Sheets

7.11.9 Fume Hood Cabinets

7.11.9.1 General Requirements

(a) Refer to Appendix 1B – Room Data Sheets for requirements.

7.11.9.2 Performance Criteria

(a) Product: CSA Approved, ATFH double sided with rear panel containing a smooth sliding counterbalanced sash with 6 mm (1/4”) tempered safety glass, 1220 mm wide, in stainless steel front stiles and airfoils. Face velocity 100fpm. Fume hood will be lockable from both sides.

7.12 Division 12 – Furnishings

7.12.1 Window Coverings:

7.12.1.1 General Requirements

(a) Refer to Appendix 1B – Room Data Sheets for requirements.

(b) Window coverings will allow control of exterior light entering the room during daylight hours and provide privacy during daylight and non-daylight hours.

(c) Window coverings will be fully coordinated and complementary with the interior design concept for their respective functional areas.

(d) Use shading fabric of non-PVC or vinyl-coated polyester or fiberglass yarn that is waterproof, washable, rot-proof, flame-resistant, colourfast to light, glare-reducing, and able to control heat gain while providing external visibility.

(e) Roller Blinds:

(i) Manually operated roller shade system:

1. Standard roll-shade complete with fascia, clear anodized finish, Stainless steel chains complete with child-safe chain retainers to the Owner’s approval.

(ii) Electrically operated roller shade system:

1. blinds are required for all high windows above 3048mm.

(iii) Where used, roller shades systems will operate with a spring wrap mechanism, adjustment - free continuous qualified #10 nickel-plated brass ball chain (50-lb. test) and pulley clutch

operating system. System will be chain operated with spring assist when required to reduce pull force to lift heavy or large shades. Fabric will be inherently anti-static, flame retardant, fade and stain resistant, light filtering, room darkening, & blackout fabrics providing 0% - 3% openness factors. Fabric weight 320g/m2 containing fiberglass, polyester, acrylic or vinyl laminates.

(iv) Roller Shade Types (See Appendix 1B - Room Data Sheets for usage):

TYPE	INCLUDES
A	Single roller shade – non-black out
B	Dual roller shade – non-black out and black-out

(f) Shading Cloth

(i) Cloth will be waterproof, washable, rot proof, flame resistant, fungal and bacteria resistant, colourfast to light and will control heat gain and provide external visibility and reduction of glare.

(ii) Cloth will be selected to suit design criteria for room and solar control and will be:

1. visually transparent single-fabric; and

2. room darkening shadecloth.

(g) Shade Bands

(i) Construction of shade band includes the fabric, the enclosed hem weight, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not permitted.

(ii) Fabrication

1. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or ravelling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 3.0mm in either direction per 2440mm of shade height due to warp distortion or weave design. Fabricate as follows:

   a. provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands;

b. for railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam;

c. provide battens for railroaded shades when width-to-height [W:H] ratios meet or exceed manufacturer's standards; and

d. blackout shadebands, when used in side channels, will have horizontally mounted, roll-formed stainless steel or tempered-steel battens not more than 915mm on center extending fully into the side channels.

(h) Walk-Off Mats

(i) To be provided by the Owner.

7.13 Division 14 - Conveying Equipment

7.13.1 Elevator

7.13.1.1 General Requirements

(a) Provide a single cab elevator to be used as transport for Occupants and Occupants with disabilities or health issues and transportation of furnishings and/or equipment.

(b) Elevator operational functions will be programmable by the Owner, integrated with the Building Management System and have to ability provide local control when enabled by a card reader, key fob or key.

(c) The Elevator will be serviceable by non-proprietary service company.

(d) There will be no access to elevator shafts other than as required for maintenance.

(e) The Elevator sumps will remain dry under all conditions.

(f) The Elevator will have a fail-safe phone.

(g) Durable elevator cab finishes (including stainless steel fronts as well as hand and bumper rails) will be provided. Finishes will be reviewed and approved in advance by the Owner as part of consultation with the Owner.

(i) Finish: Plastic laminate or stainless steel cab with stainless steel buttons and moving blankets. Flooring will be non-slip rubber sheet.

(h) Elevator machine design will not require lubrication after installation.

(i) Provide battery lowering operation of each elevator such that when the loss of normal power is detected, the battery lowering feature is

activated. When normal power becomes available, the elevator will automatically resume operation.

(j) The Elevator will serve all accessible floor levels. Access to roof is not required.

7.13.1.2 Performance Criteria

(a) The Elevator will have a minimum load capacity of 1,134kg and a vertical speed of no less than 0.75 metres per second (m/s).

(b) Codes, by-laws, and regulations:

(i) Provide equipment and perform work in accordance with all applicable Laws and standards including:

1. ASME A17.1/ CSA B44, and CSA B44.1; and

2. CSA-C22.1 - Canadian Electrical Code, Part 1, Safety Standards for Electrical Installations.

(ii) The Elevator will comply with equipment noise Section 8.3.6.2 of this Schedule 1 and Appendix 1C - Acoustical Chart.

(c) Seismic requirements

(i) Elevator system will withstand the effects of earthquake motions determined according to CAN/CSA S832.

(ii) Comply with Section 8.4 [Elevator Safety Requirements For Seismic Risk Zone applicable to the Building, or greater] in ASME A17.1/CSA B44 Safety Code for Elevators and Escalators.

(d) Platform size:

(i) Minimum 2,108 mm wide x 1524 mm deep; and

(ii) suitable for wheelchair disabled person and stretcher access and use and compliant with BCBC requirements.

(e) Elevator door location will be oriented for entry to the side to accommodate regular transport of motorized floor cleaning equipment and a stretcher.

(f) Operation: Elevator requires key switch & fob operation; return to ground function and PA system connection.

Part 8 Facilities Services

8.1 Division 21 - Fire Suppression

8.1.1 Fire Protection

8.1.1.1 Basic Requirements

(a) Provide a sprinkler system and all required equipment designed to the occupancy classification that it protects.

(b) The fire pump (if required) will require emergency power supply and will have a transfer switch which is part of the fire pump controller; package mounted in separate mechanically attached enclosure to form one assembly, specifically approved for the purpose as a complete unit.

(c) Sprinklers subject to freezing temperatures will be protected by a dry system. Glycol systems will not be allowed.

(d) Sprinkler heads located in the Gymnasium Activity Space will be protected with guards

(e) Provide a double interlocked, cross zoned pre-action supplied sprinkler system in the Main Telecommunications Rooms.

(f) All fire extinguishers will be located in fully recessed, lockable, vandal resistant cabinets with breakable plexi-glass for emergency access. Cabinets will be located in highly visible spaces and located as required by code.

8.1.1.2 Performance Criteria

(a) All fire protection systems will be hydraulically sized to NFPA standards.

(b) All equipment and installation will be in accordance with manufacturers' requirements.

(c) Locate zone shut-off valves so they are within secure back of house spaces, such as a mechanical room, storage room or janitor's closet. All valves controlling water flow will be monitored.

(d) Fire department connection will be installed at a location approved by the Authority Having Jurisdiction.

8.2 Division 22 - Plumbing

8.2.1 Provide individual water, fire protection, natural gas, sanitary, and storm services as required and sized to suit the usage needs of the Facility. Sewer, storm and water service penetrations will be designed for flexibility and movement. No service will be buried in concrete.

8.2.1.1 Basic Requirements

(a) All plumbing materials will be in accordance with Good Industry Practice and applicable ASPE Standards.

(b) Provide utility meters for domestic water and natural gas services to the Facility. The location of the water and gas meters will be

coordinated with the appropriate utility provider. Each meter will have the ability to connect to the Facility BMS and will also have remote readers compatible with the municipal water meter program.

(c) The meters will be used to accurately measure water flow and natural gas consumption in all flow conditions.

(d) Provide the plumbing in such a manner as to avoid disruption to the operation of the Facility during maintenance or repairs. Design the systems so that, as much as possible, the areas do not need to be entered when performing these functions. All isolation, maintenance, balancing, and other service valves will be located in the corridor ceiling spaces and will be accessible.

(e) Label all systems clearly, including painting and labelling of all pipes, ceiling identification dots, valve tagging, and emergency valve identification signage. The following pipe labeling and colour table will be followed:

Pipe Labeling - Figure 8.2.1.1-1

Contents	Background Colour Marking [Background / Legend & Arrows]	Legend
Chilled Water Supply	Blue / White	CHILLED SUPPLY CHWS
Chilled Water Return	Blue / White	CHILLED RETURN, CHWR
Solar Water Supply	Yellow / Black	SOLAR SUPPLY
Solar Water Return	Yellow / Black	SOLAR RETURN
Heating Water	Yellow / Black	HEATING SUPPLY, HWS
Heating Water	Yellow / Black	HEATING RETURN, HWR
Make-Up Water	Yellow / Black	MAKE-UP WTR
Domestic Hot Water Supply	Green / White	DOM. HW SUPPLY, DHW
Dom. HWS Recirculation	Green / White	DOM. HW CIRC, DHWR
Domestic Cold Water Supply	Green / White	DOM. CW SUPPLY, DCW
Storm Water	Green / White	STORM
Sanitary	Green / White	SAN
Compressed Air (Non-Medical)	Green / White	COMP. A.
Natural Gas	Refer to CGA code	
Gas Regulator Vents	Refer to CGA code	
Fire Protection Water	Red / White	FIRE PROT. WTR
Heat Pump Supply	Yellow / Black	HT PUMP SUPPLY
Heat Pump Return	Yellow / Black	HT PUMP RETURN

Contents	Background Colour Marking [Background / Legend & Arrows]	Legend
Radiant Floor Supply	Yellow / Black	RAD FLR SUPPLY
Radiant Floor Return	Yellow / Black	RAD FLR RETURN
Condensate Drain	Green / White	COND
Steam Condensate Supply	Orange / Black	STM COND SUPPLY
Steam Condensate Return	Orange / Black	STM COND RETURN
Irrigation Water	Per CSA B128.1	
Non Potable Water	Per CSA B128.1	
Grey Water	Per CSA B128.1	

(f) Ceiling Access Identification will be as follows:

(i) Provide 6mm (1/4") self-adhesive coloured dots to the T-bar framing, adjacent to panel to be removed or to access doors in solid ceilings. Identify the location of equipment concealed above as follows:

1. Yellow - Concealed equipment and cleaning access;

2. Black - Control equipment, including control valves, dampers and sensors;

3. Red - Fire and smoke dampers, fire protection equipment and fire system drains; and

4. Green – Heating water, chilled water, domestic cold water, domestic hot water isolation valves.

(g) Provide and install all fixtures and equipment to manufacturer's specifications, standards, and instructions.

(h) Provide the water systems to ensure that water is supplied at the required pressures to all water outlets. Minimum water pressure will be maintained at 30 PSI to the most remote fixture.

(i) Provide durable materials to allow for 24 hour a day operation with minimal downtime. Domestic and non-potable water piping in the Building will be Type-L copper, ductile iron, or stainless steel. PEX-a piping is permitted for branch distribution. Pex piping is also permitted for use in trap primer lines run in the slab. Sanitary and storm piping above ground in the Building will be cast iron or copper or PVC with 25/50 flame and smoke as required for the location it is being installed in.

(i) Maximum pipe velocities for cold water 2.4m/s, hot water 1.5m/s, and hot water recirculation 1.2m/s.

(j) Domestic and non-potable water piping will be connected by soldering, brazing, threading, flange or roll grooved systems.

Connections utilizing compression will not be used except for connection of trap primer lines run in the slab.

(k) Pressure piping and fuel oil piping will not be routed underslab. This includes piping such as fire and domestic water lines, ground source and non-potable water systems, gas, fuel piping, and any non-gravity based drainage systems.

(l) Provide services with easy access and serviceability and to avoid interference with other services during operation and maintenance activities. All equipment valves and serviceable items will be accessible and removable without adapting wall/ceiling finishes or structure.

(m) Provide floor drains in all mechanical, laundry, kitchen, janitorial, and washroom floors, and other areas as required by all applicable codes, recommended by ASPE, rooms noted in Appendix 1B - Room Data Sheets, and for all devices requiring these drains, including emergency showers, eyewash stations and backflow prevention devices. Ensure all equipment drain piping is terminated at floor drains and floors slope to the drains.

(n) Provide domestic water strainers on the incoming services into the Facility. Design will allow for filter maintenance to occur without affecting water flow.

(o) All piping will be accessible. No in-slab piping is allowed except piping serving the trap primers.

(p) In the case where pipe foundations are used to support the structure, all underslab piping will be supported (hung) from the concrete slab above. Hangers and rods will be of sufficient strength and installed at intervals sufficient to carry the pipe and load, at the required slope. Hangers and rods will be corrosion resistant. Install light-weight fill above all piping that is supported (hung) from the concrete slab above.

(q) All storm drainage, domestic water piping, and exposed p-traps will be insulated per code as required to prevent condensation from developing on the pipe. Where piping and / or piping components are subject to freezing, provide insulation and heat tracing. On life-safety systems, the heat trace system will be monitored and alarmed for malfunction or service disruption.

8.2.1.2 Performance Criteria

(a) Pumping systems for subsurface, storm, or sanitary drainage will include 100% redundancy (one redundant unit for each active unit). The storm / subsurface sump will have twin compartments for settling and pumping and will be sized to prevent short cycling of the pump. Provide local alarm and outputs to the BMS for high water levels, status, and pump failure.

(b) Insulate storm drainage, domestic water piping, cooling water and exposed p-traps throughout per BCICA quality standards. Where piping and/or piping components are subject to freezing, provide insulation and heat tracing. Provide canvass or vinyl service jacket on all exposed insulation inside, provide aluminum jacketing outside. Ensure life-safety systems are not installed in locations subject to freezing.

(c) Provide drainage as required to alleviate water pressure exerted onto the bottom of foundations and/or floor slabs.

(d) Provide flushing and disinfection of domestic water systems to AWWA and CSA standards. Provide independent testing of piping systems once flushing and cleaning has been completed.

(e) Provide trap primers in drains that are subject to losing the trap seal.

(f) Conceal all sanitary, waste, and water piping in walls. Only trap arms and water supply piping will be exposed. Fixture outlet piping for adjustable height fixtures will be installed so that no water can collect in the piping at any fixture height.

8.2.1.3 Sanitary Drainage System

(a) The sanitary drainage system will be capable of collecting drainage from all plumbing fixtures and equipment.

(b) Provide an approved acid-resistant drain waste and vent system for acid disposal applications in Science Labs.

(i) Provide under-counter acid neutralizers with a spare supply of lime chips or cartridges for acid-waste applications. Alternately, provide a central acid neutralizer located outside the building where convenient for service access, with pH sensing and pH output signal and low pH alarm to building control system.

(ii) Use acid resistant drain and vent piping downstream from all under-counter acid neutralizers, all the way to the point of connection to a main sanitary drain pipe.

(c) Grease interceptors will be provided where required by the BC Plumbing Code and Authorities Having Jurisdiction. Grease interceptors will be located in a readily accessible area, outside the kitchen or food services space in a suitable maintenance access area to accommodate inspection, and grease removal.

(d) Sinks in art classrooms and preparation spaces will be provided with sediment/clay traps.

(e) Provide heavy duty DIN Class C loading area drains or trench drains in Automotive and Autobody shop areas.

(f) Provide oil and particle separation systems in the Automotive and Metals Shops. Locate interceptors outdoors in a readily accessible area for maintenance access, upstream of any sanitary drain connections to the building sanitary drain system.

8.2.1.4 Compressed Air Systems:

(a) A compressed air system will be required for general use for hand tools and cleaning at work tables and along walls in Shop areas.

(b) Air compressor will be complete with receiver, starter switch, and belt guard, oil & water separator.

(c) Each outlet will be complete with shut off valve, dirt leg, quick connect outlet and pressure regulator.

(d) Outlet locations will be coordinated with the Owner.

8.2.1.5 Gas Piping Systems:

(a) The gas piping system will be capable of providing gas supply to all gas fired equipment, without application of diversity factors, at the pressure required by the equipment.

(b) Gas piping design and installation will comply with CSA-B149.1 and the Technical Safety BC regulations.

(c) Prime coat and paint all pipes exposed or above ground piping.

(d) The main incoming gas service will be provided with a seismic actuated shut-off valve.

(e) Provide emergency natural gas shutoff panic switches in each Science classroom equipped with natural gas outlets. Main shut-off valves will be key-operated.

(f) Provide locking turrets for all gas turrets in Science Labs.

8.2.2 Redundancy – Plumbing Equipment

8.2.2.1 Provide for controlled overflow or redundant drainage at all points where blockage of a single drain (e.g. by leaves, snow or ice) could cause ponding.

8.2.2.2 If a pumping system is required for subsurface, storm, or sanitary drainage, then the design will include 100% redundancy. The sump will have twin compartments: a settling and a pumping compartment and will be sized to prevent short cycling of the pump. Provide alarm points on the BMS for high water and pump failure.

8.2.2.3 If a water booster pump is required, it will be designed with 100% redundancy.

8.2.3 Floor Drainage, water containment:

8.2.3.1 Provide floor drains at all mechanical, laundry, kitchen, janitorial, and washroom floors, and other areas as required by all applicable codes, recommended by ASPE, or required by Appendix 1B - Room Data Sheets.

8.2.3.2 All mechanical rooms other than those at grade will be waterproof, and drainage systems will be provided. Curbs will be provided at all penetrations other than floor drains.

8.2.4 Plumbing Fixtures

8.2.4.1 Basic Requirements

(a) All plumbing fixtures will be of institutional quality.

(b) All wall hung fixtures will be supported by floor mounted carriers.

(c) Water closets will consist of floor mounted elongated bowls with an open front seat and wired electronic flush valves. Handicap accessible toilets will be floor mounted rear outlet bowls with an open front seat and wired electronic flush valves. Floor mounted toilets will be a minimum of 432mm (17”) from floor to rim.

(d) Urinals will be wall-hung and low-consumption with electronic hands-free flush valve operation.

(e) Lavatory fixtures will be stainless steel counter mounted oval vanity and will have electronic hands-free type faucets with single temperature supply that can be adjusted and set to the desired temperature. Lavatories will be wall hung and will be wheelchair accessible when there is no millwork and under counter mounted in millwork. Provide vandal-proof, under counter manually set and locked mixing valve (one per two Lavs maximum).

(f) Service sinks in staff rooms and at kitchen facilities shall be double compartment stainless steel 304 or 316 SS, counter-mounted type, complete with 100 mm hot and cold water blade handles, 300 mm high gooseneck faucet with a restricted flow aerator.

(g) Classroom utility sinks shall be single-compartment type, 304 or 316 SS, counter-mounted type. Faucets will be 100 mm hot and cold water blade handles, 300 mm high, swing- gooseneck.

(i) Provide under-counter solids interceptors on the drains from all classroom sinks.

(h) Provide specialized sinks as needed to meet the program requirements for, Science Labs, Shop areas, Art rooms etc.

(i) Science lab sinks and faucets to be acid-resistant where acids are used.

(ii) Provide under-counter acid neutralizers for Science lab acid-waste applications.

(i) Drinking fountains will be wall hung, with a water cooler capable of provided 8 GPH of 50°F drinking water at 90°F ambient and 80°F inlet water. Drinking fountain shall include a sensor activated bottle fill station. Bottle fill rate will be a minimum of 1.1 GPM.

(j) Provide a chilled water dispenser in all Staff lunch/kitchen areas.

(k) Provide floor mop sink in each janitor's room of an adequate size, depth and access to support the floor burnishers. Faucet will have blade handles, integral stops, vacuum breaker, and be equipped with a hose connection on the spout.

(l) Provide a protected hose thread connection to all housekeeping detergent dispensing systems, minimum one per Janitor's room.

(m) Provide eyewash and emergency shower fixtures in science labs and Shop areas to comply with the latest ANSI Z358.1 and WorkSafe BC guidelines. Tempering valves will have a cold water bypass. Provide reduced pressure backflow preventer on both hot and cold water supply.

(n) Hose bibs will be provided at each building entrance and around the building at 25m intervals and be located in easily accessible areas for maintenance purposes. Hose bibs will be non-freeze key operated, with chrome plated hydrant face, integral vacuum breaker, 3/4 in. (19mm) hose connection, 3/4 in. (19mm) female x 1 in. (25mm) male pipe connection.

8.2.4.2 Performance Criteria

(a) Provide isolation valves for all plumbing services and clearly identify the location of all valves. Isolate individual washroom fixtures groups separately to allow for maintenance in one room without affecting other areas.

(b) Provide accessible clean-outs for all sinks and lavatories above the flood-level rim of the sink.

(c) Fixtures requiring backflow preventers will have backflow preventers concealed in wall or located in mechanical room or Janitor's room.

(d) Size flush valves for the water consumption of the bowl.

(e) If system pressure exceeds the acceptable delivery pressure, then provide pressure reducing valves. Place the valves in accessible locations in mechanical rooms or chases.

(f) All electronic sensor-activated fixtures will be hardwired.

8.2.5 Domestic Hot Water

8.2.5.1 Basic Requirements

(a) Provide domestic hot water systems with sufficient capacity and recovery rate for the hot water requirements of the Facility. Calculate domestic hot water demand in accordance with ASPE Plumbing Engineering Design Handbook.

(b) Domestic hot water supply will be of adequate temperature to serve the needs of the Facility and stored and circulated at temperatures. Provide thermostatic mixing valves where temperatures are required to be less than 60ºC at point of use.

(c) Ensure delivery within 5 seconds of hot water to all fixtures where low consumption lavatories are installed, the recirculation water line will connect in the wall at the fixture to ensure hot water is delivered without excessive delay.

(d) Design the domestic hot water system to prevent growth and spread of Legionella bacteria within the piping, fixtures, or any other component. Design methods will include eliminating dead- leg piping and minimizing uncirculated piping by connecting the circulation system as close as possible to fixtures.

(e) Hot water systems need not have independent heat generation equipment from the HVAC system. If HVAC system heat generation is used, provide cross- contamination prevention via double-walled heat exchangers with interstitial space vented to atmosphere and visible leak detection path.

8.2.5.2 Performance Criteria

(a) Provide the hot water generating equipment with a minimum of 2 units sized at 50% total capacity each.

(b) Generate domestic hot water at 60°C to minimize conditions for Legionella bacteria.

(c) Recirculate domestic hot water from the distribution system(s) back to the generating equipment.

(d) Monitor hot water supply temperatures via the BMS and provide alarm outputs when the temperature exceeds the design set point.

(e) Tanks used to store domestic hot water must be capable of maintaining a water temperature in the tank of 60°C.

8.3 Division 23 - Heating, Ventilation and Air Conditioning

8.3.1 General HVAC

8.3.1.1 Performance Criteria

(a) The indoor design temperature will be 22°C in the heating season. Indoor design temperature for the cooling season is room specific as noted in Appendix 1B – Room Data Sheets.

(b) Indoor temperature setpoints will be adjustable ±1°C through the DDC graphic interface by operating and maintenance Staff.

(c) Control tolerance will be ±0.5°C at the zone temperature sensor with no more than 0.5°C swing in any 15 minute period unless there has been an abrupt load change.

(d) The temperature of separate space within a single control zone may vary by up to ±2°C from the zone setpoint.

(e) The temperature gradient between 200mm and 1800mm above the floor at any point more than 300mm from an exterior wall will not exceed 3°C.

(f) Air velocity will not exceed 0.15m/s (30ft/min) on the head and shoulders of a person who is seated.

8.3.1.2 General HVAC System Prescriptive Criteria

(a) The following requirements apply to the Facility, except where specifically noted otherwise:

(i) no failure of any single boiler, pump, fan, VFD, furnace, heat pump or central system control valve will be able to prevent heating of the Facility to the required design conditions listed in Section 8.3.1.1 of this Schedule 1. Cross connection of systems is an acceptable way of addressing this requirement;

(ii) all high points in piping will be equipped with automatic air removal devices including air collection chambers and air vents. Relief will be piped to nearest drain, glycol systems pipe to receiver or back to feed tank. Discharge termination will be visible;

(iii) isolation valves, unions and bypass piping will be provided to allow for equipment isolation and removal without unduly affecting the system operation or requiring a major drain down;

(iv) pumps will be selected to operate without vapour binding or cavitation, and will be non-overloading in parallel or individual operation;

(v) pump construction and installation will permit complete pump servicing without breaking piping or motor connections;

(vi) utilize screw fittings, welded fittings or roll grooved mechanical couplings for all piping;

1. All grooved/mechanical joint products and components will form a complete system by the same ISO certified manufacturer, unless a required product is not manufactured as part of their offering. Pipe preparation

tools will be by the same manufacture and groove rolls must be specifically designed for the pipe type used;

(vii) no DDC system failure will be able to prevent the conditions listed in this Schedule 1 from being achieved within 4 hrs of the failure occurring; and

(viii) insulate all chilled & heating water piping, equipment and accessories in accordance with applicable standards. Provide canvass or PVC service jacket on all exposed piping inside. Exterior piping will have aluminum jacketing. Piping above 3m off finished floor in mechanical rooms does not require service jacketing; and

(b) All HVAC equipment requiring regular inspection, servicing, or repair will be:

(i) located indoors or in a fully enclosed and well lit service space. This does not apply to rooftop air handling units, rooftop exhaust fans, cooling towers, air cooled condensers, or air cooled chillers;

(ii) accessible from floor level wherever feasible and from catwalks where floor level access is not feasible. In lieu of catwalks, access may be provided by a maximum 8-0’ ladder located within service rooms where equipment is stacked. The underside of stacked or elevated equipment will not exceed 2m above floor level; and

(iii) access will be provided such that any piece of HVAC equipment can be removed and replaced without adverse effect to normal operation of the Facility, and without removal of walls or structural modifications.

8.3.2 Heating

8.3.2.1 Basic Requirements:

(a) The HVAC systems will maintain the space temperature levels as required by Section 8.3.1.1 of this Schedule 1 and Good Industry Practice and will have the capacity to restore the Building from the setback temperature to the occupied temperature (3°C offset between occupied and setback) within 4 hours.

(b) Provide adequate expansion compensation for heating piping.

(c) Provide heating by providing a stand-alone heat source for the Building.

(d) Provide multiple hot water heating devices to provide all necessary heating and domestic hot water generation, if applicable, for the Building to meet the standards as required.

8.3.2.2 Performance Criteria

(a) The heating system will meet all general performance criteria as indicated in Section 8.3.1 General HVAC of this Schedule 1.

(b) Boilers and heat pumps, if any, will be suitable for the Site environmental conditions

(c) Boilers, if applicable, will be capable of operating at a minimum AFUE efficiency of 93% at all firing rates.

8.3.3 Air Conditioning

8.3.3.1 Basic Requirements

(a) Mechanical cooling will be provided in spaces with more than one computer per 5 sq.m., in classrooms/flex-classrooms without external windows, and one Learning Community (4 classrooms; for summer school operation). Refer to Appendix 1B - Room Data Sheets for specific temperature and humidity setpoints.

(b) Mechanical cooling will also be available continuously for all areas of the Facility containing continuous internal heat gains such as electrical and Communications Rooms.

(c) All Communications Rooms will be supplied with dedicated air conditioning systems. Targeted cooling, with cooling located within the row of racks, will be employed in the Main Telecommunications Rooms. At a minimum provide for 35 MBH of heat per cabinet in the Main Telecommunications Rooms, and 18 MBH of heat per cabinet in sub-telecom rooms. Refer to Appendix 1B - Room Data Sheets for specific temperature and humidity setpoints. If not specifically noted, these rooms will be maintained between 18°C and 23°C, and between 20% and 55% relative humidity.

(d) Mechanical cooling equipment serving the main electrical room will be located outside the room.

8.3.3.2 Performance Criteria

(a) Provide sufficient space cooling capacity to meet the required indoor design temperatures outlined in applicable Standards while using the July 2.5% outside design wet and dry bulb temperatures outlined in the BC Building Code.

(b) Ensure that no air within the air conditioning system, outside of the central air handling equipment, drops below its dew point temperature.

8.3.4 Ventilation

8.3.4.1 Design Principles

(a) Provide all necessary ventilation for the Building per applicable standards.

(b) Return air paths will be arranged to avoid ‘cross talk’ between spaces.

(c) Ductwork velocity will not exceed 1500 feet per minute.

(d) Provide an HVAC system that maintains appropriate pressure relationships between various areas of the Building and provides necessary outdoor air quantity, air filtration, cleansing.

(e) Provide fans with Variable Frequency Drives (VFDs) for energy savings under part-load conditions.

(f) All motors (fans and pumps) 1 HP and larger will be provided with a VFD.

(g) Provide grounding rings on all motors with VFD’s (fans and pumps).

(h) All VFD motors greater than 10 HP (fans and pumps) will have 5% THD input current harmonic filter, designed such that no individual current harmonic will be greater than 4% at full load operation. The supply of line reactors (such as 3% DC reactors or 5% AC reactors), without filters, is not acceptable.

(i) Provide air filtration in accordance with all applicable standards. MERV-13 filters are to be provided for all ventilation systems.

8.3.4.2 Performance Criteria

(a) All equipment below the roof for supply air, return air and general exhaust systems will be located inside the building envelope.

(b) Rooftop equipment will be screened or hidden from public view from any angle on the ground within 200 metres of the Building in a manner consistent with the exterior architectural façade treatment.

(c) Provide fresh air intakes, cooling coil drain pans, air handling units, duct mounted humidifiers, ductwork, and all other interconnected components to prevent moisture and contaminants from collecting within the system. Provide sufficient access panels to allow for inspection and cleaning.

(d) Fresh air intakes will be located to not entrain contaminants from outdoor sources. All intakes will be located in areas that are not accessible by the public and will not be located near exhaust air outlets. Take into account the location of the emergency generator exhaust (if provided) and ensure that fumes from the generator exhaust are not introduced into the Building or adjacent buildings’ fresh air intakes.

(e) All supply, transfer, and exhaust air will be fully ducted to the space being served.

(f) Insulate all ductwork in accordance with the applicable standards and codes. Provide canvas service jacket on all exposed insulation inside and up to 3 metres above finished floor in mechanical rooms.

(g) Ventilation systems serving classrooms will be ducted to provide uniform air distribution in the space.

8.3.5 Exhaust Systems

8.3.5.1 Design Principles

(a) Provide exhaust fans and locate them as close as possible to the end of the exhaust ductwork systems. Ensure that the fans will be readily serviceable and are separated from spaces that house other mechanical equipment.

(b) Provide exhaust systems for enclosed parking areas controlled by carbon monoxide and nitrogen dioxide sensors tied to BMS.

(c) Provide exhaust above all floor model printers or multipurpose business machines to remove fumes.

(d) Provide additional special exhaust systems as outlined in Appendix 1B - Room Data Sheets.

(i) Exhaust ductwork from shower areas or high-moisture areas will be fabricated from aluminum.

(ii) Kitchen exhaust ductwork will be welded black steel, and constructed in accordance with NFPA 96.

(iii) Fumehood exhaust ductwork will be 316L welded stainless steel.

(iv) Workshop areas will require separate dust collection systems for woodworking and metalworking. Provide complete system with independent controls and ducting to workshop equipment. Dust collection system will have filtration rated to 1-micron and be canister type.

1. Woodshop exhaust ductwork will be high pressure ductwork in accordance with SMACNA – HVAC Duct Construction Standards for Class II, minus 3 kPa. (12 “wc), 22 m/sec. (4500 fpm), Seal Class A. Exhaust ductwork will be smooth internally and continuously welded.

(v) A dedicated exhaust fan will be provided for smudging in the Indigenous Education room and in the Indigenous Language & Cultural Centre. Exhaust systems will be manually activated with a wall switch and timer and provide a minimum of 3 air changes per hour.

(vi) Provide retractable hose reels or centralized in-ground vehicle exhaust system where required for vehicle exhaust in the

Automotive Shop for six individual vehicle stations. Provide shop exhaust for vehicle emissions work areas complete with a gas detection system. Any in-ground system shall be equipped with a central fan, buried ductwork, a floor box, flexible hoses and tailpipe adapters.

(vii) A dedicated exhaust fan will be provided for welding booth exhaust in the Metal Shop.

(viii) A dedicated exhaust fan will be provided for the Finishing Room in the Woodworking Shop.

8.3.6 Noise and Vibration

8.3.6.1 Design Principles

(a) Design and install all mechanical systems to prevent sound and vibration transmission between spaces, and transmission from mechanical equipment to the spaces. Provide sound attenuation to limit sound levels in accordance with Appendix 1C - Acoustical Chart. Design and install mechanical systems located at or near any exterior wall to minimize sound transmission to the neighboring community.

(b) Provide vibration isolation devices on all equipment with rotating components.

(c) All hung equipment will utilize spring isolators designed for the weight and vibration characteristics of the equipment.

(d) Provide flexible connections where needed to isolate mechanical equipment sound and vibration from ducting, piping and electrical wiring systems.

8.3.6.2 Performance Criteria

(a) Ensure duct silencers meet or exceed the requirements of the ductwork for cleanliness and inspection.

(b) Utilize fiber free internal insulation.

(c) Prior to completing the Design, provide an acoustical consultant's report demonstrating that the specified interior noise requirements will be met.

(d) HVAC, plumbing and electrical systems will not exceed the Noise Criterion (NC) as specified in Table 8.3.6.2-1.

Figure 8.3.6.2-1

Space Type	Noise Criterion – NC
Drama Room	20-25

Music Rooms	30-35
Sensory Room	20-25
Classrooms	30-35
Recording / Composition Room	20-25
Audio Recording Room	20-25

8.3.7 Commissioning of Mechanical Systems

8.3.7.1 The Commissioning process will be applied to all mechanical components, equipment and systems and sub-systems.

8.3.7.2 The mechanical commissioning scope will include:

(a) demonstration of equipment and systems operations;

(b) instruction seminars for Staff designated by the Owner;

(c) system start-up, testing and operational checking;

(d) system failure mode testing; and

(e) system back-up mode testing.

8.4 Building Management System

8.4.1 Design Principles

8.4.1.1 Provide a Building Management System (BMS) to perform the following functions:

(a) automatically operate, monitor and control all mechanical systems and equipment to meet the requirements of this Schedule 1;

(b) display building related alarms at a BMS control center and through a remote internet connection;

(c) allow provision for external monitoring by the Owner including all associated hardware and software;

(d) meter and trend data related to flow of electrical power, natural gas, domestic water, and heating and cooling energy to the Facility;

(e) interface with the Facility's electrical and communication systems including FA, lighting, UPS, security and emergency power systems (if provided) for monitoring and alarming;

(f) annunciates building and equipment alarms, including FA, security alarms, lighting, UPS, emergency power systems (if provided) and switchgear alarms; and

(g) monitor equipment status, temperature, humidity and alarms in areas, such as communication/server rooms.

8.4.1.2 The BMS will be non-proprietary and designed with open protocol.

8.4.1.3 The BMS will allow monitoring and operation of the entire Facility from a single location and secure remote Internet connection.

8.4.1.4 The BMS will be a completely integrated (front-end and back-end) Native BacNET DDC system.

8.4.1.5 The BMS will be an independent system separate from the Facility's FA and other control systems.

8.4.1.6 The BMS will be provided as a complete package from one manufacturer. A composite system from several manufacturers will not be permitted.

8.4.1.7 The BMS will be a completely independent network from the School's data network and will be monitored via remote access VPN through one common firewall.

8.4.2 Performance Criteria

8.4.2.1 The BMS will be connected to UPS power.

8.4.2.2 All conduit pathways required for control wiring and for BMS integration will not be run overhead or exposed. These will be consolidated with the electrical duct banks.

8.4.2.3 Failsafe components will be hard-wired to provide reliable operation in all circumstances.

8.4.2.4 Zoning for HVAC systems will be based on occupancy, room location within the Facility, room orientation, and thermostatic room loads.

(a) Each classroom will be a dedicated zone.

(b) No zone will be larger than 100m^2.

(c) Zones serving the exterior of the Building will not be more than 5m wide along the exposure.

(d) Areas with more than one exposure will be defined as a separate control zone (the corners of a floor plate will be separated).

(e) No more than 3 individual offices on a single control zone provided each room is less than 20m^2.

(f) Any enclosed room larger than 20m^2 will be provided with a control zone.

8.4.2.5 The BMS will monitor alarms for essential building and life safety systems. Provide ability to direct alarms to an e-mail address and an alpha numeric pager. Alarms include:

(a) FA system for alarm, supervisory and trouble;

(b) all temperature and humidity alarms resulting from set point deviations;

(c) failure of any major HVAC or plumbing equipment;

(d) all alarms relating to the fire protection system; and

(e) UPS, emergency power systems (if provided). Upon activation of an alarm, notify the Owner.

8.4.2.6 The BMS documentation will include a detailed narrative description of the sequence of operation of each system.

8.4.2.7 User interface will be graphical in nature with animated graphics to indicate equipment operation. Graphics will be grouped in systems and in departments. Generate a pop-up window on the browser display panel with audible alarm, informing operator that an alarm has been received.

8.4.2.8 The BMS will only be accessible by personnel authorized by the Owner.

8.4.2.9 Provide an integrated energy management system to monitor, record, analyze, report on and control energy consumption from end sources supplying energy to the Facility that make up 10% or greater of the overall Facility energy consumption. This system to be connected and stored in the BMS.

8.4.2.10 The BMS will accommodate future technological changes and the architecture of the BMS will permit expansion of the system for future renovations. The BMS will have additional 20% capacity floor by floor for traffic increases and future expansion. If panels are not mounted on every floor provide spare conduits to floors served to accommodate the 20% additional capacity utilization without coring.

8.5 Division 26 - Electrical

8.5.1 General

8.5.1.1 Basic Requirements

(a) The Design-Builder will supply and install all material necessary to complete and make operational the electrical systems.

(b) Appendix 1D - Systems Responsibility Matrix provides a summary of the party's responsibilities related to design and construction of the building systems.

(c) Electrical/security locking requirements to be confirmed with the Owner during design development.

(d) Refer to Appendix 2A - Submittals for submittal requirements.

(e) The Design-Builder will comply with all requirements in this Section as well as all the electrical requirements in other sections and associated appendices.

(f) All electrical systems, materials, and equipment in the Facility will be new, and of a type and quality intended for use in a permanent educational facility. Remanufactured or refurbished equipment will not be permitted. All equipment and their components will have a visible manufacturer's nameplate, indicating the manufacturer's name, model number, serial number, cUL listing, capacity, electrical characteristics and approval stamps. The electrical systems will provide proper protection, continuity of service and a safe working environment for Staff and students.

(g) The Design-Builder will be responsible for all coordination of all electrical or systems interfaces with all divisions involved.

(h) The Design-Builder will identify on electrical drawings for all locations of all fire-rated partitions and smoke separations.

(i) The Design-Builder will comply with the latest editions and revisions of all applicable Standards including those standards listed in Section 2.1 (Standards) and the following:

(i) American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) 90.1;

(ii) Canadian Electrical Code and BC Electrical Safety Branch Regulations and Bulletins;

(iii) British Columbia Fire Code including the requirements of the Authority Having Jurisdiction;

(iv) National Energy Code of Canada for Buildings;

(v) National Fire Protection Association (NFPA) Standards;

(vi) CAN/ULC S524 Standard for the Installation of Fire Alarm Systems;

(vii) CAN/ULC S537 Standard for the Verification of Fire Alarm Systems;

(viii) EIA/TIA 568 Telecommunication Cabling Standard;

(ix) All Electrical Safety Branch Directives and Bulletins; and

(x) BCBC.

8.5.1.2 Performance Requirements

(a) The Design-Builder will:

(i) install every electrical system in a fixed and permanent manner;

(ii) install equipment to strategically occupy spaces;

(iii) provide sufficient space for future additions;

(iv) locate Electrical and Telecommunications Rooms to provide easy access for maintenance and inspections of equipment; and

(v) provide record drawings and operation and maintenance manuals in accordance with this Agreement, Project Binder and Record Drawings.

(b) The Design-Builder will select the appropriate firestop assembly to suit that type of penetration and will comply with the selection criteria specified herein.

(i) Follow all manufacturer's documentation, including the approved shop drawings, for proper installation of each firestop product and system. All firestop assemblies will be installed in accordance with the manufacturer's written instructions in order to maintain the specific rating assigned by the applicable independent testing laboratory.

(ii) In all finished areas make good the surface area surrounding firestop penetrations to match finished quality of adjoining surfaces.

(iii) Provide damming materials, plates, wires, restricting collars, and any other devices necessary for proper installation of the firestop product or system.

(iv) Remove all combustible installation aids after firestopping material has cured.

(v) Remove excess materials and debris and clean adjacent surfaces immediately after application of firestop products.

(c) The following products are approved for use only in the specific applications for which they are rated and tested. Additional products will be considered for approval, provided that they are produced by an acceptable manufacturer.

(i) Sealants

1. Hilti FS-ONE Intumescent Firestop Sealant.

2. STI LCI Intumescent Sealant.

(ii) Plugs

1. Hilti CP 658 Firestop Plug.

2. STI SpecSeal Series FP Intumescent Firestop Plugs.

(iii) Fire Blocks

1. Hilti FS 657 Fire Block.

(iv) Pillows

1. STI Series SSB Firestop Pillows.

(v) Putty

1. Hilti CP 617 Firestop Putty Pad.
2. Hilti CP 618 Firestop Putty Stick.
3. STI SpecSeal SSP Intumescent Putty.

(vi) Fire Rated Pathways (to be used for Cable Tray penetrations)

1. Wiremold FlameStopper Thru-Wall Fittings.
2. Specified Technologies EZ-Path.

8.5.2 Load Classification and Identification

8.5.2.1 Performance Requirements

(a) The Design-Builder will provide a detailed load calculation showing the UPS load.

(b) The Design-Builder will provide identification as follows:

(i) All main distribution switches, breakers, panels, transformers, generators, control devices, disconnect switches and other major electrical equipment with Lamicoid plates. Use black lettering on white face. All nameplates will be mechanically attached (rivets or sheet metal screws). Adhesive affixing alone is not sufficient. Lettering on name tags will be sized as follows:

Equipment	**Height of Letters**
Main Distribution Panel (MDP)	12.7mm (.5”)
Overcurrent Protection Devices in MDP	6.4mm (.25”)
Branch Circuit Panelboards	6.4mm (.25”)
Disconnect Switches (200A or less)	6.4mm (.25”)
Disconnect Switches (Greater than 200A)	12.7mm (.5”)
Motor Starters	6.4mm (.25”)

(ii) In terminal cabinets for control wiring, sound wiring, telephone and/or data cable, fire alarm wiring, and similar systems, identify terminal strips and other similar equipment with 4.8mm (3/16”) roll adhesive back embossed type name tags

(clear adhesive with black lettering). Include a wiring diagram in the cover for each terminal cabinet.

(iii) Typewritten panel directories for each circuit, referencing the room in which the equipment served is located. Include the room number and room description in the reference (e.g. “PE – Gym 100 North Wall”). Similar method will be utilized for Data and security equipment and outlets.

(iv) Disconnect Switches, Starters and Contactors: Indicate equipment being controlled, location by room number, voltage, and phase (e.g., “EF-10, WC A120, 120V, 1gi”).

(v) Terminal Cabinets: Indicate system and voltage.

(vi) Remote On/Off Switches: Indicate area(s) being served by room number.

(c) The Design-Builder will use the room numbers that will be used by the occupants, not the room numbers used in the construction documents. Confirm actual room numbers with the Owner and Coordinating Consultant prior to creating labels.

8.5.3 Electrical and Utility Services

8.5.3.1 Basic Requirements

(a) The Design-Builder will coordinate all power, telecommunication, and CATV utility services with BC Hydro, Telus and Shaw. The Design-Builder will conduct the construction in accordance with the relevant utility standards and requirements, including the BC Hydro utility standards.

(b) The Design-Builder will provide type DB2 utility service entrance ducts, or as required by the local utility. Provide drainage of ducts in accordance with utility standards.

(c) The Design-Builder will provide the following underground service components as per the following requirements:

(i) Primary ducts and secondary ducts, whether concrete encased or directly buried, will be rigid type DB2 polyvinyl chloride conduit conforming to the latest edition of CSA C22.2 No 211.1.

(ii) Install underground utility service boxes as directed by Utility “For Construction” drawings.

(iii) All other underground junction boxes will be manufactured by West Coast Engineering or Armtec.

(iv) Provide drainage rock pit below all junction boxes.

(v) Bell ends, couplings, adapters, bends and other fittings will be of the same material as the duct. Solvent recommended by manufacturer will be used.

(vi) Only factory bends are acceptable.

(vii) Plastic Warning Tape Trace: 150mm (6”) wide yellow polyvinyl tape.

(d) The Design-Builder will provide and install ductbanks as per the following:

(i) Contact and coordinate with each utility prior to installation of any underground services to ensure full coordination with the utility’s “For Construction” drawings and all civil site and offsite servicing drawings.

(ii) Install on undisturbed soil where possible. Provide sand cover and backfill as indicated in conduit section in drawings.

(iii) Clean ducts with full size mandrel and swab all ducts. Install 7mm (¼”) nylon pull cord in all ducts.

(iv) All service ducts to be installed not less than 1m (3’), and not more than 1.8m (6’), below finished grade.

(v) Rigid threaded galvanized steel conduit will extend not less than 3m (10’) from building.

(vi) Halfway between ductbank and finished grade, supply and install 150mm (6”) wide polyvinyl warning tape for entire length of each ductbank on site.

(vii) Clean ductbanks before installation. Cap ends of ducts during construction and after installation to prevent entrance of foreign materials.

(e) The Design-Builder will install primary & secondary services ducts to comply with all regulations and by-laws of the supply and inspection authorities. General routing to be coordinated with new and existing underground services.

(f) The Design-Builder will provide the telephone service including the following requirements:

(i) Install underground telephone services as required by Telus. General routing to be coordinated with new and existing underground services.

(ii) Install two 100mm (4”) rigid PVC duct from the main telephone terminal board (MTTB) to the service point.

(iii) Provide nylon pull cord in each and every telephone service duct.

(iv) Telephone service cables to be supplied and installed by Telus.

(v) The Design-Builder to arrange and coordinate telephone service requirements with the Owner and telephone supply authority. Coordinate and schedule all work and inspections to be completed by Telus.

(g) The Design-Builder will provide the television service including the following requirements:

(i) Install new underground cable television service as detailed on the drawings and as required by Shaw Cablesystems. General routing to be coordinated with new and existing underground services.

(ii) Install one 100mm (4”) rigid PVC duct from the main television terminal board (MTVTB) to the service point as directed by Shaw Cablesystems.

(h) Primary service ductbank to slope to low point adjacent to building for drainage purposes.

(i) The Design-Builder will provide:

(i) T fittings and drain pipe to rock pit for each service duct; and

(ii) Drainage rock pit for each T-Drain.

(j) The Design-Builder will provide seismic restraint systems and methods that comply with the following:

(i) Facilitates ease of maintenance and ease of replacement and reconfiguration of electrical equipment and systems and other equipment and the Facility components.

(ii) Coordinates with the building architecture and finishes. Components of seismic restraints will, wherever practicable, be concealed from public view. Where concealment is not practicable the systems will be designed to complement the building architecture and finishes.

(iii) Meets or exceeds the requirements of the current edition of the BCBC and National Building Code.

8.5.3.2 The Design-Builder will follow the recommended practices published in the Seismic Restraint Standards Manual (AIBC) as adopted by the Electrical Contractors Association of BC and CSA S832-06 Guide/lines for Seismic Risk Reduction of Operational and Functional Components.

(a) The Design-Builder will provide:

(i) One underground electrical services for the main electrical rooms within the Facility. The switchgear for these incoming services will be rated for 600V.

(ii) Sufficient capacity of the utility connections, cable and incoming high voltage switchgear for the connected load requirements plus 25% spare capacity.

(iii) Separate underground service ducts as required by Telus and Shaw to the services Entrance Facility in the Main Telecommunications Room (School Network) as the main demarcation for the Facility. The Entrance Facility in the Main Telecommunications Room (School Network) may be shared with the main electrical room.

(iv) Concrete encasement, location marking, and other means to guard against accidental disruption of utility connections by on-site or near-site activities. The installation will be in accordance with the individual utility company standards and requirements.

(b) The Design-Builder will pay for all the utility costs and related work with no additional cost to the Owner.

(c) The Design-Builder will ensure the location of utility ducts will not interfere with any known future expansion of the Facility.

8.5.4 Seismic Requirements for Electrical Systems

8.5.4.1 Basic Requirements

(a) The Design-Builder will obtain and pay for the services of a Professional Engineer specializing in seismic restraints, to design supports and seismic restraints for electrical equipment and components of electrical systems including telecommunication racks and low voltage systems and to provide BCBC Schedules SB and SC. The Design-Builder will provide copies of seismic restraint drawings, shop drawings.

(b) The Design-Builder will submit shop drawings including details of all connections, bracing, and restraints for equipment requiring seismic restraint and/or vibration isolation. Shop drawings submitted will bear the seal of the Professional Engineer retained in accordance with Section 8.5.4.1(a).

(c) Where drilling of the structure is required for anchorage details, the drilling will be subject to the approval of the Structural Engineer of Record for the project.

8.5.4.2 Performance Requirements

(a) The seismic restraint systems and structural capacity, or, where an identified pre-designed standard restraint device or system exists for a particular item, will be designed by a Professional Engineer.

(b) All electrical equipment which vibrates or makes noise will be suitably isolated from noise- sensitive areas such as classrooms, offices, and theatres. Any audible sound from transformers, contactors, starters or the like in such areas is not acceptable and will be remedied by the Design-Builder at no cost to the Owner.

8.5.5 Grounding and Bonding

8.5.5.1 Basic Requirements

(a) The Design-Builder will properly bond and ground all electrical equipment and systems in the Facility in accordance with the most current edition of the Canadian Electrical Code, ANSI/TIA Standards, and local codes and by-laws.

(b) The Design-Builder will provide grounding and bonding for safety of personnel and for protection against damage to equipment or property in the case of a fault occurring in any of the equipment or systems.

8.5.5.2 Performance Requirements

(a) The Design-Builder will ensure all conductors and conducting components which form part of the grounding and bonding systems in the Facility will be of non-alloyed copper.

(b) The Design-Builder will provide grounding grid consisting of minimum three 20mm (3/4") x 3m (10’) copper clad steel driven rods (or the amount necessary to obtain acceptable levels) with #3/0 bare stranded copper interconnecting cable. Install two cables from the grid to the main ground bus in the electrical room.

(c) The Design-Builder will provide a ground bus adjacent to the main distribution panel install a continuous main ground bus, of hard drawn copper, flat, 50 mm (2”) wide x 6 mm (1/4”) thick, length as required. Mount on insulating standoffs. Install complete with lugs suitable for grounding cables.

(d) The Design-Builder will provide cable connections to ground rods will be made with approved exothermic welds or Thomas & Betts ground system compression connectors. Also provide #3/0 bare copper ground conductor between all wall mounted ground busses on the same power distribution system

(e) The Design-Builder will provide the following:

(i) One #4/0 bare ground conductor in 25mm (1") conduit from ground bus to service ground lug on main distribution panel.

(ii) One #4/0 insulated ground conductor in 25mm (1") conduit from main electrical room ground bus to water main with approved ground clamp ahead of water meter. Install one #3/0 ground conductor jumper of flexible copper strapped around

water meter and associated unions and valves to ground building side of water system.

(iii) Grounding bushings, grounding studs and grounding jumpers at all distribution centres, pullboxes, meter centres, and panelboards where separate grounding conductors are indicated.

(iv) Bonding conductors to lugs on boxes, tubs and other conductive enclosures. Use conductors with green insulation, sized by CEC Table 16. Connection to neutral to be made only at service neutral bar with a dedicated lug.

(v) Bonding wire in all flexible conduits. Connect wire at each end to a grounding bushing, solderless lug, clamp, cup washer and screw.

(vi) All interior metallic gas piping to be made electrically continuous and to be bonded in accordance with the requirements of the current edition of the Canadian Electrical Code.

(vii) Each metallic waste water piping system in the Building will be grounded by bond to the interior metallic water supply system with copper bonding jumper of not less than #6 AWG or as per the current edition of the Canadian Electrical Code.

(viii) Ground applicable communication systems as follows:

1. Telephone & Data:

2. One #6 TWH in 20mm (3/4") conduit from main ground bus to main telecommunications ground bus.

3. One #12 TWH from telecommunications ground bus to all metal conduits terminating at backboard.

(ix) Fire Alarm:

1. One #8 TWH in 16mm (1/2") conduit to main ground bus.

(x) Television Distribution System:

1. One #6 TWH in 20mm (3/4") conduit from main ground bus to main telecommunications bus.

(xi) Security Systems:

1. One #8 TWH in 16mm (1/2") conduit to main ground bus.

(xii) Sound & PA Systems:

1. One #8 TWH in 16mm (1/2") conduit to main ground bus.

8.5.5.3 Each feeder and branch circuit will have a separate green insulated equipment bonding conductor.

(a) Main electrical room and all Telecommunications Rooms will be provided with a copper ground bus bar.

(b) A 4/0 AWG grounding conductor in conduit will be extended from the main building ground for each building to the main electrical room and from there to each additional sub-distribution room.

(c) A 4/0 AWG grounding conductor in conduit will be extended from the main Building ground to the Main Telecommunications Room (School Network) and from there to each Telecommunications Room and the Main Telecommunications Room (Island Health).

(d) All panelboards will be fitted with a branch circuit grounding terminal bus firmly bonded to the inside of the panelboard case and consisting of a length of copper grounding bus with one terminal for each circuit position available in the panel. Branch circuit equipment grounding conductors will terminate at the ground bus.

(e) The Design-Builder will commission an approved testing agency to perform a main system ground test and provide a report confirmation to the Owner.

8.5.6 Power Quality

8.5.6.1 Basic Requirements

(a) The Design-Builder will provide an overall power quality which assures suitable conditions for operation of all electrical and electronic equipment throughout the Facility.

(b) The Design-Builder will provide equipment and systems, which meet applicable codes and standards to prevent electrical equipment and systems from being harmed or impaired either by external events or conditions, such as lightning and disturbances on the utility service, or by Facility generated internal events or conditions.

8.5.6.2 Performance Requirements

(a) The Design-Builder will provide equipment specifically designed to meet applicable codes and standards to control and remove all adverse power quality conditions that could damage or impair function of any of the electrical or electronic equipment, which will be in use in the Facility. Adverse power quality conditions to be addressed include, but are not limited to voltage spikes, dips and droops, transients, harmonics, power factor and radio frequency interference.

(b) The Design-Builder will provide power factor correction to ensure overall Facility power factor does not fall below 90% lagging or leading and that the utility does not apply a power factor penalty for all conditions of operation (occupied/ unoccupied/ summer/ winter).

8.5.7 Emergency Power

8.5.7.1 The Design-Builder will provide a stand-by rated diesel generator for the Facility for backup emergency power if required for fire pump and Facility sump pumps. If provided, the generator will be sited in a discrete and unobtrusive location, with easy access for refilling to be confirmed in consultation with the Owner.

8.5.7.2 Fuel storage will be sufficient for minimum twelve hours of operation at full load.

8.5.8 Uninterruptible Power Supply

8.5.8.1 Basic Requirements

(a) The Design-Builder will provide Uninterruptible Power Supply (UPS).

(b) The Design-Builder will provide systems which conform to all applicable standards of CSA and ULC, and will be ULC labelled. In addition it will comply with the requirements of ULC 1778.

(c) The Design-Builder will network and integrate systems to alert the Facility operation staff to the loss of power and low battery status.

(d) The Design-Builder will provide UPS power to required rooms and equipment including the following (and with a UPS overall demand factor of 0.70 applied to loads for the UPS sizing only):

(i) computer network equipment;

(ii) public address systems;

(iii) telephone systems;

(iv) intrusion detection system;

(v) Communications Rooms;

1. The exact loads will be confirmed during design development. However, the Design-Builder will allow for:

   a. 6kW for every rack provided except for server racks; and

   b. 8kW for server racks.

2. The Design-Builder will also allow for the following future capacity (not inclusive of above loads required on day 1):

   a. 4kW for every rack except for server racks; and

   b. 4kW for server racks.

(vi) panic duress system;

(vii) access control system;

(viii) video surveillance system; and

(ix) intercommunication system.

(e) The Design-Builder will provide stationary batteries for the UPS system.

8.5.8.2 Performance Requirements

(a) Input ratings

(i) Voltage: nominal 120/208V, 4-wire plus ground;

(ii) Frequency: 45 to 65 Hz;

(iii) Power Factor: 0.99 typical;

(iv) Current Distortion: 5% THD maximum at full rated linear load;

(v) Surge Protection:

1. Line to Line 180J; and

2. Line to Ground 450J.

(b) Output Ratings

(i) Voltage: nominal 120/208V, 4-wire plus ground;

(ii) Voltage regulation: +/-2% of selected output votage in steady state;

(iii) Voltage THD:

1. 2% Total Harmonic Distortion (THD) maximum phase to neutral into a maximum rated linear load (5% phase to phase); and

2. 5% THD maximum phase to neutral into a maximum rated non-linear load (7% phase to phase);

(iv) Nominal Frequency: 60 Hz;

(v) Bypass:

1. Automatic bypass will provide an alternate path to power in the case of overload, inverter failure or other system failures; and

2. External Maintenance Bypass will be utilized with the systems to allow servicing;

(vi) All materials and components of both systems will be new, of current manufacture, and will not have been in prior service except as required during factory testing. The systems will be constructed of replaceable subassemblies. All active electronic devices will be solid-state; and

(vii) The system will include rectifiers, battery chargers, inverters, bypass, and batteries consisting of the appropriate number of sealed battery modules, and will be housed in a single freestanding enclosure. The system's cabinets will be cleaned, primed, and painted with the manufacturer's standard color. Casters and leveling feet will be provided as standard.

(c) The Design-Builder will provide a Valve Regulated Lead Acid (VRLA), minimum two-year warranted float service life at 25°C.

(d) Extended Holdover Time (Runtime): Each UPS system will have capability for addition of extra matching battery cabinets (in two cabinet configurations) to increase the total holdover time.

(e) Battery Recharge Time: Base UPS system consisting of six battery strings will have a recharge time of max. 1.75 hours to 95% usable capacity @ nominal line after full load discharge (30kVA).

(f) Bus Voltage: Nominal bus voltage is 216 VDC. Each string consists of 18 battery blocks in series with 9Ah capacity.

(g) Short Circuit Protection: Over-current protection will protect the batteries from all short circuit fault conditions.

(h) Battery Module Protection: Internal battery circuit breaker will be provided.

(i) Battery operation will be terminated when the battery voltage drops to the 1.67 VPC set point.

(j) Protective shutdown voltage: Inverter will shutdown after 1 minute when the voltage drops below 1.7 VPC volts-per-cell typical.

(k) Over-voltage Protection: If the UPS system's battery bus voltage exceeds the predetermined set point then the UPS will disable the charger and alarm a high battery condition.

(l) Battery capacity will be rated for a minimum of 30 minutes at full rated load. All system units will automatically transfer the load to and from the normal power supply without any interruption or disturbance of supply to the load.

8.5.9 Power Distribution Design

8.5.9.1 Basic Requirements

(a) The Design-Builder will satisfy the following design requirements for the power distribution system:

(i) Submit site plan and single line diagram detailing power service requirements to the building.

(ii) Supply and install indoor unit substation. Interior transformer locations will be coordinated to minimize vibration and noise. Exterior pad mount transformer will be an acceptable alternative if it is determined as an available option from BC Hydro. Final location of exterior pad mount transformer will be approved by the Owner.

(iii) Provide housekeeping pad for all distribution equipment.

(iv) Provide all required underground primary ducts from the service entry point to the unit substation. Provide underground duct installation to BC Hydro standards.

(v) If required provide primary service conductors from the utility connection point (service box) to the unit substation.

(vi) Coordinate exact routing of underground services with supply authorities prior to installation.

(vii) Distribution equipment and systems will be robust, reliable, easily operated and maintained and be designed with 25% extra capacity to accommodate load growth, equipment additions, and changes.

(viii) Distribution equipment will be of a “specification grade” and “institutional" or “industrial" quality and not of a “light duty” or “commercial” quality.

(ix) Appropriate drip shields or sprinkler proof enclosures will be provided for all electrical equipment located in areas protected by a sprinkler fire protection system.

(x) All secondary power distribution equipment will be from the same manufacturer.

(b) Acceptable manufacturers: Schneider, Eaton Cutler-Hammer, and Siemens.

(c) The Design-Builder will provide:

(i) Lamicoid name tags indicating name of building, name of manufacturer, contractor, date installed and system specifications.

(ii) Shock and arc flash protection and warning labels on all electrical distribution equipment in compliance with the latest editions of C.E.C. 2-206 and NFPA 70E and ANSI Z535.4.

(iii) Short circuit calculations for the distribution center based on actual feeder lengths and sizes. Obtain available fault level information from power supply authority for the short circuit calculations as required.

(d) The Design-Builder will provide a power system study that includes a short-circuit study, protective device coordination study, and an arc flash incident energy analysis.

(e) The Design-Builder will incorporate design features and practices to reduce arc flash hazards on electrical systems such that routine operations such as inspection and maintenance activities will require PPE Level 2 (as defined in NFPA 70E) and no activities will expose personnel to arc flash hazards which exceed the protection afforded by PPE Level 2.

(f) The Design-Builder will be responsible to provide an arc flash study for all distribution including panel boards complete with field labeled warnings of potential electrical shock and arc flash hazards per rule 2-306 on each panel.

(g) The Design-Builder will provide a coordination study as per the following requirements:

(i) Produced by the manufacturer of the switchgear. Coordination study must be submitted and approved prior to shop drawing submission of primary and secondary breaker types.

(ii) Include the main primary feeder protective devices in the utility system, transformer damage curves, and all proposed main and secondary breakers for the distribution system in order that complete selective coordination of the system will be demonstrated.

(iii) Plot on log graph paper with the base voltage shown and will be accompanied by individual time current trip curves of each device in order to enable the Professional Engineer to verify the ratings and settings selected. Switchgear manufacturer to indicate the ratings and settings selected.

(iv) Submissions and approval will verify the ratings and settings of all protective devices. Approval will not eliminate the responsibility of the Design-Builder and manufacturer to provide proper selective coordination.

(v) Submit the coordination study in report form and printed in full colour.

(vi) Power system coordination study must be submitted prior to distribution shop drawings. No distribution shop drawings will

be reviewed until a satisfactory coordination study is submitted.

(vii) Prior to final inspection, the Design-Builder will arrange for switchgear manufacturer to visit the site and check all settings to ensure that they are in accordance with coordination study values. Provide results of the manufacturer review to the Owner in report form.

8.5.9.2 Performance Requirements

(a) The Design-Builder will provide and install major electrical equipment, which includes but is not limited to high voltage distribution, transformers, main distribution centres, transfer switches, mechanical distribution panels, and power factor correction equipment which satisfies the following:

(i) Equipment is grouped together in a configuration that allows for addition or expansion of each type of equipment, logical arrangement in terms of the interconnection, operation and maintenance of the equipment. Electrical equipment will be located with the intention of minimizing length of feeders and branch circuits and will be located so as to provide a clean, dry, safe, accessible installation protected from unauthorized access.

(ii) The high voltage power transformer and associated high voltage distribution equipment will be located inside the building and rated for 25kV. Exterior pad mount transformer will be an acceptable alternative if it is determined as an available option from BC Hydro. Final location of exterior pad mount transformer will be approved by the Owner. Power transformer will be dry type, ANN/ANF, 3 phase, complete with copper windings.

(iii) The main distribution centre will be rated at 600 volts, 3-phase.

(iv) Provide at least one 600 volt, 3-phase panel (42 circuits) on every floor from the main distribution centre and allow for 600 volt future equipment.

(v) Distribution transformers will be harmonic mitigating type.

(vi) Sub- distribution panels and branch panelboards will be rated at 120/208 volt, 3-phase, 4-wire.

(vii) Mechanical distribution equipment to be rated at 600 volt, 3-phase, 3 wire and/or 120/208 volt, 3-phase, 4-wire.

(viii) Motor starters will be combination circuit breaker type, CEMA or NEMA rated (IEC rated starters are not acceptable).

(ix) Lighting, receptacle and mechanical equipment will be separately metered.

(x) All lighting to be 120 volt, except 347 volt site lighting will be acceptable for pole-mounted luminaires. Motors 0.5HP and larger to be 3-phase, 208 or 600 volt.

(xi) Shop equipment will be served by a dedicated panelboard per shop, controlled via a contactor and key operated switch and remote red emergency “mushroom head” pushbuttons located strategically around the room. In addition to the emergency shut-off controls, shop equipment which is served by a dust collection system will be interlocked with the dust collector control panel to prevent the operation of the shop equipment until the dust collection system is running. General power and non-shop equipment loads are to be served by a separate, non-contactor-controlled panelboard.

(xii) All components of power distribution systems will be selected, configured, located, and installed to minimize the transmission of noise, vibration and unwanted heat into other parts of the Facility.

(xiii) Protection and coordination of protection equipment will be designed and installed so that the initial electrical installation, and future additions and modifications to the installation will be properly protected and fully coordinated. In the event of a fault or overload, protective devices will act to isolate only the faulty portion of the system and areas downstream, leaving all other portions of the system fully operational. Protection equipment will adequately protect against injury to persons and damage to property. Only breakers will be used for power distribution over current devices.

(xiv) Provide a short circuit analysis and coordination study based on actual distribution equipment proposed for the Facility, including the unit substation, main distribution, transformers, panelboards, and feeders. Provide a copy of the completed study to the Owner and the Owner’s Representative for review.

(xv) Where required by system characteristics or operational requirements, special shielding, isolation, grounding, bonding, harmonic filtration or other treatment will be provided to prevent interference between systems or degradation of performance of an individual system.

(xvi) Electrical rooms will be located with due regard to future expansion. Provide 20% extra physical space in distribution centres.

(xvii) Components of the power distribution systems which are in any public, administrative or staff area will be of a type which gives both long life expectancy without perceptible

deterioration, good appearance, and will be designed, selected, and installed to permit easy and complete cleaning. These components include but are not limited to recessed electrical panels and wiremold, light switches, occupancy sensors, receptacles, wire ways, equipment grounding points, and status displays.

(xviii) Single phase 120VAC grounding receptacles conforming to CEC and specifically to CSA.Receptacles will be provided where required by equipment.

(xix) Provide 20 ampere, CSA configuration 5-20R receptacles every 5 metres in corridors and common areas not described in Appendix 1B – Room Data Sheets. No more than three duplex receptacles will be on a single circuit. Receptacles will be on alternating circuits such that directly adjacent receptacles are not on the same circuit.

(xx) The Design-Builder will allow for 25 workstations distributed throughout the Facility in addition to the requirements of Schedule 1 and all appendices. Each workstation will have power of at least two duplex receptacles and two Data Drops (one for data and one for telephone). The exact locations of the workstations will be finalized with the Owner during design development.

(xxi) The Design-Builder will allow for three televisions per floor distributed throughout the Facility to use as digital signage to broadcast school related messages. Each television should be on normal power and require one duplex receptacle and one drop. The Design-Builder is to connect and integrate televisions with Carousel Digital Signage services. The exact locations of televisions will be finalized with the Owner during design development.

(xxii) All receptacles will be specification grade and will be provided with stainless steel cover plates. Grouped receptacles will have a single cover plate covering the entire group. Receptacles will be white colour or as determined in consultation with the Owner.

(xxiii) Coordinate all locations and quantity of switched receptacles with the Owner to meet the intended functionality. All switched receptacles will be clearly identified by the receptacle manufacture.

(xxiv) All switched receptacles will not be controlled by occupancy or daylight sensing. Time-clock or security panel control is permitted.

(xxv) Line voltage switches will be specification grade, 120 volt, 20 ampere. All switches will be provided with stainless steel cover plates. Grouped switches will have a single cover plate

covering the entire group. Switches will be white colour or as determined in consultation with the Owner.

(xxvi) All switches, receptacles, panelboards, and motor starters will be suitably identified. Panelboards will be supplied with type-written directories. All receptacles and light switches will be permanently marked with machine printed labels (clear label with black lettering) identifying the circuit and panel number. Lamicoid nameplates will be provided for all distribution equipment including switchboards, panelboards, transformers, motor control centres, disconnect switches, motor starters, and contactors.

(xxvii) Identify concrete duct banks, main service conduits for telephone and power and other spare raceways where they enter or leave the Facility with engraved stainless steel marker plates. Install marker plates on the exterior wall immediately above the point of entry.

(b) The Design-Builder will provide the main switchboard to be a fully integrated assembly consisting of an incoming service wire way, main breaker, utility compartment, and distribution panel. The switchboard will be rated 347/600 volt, 3 phase, 4 wire, amperage to suit calculated load plus 15% spare capacity, of solid neutral design. The complete switchboard will be factory assembled and tested prior to delivery to site.

(i) Acceptable manufacturers: Schneider, Siemens, Eaton Cutler-Hammer, General Electric.

(c) The Design-Builder will provide the main breaker as per the following requirements:

(i) 3-pole, moulded case circuit breaker, rated as required.

(ii) Breaker to be complete with handle projecting through front cover; provide with lock-off facility.

(iii) Main breaker to be complete with RMS sensing digital trip unit with adjustable settings for long, short and instantaneous trips, complete with ground fault protection (if required by code).

(d) The Design-Builder will comply with BC Hydro requirements and regulations.

(e) The Design-Builder will provide distribution as per the following requirements:

(i) Distribution panel to consist of an assembly of moulded case circuit breakers of the frame size, trip rating, and number of poles required to suit the project. Provide two 3P- 100 amp, and two 3P-200 amp spare breakers.

(ii) All breakers will have an interrupting capacity of not less than the calculated RMS symmetrical fault current at 208 volts.

(iii) At least 20% of the distribution panel and panelboards space will be left empty, provisioned for future installation of additional breakers.

(f) The Design-Builder will provide the main bus bar connections and risers to be clearly identified with phase markings A, B and C throughout. Bussing to be rectangular section, tin plated copper. All joints to be securely bolted to manufacturer's recommendations. All bussing to be braced for a minimum 50,000 amps RMS symmetrical fault.

(g) The Design-Builder will provide enclosures as per the following requirements:

(i) The switchboard will be totally enclosed in sheet metal panels with front panels of formed type construction. Internal barriers to be provided to separate the various compartments. The enclosure will be of uniform height, depth and width throughout.

(ii) Provide suitable bushed ports or buspads in barriers between compartments.

(iii) Enclosure to be provided complete with drip shield.

(iv) Flush and/or surface mounted complete with panel trim having concealed hinges and trim mounting screws.

(v) All panels will have a hinged lockable door with flush catch.

(vi) Provide two keys for each panel, interchangeable with panels of same voltage.

(vii) Provide sprinkler drip protection for all surface mounted panels.

(viii) All surface mounted tubs to be finished in enamel over corrosion-resistant primer. Finish colour will be ASA 61 Grey.

(h) The Design-Builder will provide panelboards as per the following requirements:

(i) Unless indicated otherwise, all panelboards will be 120/208V, 3 phase, 4 wire, solid neutral design with sequence style bussing and full capacity neutral, composed of an assembly of bolt-in-place moulded case circuit breakers as indicated with thermal and magnetic trip and trip free position separate from either the "On" or the "Off" positions.

(ii) Two and three pole breakers to have common simultaneous trip.

(iii) Surface or flush mounted to suit. Locate all panels in designated Electrical or other Service Rooms, except Communication Rooms unless the panel is serving that Communication Room. Panels are not to be located in Corridors, Classrooms, Janitor Rooms, Storage Rooms or closets.

(iv) Provide all mounting brackets, busbar drillings and filling pieces for spaces.

(v) Affix typewritten directory to the inside cover of panelboard indicating loads controlled by each circuit.

(vi) Provide three 25mm (1") empty conduit stubs from flush panels to accessible cabling space (t-bar ceiling or crawlspace as dictated per project) for future connections.

(i) The Design-Builder will provide over current protection devices as per the following requirements:

(i) Install over current protective devices in accordance with manufacturer's written instructions.

(ii) Fasten over current protective devices without causing mechanical stresses, twisting or misalignment of equipment in final position.

(iii) Provide manufacturer's product data for all devices.

(iv) Shop drawings will include the following information:

1. Fault interrupting capability of each device in symmetrical amperes at applied voltage.

2. Confirmation from the manufacturer that any devices used in series to obtain a specified fault current interrupting capacity are rated for such use.

3. Motor control over current protective device characteristics and curves.

(j) Supply all molded case circuit breakers by a single manufacturer and as per the following:

(i) CSA C22.2 No. 5-M1986.

(ii) Trip Type: Thermal/magnetic.

(iii) Voltage: To suit project requirements.

(iv) Poles: To suit project requirements.

(v) Interrupting Capacity: To suit project requirements.

(vi) Mounting: Bolt-in place.

(vii) Normal Operation: In 40°C ambient.

(viii) Features:

1. Thermal and instantaneous magnetic trip.
2. Trip free, toggle type operation.
3. Quick-make, quick-break action.
4. Positive handle trip indication.
5. Trip rating visible with panel trim installed.

(k) The Design-Builder will provide Plug and Cartridge Standard (STD) Fuses to CSA C22.2 No. 59.1-M1987 and as follows:

(i) Standard fuse interrupting ratings will be 10 kA symmetrical unless otherwise indicated.

(ii) HRC fuses: to CSA C22.2 No. 106-M1985 and as follows:

1. HRC fuse interrupting ratings: 200 kA symmetrical.
2. HRCI-J time delay.

(iii) Voltage: to suit project requirements.

(iv) Ampacity: to suit project requirements.

(v) Fuse Types: to suit project requirements.

(l) The Design-Builder will provide Surge Protective Devices (SPD) at the service entrance and throughout the power distribution system as per the following requirements:

(i) Comply with the following standards:

1. ANSI/IEEE C.62.41 and C62.45;
2. UL 1449 – 2nd Edition;
3. UL 1283;
4. NEC – NFPA 70;
5. NEMA LS1; and
6. NFPA.

(ii) No audible noise will be generated.

(iii) No appreciable magnetic fields will be generated. System will be capable of use directly in computer rooms in any location without danger to data storage systems or devices.

(iv) Operating Conditions will be -1°C to 54°C (30°F to 130°F), 2 15% to 85% humidity non-condensing.

(v) The unit will have a heavy duty NEMA 12 dust-tight, drip-tight enclosure unless specified otherwise. Enclosure will be wall mountable. Integral panelboard SPD devices will exhibit performance as detailed in this specification and will include a barrier device to separate the SPD from the panelboard interior.

(vi) All panels will have SPDs and will be rerated for 60 Hertz. The system and will be connected to the power distribution system per the manufacturer's recommendations.

(vii) The manufacturer will be ISO 9001 certified, demonstrating world-class quality systems for the design and manufacture of the SPD units.

(viii) Each surge suppression element (MOV) will be individually fused so that a failure of one element and/or fuse will not affect other surge suppression elements. SPD will have a short-circuit rating of 200kAIC.

(ix) Unit will include solid-state, long-life externally mounted LED visual status indicators that indicate the on-line status and operational integrity of each phase of the unit.

(x) Unit will have a Form C summary alarm output contact rated for at least 1 amp at 120VAC for remote annunciation of SPD status by the DDC system. Coordinate with DDC contractor to provide commissioning and testing of the SPD system interface with the DDC system for inclusion in the O&M manuals.

(xi) Acceptable manufacturer: Liebert "Interceptor".

(xii) Current Technology: CurrentGuard 200 Series.

(xiii) The SPD will be modular in design. Separate and replaceable suppression modules will protect each mode (L-N, L-G, and N-G).

(xiv) The service entrance SPD will be capable of surviving 15,000 ANSI/IEEE, Category C3 (10kA) impulses without failure or degradation of original performance characteristics of more than 10%.

(xv) The unit will have a maximum surge current rating of 125,000 amperes L-N, 125,000 amperes L-G, and 125,000 amperes N-G, based on ANSI/IEEE C62.41 standard 8 by 20

microsecond current waveform. Manufacturers will provide a higher maximum surge current rated device if required to meet the requirements. .5 Unit will be UL 1283 listed as an electromagnetic interference filter and provide 50 Ohm noise attenuation of at least 40 dB at 100 kHz, 30 dB at 1 MHz, 35 dB at 10 MHz, and 50 dB at 100 MHz.

(xvi) The unit will include a built-in, push-to-test feature that tests the integrity of all modules, MOVs and fuses in the system. Manufacturers that require an external test device to perform this feature will include the test set in this quotation.

(xvii) The unit will include an integral fused and safety interlocked disconnect switch located in the unit enclosure with an externally mounted manual operator. The switch will disconnect all ungrounded circuit conductors from the distribution system to enable testing and maintenance without interruption of power to the Facility's distribution system. The switch will be rated for 600VAC. Each current-carrying ungrounded circuit conductor connected to the Facility's distribution system will be individually fused with 200,000 AIC rated fuses in order to provide maximum fault current protection. The unit will be UL 1449 listed with the integral fused disconnect switch and the UL 1449 Suppression Rating for this configuration will be provided.

(xviii) The unit will have an audible alarm with an alarm on/off switch to silence the alarm and a push-to-test switch to test the alarm function.

(xix) A resettable counter will be provided to totalize transient voltage surges in both the normal and common mode.

(xx) The readout will be at least a six-digit LCD located on the unit front cover and provided with a 10-year battery back-up to maintain counts in the event of power loss.

(xxi) Provide an equipment manual with installation, operation and maintenance instructions for inclusion in the Operation & Maintenance Manuals. Instructions will include a list of all customer-replaceable spare parts, part numbers and ordering information.

(xxii) The unit will be thoroughly factory-tested before shipment. Testing of each unit will include but will not be limited to quality assurance checks, MCOV and clamping voltage verification tests. A copy of the test results will be shipped with product and will be included in the maintenance manuals.

(xxiii) Manufacturer will provide a product warranty for a period of not less than 10 years from date of commissioning. Warranty will cover unlimited replacement of system protection modules during warranty period. The first 5 years of this warranty will

include any field labor required to perform repair or replacement work.

(xxiv) Units to be wall-mounted as close as practical to protected distribution, with leads twisted to minimize surge impedance. Provide overcurrent and short circuit protection as recommended by manufacturer.

(xxv) Conductors between suppressor and point of attachment to service equipment will be sized in accordance with manufacturer's Shop Drawings and conductor lengths will be as short as possible and will not exceed 24".

(xxvi) Suppressor ground will be bonded to the equipment grounding conductor and service entrance ground.

8.5.10 Service Rooms

8.5.10.1 Basic Requirements

(a) The Design-Builder will coordinate space requirements and the installation of mechanical and electrical work and will maximize accessibility for other installations, maintenance, and repairs.

(b) The Design-Builder will provide space in service rooms to ensure adequate service clearances are maintained as per the CEC and BCBC to provide periodic maintenance as well as allow future replacement of equipment without the removal of other non-associated equipment or services.

(c) The Design-Builder will comply with the clearance requirement and recommendations for all equipment and systems including TIA and BICSI.

(d) The Design-Builder will follow the manufacturer recommended clearances for all equipment.

(e) The Design-Builder will provide at least stair access to service rooms and roof areas. Ships ladders and hatches are not acceptable. Where maintenance or replacement of large equipment is foreseen, the Design-Builder will provide an optimum means for access and removal of the equipment.

8.5.10.2 Performance Requirements

(a) The Design-Builder will provide minimum two hour fire rating for main electrical room and Main Telecommunications Rooms.

8.5.11 Metering

8.5.11.1 Basic Requirements

(a) The Design-Builder will provide detailed power quality and power consumption information at key points throughout the Facility via digital metering.

(b) The Design-Builder will provide a networked metering system, with terminals for maintenance and plant administration, and data transfer to the Building Management System.

(c) Metering will reside on the FM Network.

8.5.11.2 Performance Requirements

(a) The Design-Builder will provide a metering system that meets the following requirements:

(i) Easy to read, locally displayed information for all distribution at primary voltage and for all distribution switchboards.

(ii) Historical data from the metering system network will be stored and will be capable of recalling data for a minimum of a week.

(iii) The metering system will not be dependent on power from the metered circuit for its operation, and will be supported by a backup power source or sources, which ensures operation when the metered circuit is de-energized.

(iv) The electrical metering system will meter each of the following loads separately: total building electrical consumption, HVAC systems, interior lighting, exterior lighting and receptacle circuits. Final metering strategy and panelboard load mixing will be determined in consultation with the Owner.

(v) The system will include at least one intelligent controls meter complete with internet communication IP module. Provide BACnet output to connect to DDC for remote reading of all the 7650 meter's functions through the DDC system. Acceptable manufacturer: Power Logic ION PM7650 or acceptable equivalent.

(vi) Meters will incorporate Web service, built-in modem, direct data transfer, BACnet and Ethernet ports.

(vii) Meters will have built-in power line communications (PLC) for remote meter reading, RS-485 and BACnet, 5 amp current transformers. Acceptable manufacturer: Quadlogic RSM-5 single load meter, MiniCloset MC-5c Multi-load meter, or acceptable equivalent.

8.5.12 Wiring Methods and Materials

8.5.12.1 Basic Requirements

(a) The Design-Builder will utilize wiring methods and materials to provide safe, reliable and flexible electrical power, control, communication, data, and life safety systems in the Facility.

(b) The Design-Builder will check drawings of all other trades for proper coordination of electrical outlet locations.

(c) Mounting heights are from finished floor level to centre line of device outlet, unless noted otherwise.

(d) All electrical fittings, supports, hanger rods, pullboxes, channel frames, conduit racks, outlet boxes, brackets, clamps, etc., will have galvanized finish or enamel paint finish over corrosion-resistant primer.

(e) All panelboards and similar equipment to be factory finished in glass air dry enamel applied over corrosion-resistant primer. Matte or flat-type finish paint not acceptable. Factory finished units that are scratched or marked during installation or shipping to be touched up with matching spray-on air dry lacquer or, if required to provide a satisfactory appearance, completely refinished.

(f) The Design-Builder will ensure all wiring is neatly and securely installed in such a way that it is protected from damage, not in conflict with mechanical or architectural components of the building and allows for future changes for the life of the Facility.

(g) The Design-Builder will provide emergency shut off switch and strobe light in every shop to kill power for all equipment and outlets in the shop. The location of the switch and strobe will be determined in consultation with the Owner.

8.5.12.2 Performance Requirements

(a) The Design-Builder will provide conductors with a minimum conductor size to be #12 AWG. All conductors #8 AWG and larger will be stranded.

(b) The Design-Builder will provide control cable for Class 2 remote control and signal circuits as follows:

(i) Conductor – copper;

(ii) Insulation - 300V insulation, rated 60EC.;

(iii) Individual conductors twisted together, shielded and covered with a PVC jacket; and

(iv) Wiring for fire alarm, security systems and public address systems as recommended by system manufacturer.

(c) The Design-Builder will provide:

(i) Conduit or cable tray of all intrusion alarm and door access control wiring.

(ii) Conduit for wiring for equipment and devices in corridors and in masonry walls.

(iii) Copper grounding conductors and straps.

(iv) All ground conductors to have green insulation jacket.

(v) T90 insulation is acceptable for use for grounding conductors only.

(vi) Power and infrastructure for two washroom lifts.

(vii) Clip groups of feeder conductors at all distribution centres, pullboxes and termination points.

(d) The exact routing and lengths for conduit will be coordinated by the Design-Builder, taking into account all ceiling types, dropped bulkheads, beams, mechanical equipment, ducts and piping.

(e) All voltage drop calculations will be based on the latest edition of the Canadian Electrical Code, Part I, and will assume a current of 80% of the rating of the circuit overcurrent protection device specified for each respective circuit. (e.g., for a circuit with a 15A breaker, assume a 12A current for the voltage drop calculations).

(f) When exact run lengths are determined for all branch circuits, and prior to installation of the conductors, ensure that the maximum voltage drop does not exceed 3%. In any case, unless noted otherwise or proven acceptable by proper voltage drop calculation, the minimum wire size for 120 volt branch circuits will be as follows:

(i) 0-30m (0-100’) long - #12 AWG.

(ii) 30-50m (100’-165’) long - #10 AWG.

(iii) 50-80m (165’-265’) long - #8 AWG.

(g) The Design-Builder will provide FT6 rated wiring in all air plenums as required by the local Authority Having Jurisdiction. Confirm plenum locations with the Design-Builder’s mechanical consultant prior to rough-in.

(h) The Design-Builder will provide switches as per the following requirements:

(i) Unless noted otherwise, line voltage switches will be rated for 120 volt, 15 amp operations with quiet, quick make/break toggle movement and totally enclosed case. 3-way and 4-way switches to be of matching type.

(ii) Colour to be white or as determined in consultation with the Owner.

(iii) Service and unfinished areas: Pass & Seymour #CSB15AC1 or equal.

(iv) Finished areas: Pass & Seymour #2601 or approved equivalent.

(v) Line voltage switches with integral occupancy sensors: 120 volt, push button operation, time delay of 15 seconds to 30 minutes, built-in light level sensor (10 to 150 foot candles), LED indicator. Wire for immediate automatic on and automatic off after 20 minutes of no motion.

(vi) Install Quiet Room switches outside the room.

(vii) Coordinate switch mounting heights with architectural detail and adjust, if required, to coordinate with paneling, dados, and masonry course lines.

(viii) Mount switches according to heights indicated later in this section.

(i) All conductors and all conducting components of electrical equipment, which form part of the wiring systems in the Facility, will be:

(i) Non-alloyed copper, except conductors and conducting components equal to or larger than 150 amp or 1/0, aluminum is permitted.

(ii) R90 cross-linked polyethylene.

(iii) Sized to ensure a voltage drop of not more than 2% for feeders and 3% for branch circuits.

(iv) Installed in conduit.

(v) Type AC-90 armoured cable will be used for final connections to light fixtures (3m maximum length). Daisy-chaining of AC-90 cables between luminaires is not permitted.

(vi) In exposed ceiling areas, all wiring will be in conduit painted out to match ceiling.

(vii) Neutral conductors will be fully rated.

(viii) Concealed except in service rooms.

(ix) Protected from mechanical damage throughout each wiring system. Entry or accumulation of moisture into any wire, cable, or wire way will be prevented.

(x) Suitable to the application used for. Wiring for systems of different voltages and from different sources of supply will be separated. Interference between wiring of power supply systems and wiring of data and telecommunication systems will be prevented by maintaining adequate separation and shielding throughout.

(xi) Components which are in any public, administrative or Staff area will be of a type which gives both long life expectancy without perceptible deterioration, good appearance, and will be designed, selected, and installed to permit easy and complete cleaning.

(xii) Clearly labelled at both ends.

(j) The Design-Builder will provide receptacles and branch circuit wiring throughout the building. The locations and quantity of receptacles are to be provided for convenience and equipment in accordance with the RFP and layouts developed in consultation with the Owner.

(k) The Design-Builder will provide while-in-use covers for all exterior outlets and receptacles.

(l) The Design-Builder will provide connections for wayfinding signage including perimeter signage to enter the Facility.

(m) The Design-Builder will provide drop cords receptacles with twist-lock connectors as determined in consultation with the Owner to suit layout.

(n) The Design-Builder will provide a minimum of one 4-plex receptacle adjacent to the telephone/data outlet at every Staff work or teacher station. Additional receptacles will be provided for convenience power in accordance with the RFP.

(o) The Design-Builder will provide receptacles and components as per the following requirements:

(i) The Design-Builder will provide duplex receptacles in accordance to Appendix 1F - Furniture Fixtures & Equipment List, and additional duplex receptacles every 5m for convenience in Common Area.

(ii) All receptacles accessible to students will have two connectors for USB3.1. One connection to be type A and one connection to be type C.

(iii) 30 amp and 50 amp receptacles in the Gymnasium for use of portable production dimming and sound equipment.

(iv) One duplex receptacle and 25mm (1”) conduit for future structured cabling to each TV location as per Appendix 1B - Room Data Sheets unless noted otherwise.

(v) Infrastructure for overhead projectors in locations identified in Appendix 1B - Room Data Sheets.

(vi) Full gang size, captive nylon face, polarized, duplex, parallel blade, U-grounding slot, triple wipe, brass power contacts, rated at 15 amp, 125 volt. Receptacles to have plug & tail for quick installation connection: Pass & Seymour PT5262 (15A) or PT5362 (20A t-slot) or approved equivalent.

(vii) The Design-Builder will provide a minimum of 10 duplex receptacles and 10 data outlets in the Wellness Centre.

(viii) Tamper-resistant receptacles: Pass & Seymour PTTR5262 (15A) or PTTR5362 (20A t-slot) or approved equivalent.

(ix) GFCI receptacles: Pass & Seymour PT1595 (15A) or PT2095 (20A t-slot) or approved equivalent.

(x) Red receptacles on emergency or UPS power.

(xi) White receptacles in all other areas or as determined in consultation with the Owner.

(xii) Receptacles mounted above or within millwork to be coordinated with millwork details and millwork contractor.

(xiii) All cover plates for flush-mounted wiring devices in areas with drywall walls will be nylon, colour should match colour of device, colour specified by the Architect. Other plates will be of type 430 stainless steel.

(xiv) All steel components will be hot dip galvanized to CSA Standards.

(xv) Stainless Steel: Type 430, No. 4 finish, 1 mm thick, accurately die cut, smooth rolled outer edges and protective release film complete with stainless steel screws.

(xvi) Bakelite or Nylon: Completely smooth heavy-duty service type.

(xvii) Cast Metal: Die cast profile, ribbed for strength, flash removed, primed with grey enamel finish and complete with four mounting screws to box.

(xviii) Gaskets: Resilient rubber or close cell foam urethane.

(xix) Flush Mounting Plates: Beveled type with smooth rolled outer edge, plain design.

(xx) Outlet cover plates for wall mounted handsets will be stainless steel complete with steel mounting studs. Confirm coverplate is suitable for handsets to be installed prior to ordering.

(xxi) Surface Box Plates: Beveled, pressure formed for smooth edge free fit to box.

(xxii) Weatherproof Plates: Cast metal gasketed coverplates for receptacles, spring loaded cast gasketed doors. Double doors for standard duplex receptacles. Coverplates to fasten to box by four screws.

(xxiii) Acceptable manufacturers: Pass and Seymour, Thomas & Betts.

(xxiv) Install coverplates on all wiring device boxes.

(p) Mounting Height Requirements

(i) Wall receptacles will be mounted 356mm (14”) above finished floor. Generally, outlets installed above counters or work tables will be mounted 150mm (6”) above the finished surface. Outlets will be either entirely within or above splashboards.

(ii) Fire alarm audio signaling devices will be mounted 2440mm (96”) above finished floor or 300mm (12”) below the ceiling, whichever is lower. Where signaling devices are mounted adjacent to other surface mounted devices, the centres will be aligned.

(iii) Fire alarm visual signaling devices will be mounted 2000mm (78”) above finished floor or 300mm (12”) below the ceiling, whichever is lower. Where signaling devices are mounted adjacent to other surface mounted devices, the centres will be aligned.

(iv) Fire alarm manual pull stations will be mounted 1200mm (47”) or 1150mm (45”) above finished floor to comply with accessibility requirements.

(v) Emergency lighting battery units will be mounted 2440mm (96”) above finished floor to the centre of the device or 300mm (12”) below the ceiling, whichever is lower.

(vi) Wall mounted occupancy sensors will be mounted at 1050mm (41”) above finished floor.

(vii) Emergency lighting remote fixtures will be mounted 2440mm (96”) above finished floor or 300mm (12”) below the ceiling, whichever is lower.

(viii) Motor starters and disconnect switches will be mounted 1800mm (41”) above finished floor where wall mounted or on channel iron supports.

(ix) Local branch circuit lighting switches will be mounted 1050mm (50”) above finished floor. Local lighting switches will be installed on the strike side of the door.

(x) Telephone outlets will be mounted 356mm (14”) above finished floor. Wall mounted telephone handset outlets will be mounted 1400mm (55”) above finished floor. Coordinate location so handset cords do not drape over light switches or other devices.

(xi) Data and CATV outlets will be mounted 356mm (14”) above finished floor.

(xii) Security keypads and proximity readers will be wall mounted 1400mm (55”) above finished floor.

(xiii) Thermostats will be mounted 1500mm (60”) above finished floor or as coordinated with the Design-Builder’s mechanical consultant.

(xiv) Branch circuit panelboards will be mounted 1800mm (70”) above finished floor to the top of the panel.

(xv) The Owner reserves the right to change location of outlets to within 3m (10’) of points presented by the Design-Builder without extra charge provided the Design-Builder is advised prior to installation.

(q) Where two or more outlets are shown in the same proximity, they will be either centered on a vertical line or centered on a common horizontal line, whichever is most appropriate.

(r) The Design-Builder will provide raceway infrastructure for the Art Studio as follows:

(i) Infrastructure including junction box and conduits to the Art Studio from the closest panel. Allow space for at least three single pole 20 amp breakers; and

(ii) Power and low voltage conduit infrastructure, including junction box and conduits to roof for future exhaust fan.

8.5.13 Junction Boxes and Raceways

8.5.13.1 Basic Requirements

(a) The Design-Builder will provide institutional or industrial quality cables, connectors, conduit systems, fittings and hardware. The Design-Builder will select and install such equipment to provide for high levels of reliability, durability and ease of maintenance of the equipment.

(b) All pullboxes and junction boxes will be of code gauge steel construction and/or cast corrosion-resistant type, conforming to Canadian Electrical Code, with screw-on or hinged cover.

(c) All pullboxes, junction boxes and conduits will be identified with purpose-manufactured durable and clearly legible marking to identify the function and voltage of the system.

(d) The Design-Builder will not exceed 50% of the maximum fill for back boxes and junction boxes.

(e) Approved fire stopping will be installed and maintained at all fire separations and at any locations required by code or by the Authority Having Jurisdiction.

(f) The Design-Builder will provide and install raceways for wiring and cabling to support, protect and organize wiring and cabling systems throughout the Facility.

(g) The Design-Builder will design and install raceways in such a way to provide ease of access, capacity for expansion and change, and in accordance with the requirements of the equipment and systems that they serve.

(h) Surface conduits will run parallel or perpendicular to building lines in flanged portion of structural steel. Group conduits wherever possible on suspended or surface channels. Conduits will not pass through structural beams.

8.5.13.2 Performance Requirements

(a) The Design-Builder will:

(i) Provide pullboxes and junction boxes as required to suit job conditions.

(ii) Locate pullboxes and junction boxes above removable ceilings, in electrical rooms, utility rooms or storage areas. All pullboxes must be positioned and installed in such a way that they are within 1m of an accessible ceiling area or hatchway.

(iii) Provide overlapping covers with flush head cover retaining screws, prime coated and painted to match wall or ceiling finish where pullboxes are flush mounted.

(iv) Install junction boxes in areas that are accessible through luminaire openings and/or access panels.

(v) Provide matching type and gasketed covers on cast corrosion-resistant boxes.

(vi) Provide lamicoid name tags to box covers with 9.5mm (0.35”) lettering identifying system on pullboxes and/or junction boxes that are not a standard 100mm square or octagon box, over and above paint identification for system.

(vii) Support all pullboxes and junction boxes directly from building structure using one or a combination of the following devices:

1. Galvanized screws;

2. Galvanized bolts;

3. Galvanized rods; or

4. Approved box clip.

(viii) Provide bushings on all conduit ends.

(ix) Cap all unused conduits.

(x) Provide cable tray and the following:

1. minimum 25mm (1") EMT conduit from each communications outlet box stubbed into cable tray; and

2. 12 tagged pull cords in cable tray for future use by the Owner.

(b) The Design-Builder will provide a minimum of 3 x 103mm riser sleeves or ducts for all Electrical Rooms and Telecommunications Rooms from main respective rooms. Where group of rooms are stacked, provide one additional 103mm riser sleeve or duct for every additional room serviced from a riser stack. For example: Where there are 3 TRs in a riser stack, one on each level where level 1 is the beginning of the riser and level 3 is the end; provide the following telecommunications riser:

(i) Level 1 – provide 5 x 103mm riser sleeves or ducts;

(ii) Level 2 – provide 4 x 103mm riser sleeves or ducts; and

(iii) Level 3 – provide 3 x 103mm riser sleeves or ducts.

(c) The Design-Builder will not exceed 28% conduit-fill as well as no more than two 90-degree bends (or equivalent) in any conduits.

(d) The Design-Builder will provide conduits according to the following requirements:

(i) Conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

(ii) Conceal conduits except in mechanical and electrical service rooms.

(iii) Use rigid galvanized steel threaded conduit in areas as shown on drawings.

(iv) Use epoxy coated conduit in corrosive areas.

(v) Minimum conduit size for lighting and power circuits: 21 mmC.

(vi) Bend conduit cold.

(vii) Replace conduit if kinked or flattened more than 1/10th of its original diameter.

(viii) Mechanically bend steel conduit over 19 mm diameter.

(ix) Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

(x) Run 3-25 mm spare conduits up to ceiling space and 2-25 mm spare conduits down to ceiling space from each flush panel.

(xi) Terminate these conduits in 152 x 152 x 102 mm junction boxes in ceiling space.

(xii) Remove and replace blocked conduit sections.

(xiii) Do not use liquids to clean out conduits.

(xiv) Dry conduits out before installing wire.

(xv) Run surface conduits parallel or perpendicular to building lines. Locate conduits behind infrared or gas fired heaters with 1.5 m clearance. Run conduits in flanged portion of structural steel. Group conduits wherever possible on suspended or surface channels. Do not pass conduits through structural members except as indicated. Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

(xvi) Run concealed conduits parallel or perpendicular to building lines. Do not install horizontal runs in masonry walls. Do not install conduits in terrazzo or concrete toppings.

(xvii) No conduit will be allowed in slab.

(e) Slope underground conduits to provide drainage. Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

(f) Seal conduits wherever they leave a heated area and enter an unheated area. Provide 12mm (1/2”) minimum duct seal in addition to other sealants.

(g) Provide necessary flashing and pitch pockets to make watertight joints where conduits pass through roof or exterior walls.

(h) Utilize approved expansion fittings complete with grounding jumper where conduit, wireways, and raceways, installed in masonry walls or across building expansion and seismic joints. Install feeder runs of conduit in suspended ceiling spaces in such a manner that there is a bend or off-set adjacent to the major building expansion or seismic joint to take up building movement. In lieu of this, utilize approved expansion fitting.

(i) The Design-Builder will provide conduit supports as per the following requirements:

(i) Single Runs: Galvanized conduit straps or ring bolt type hangers.

(ii) Multiple Runs (three or more): Conduit rack with 25% spare capacity.

(iii) Except where otherwise noted, support conduit and cables utilizing clips, spring loaded bolts, or cable clamps designated as accessories to base channel members.

(iv) Where inserts are required in concrete, expansion inserts, lead inserts or plastic inserts will be used in drilled holes. Wood or fibre plugs are not permitted. Shot driven pins will not be used.

(v) Install to maintain headroom, neat mechanical appearance, and to support equipment loads required plus 25% spare load capacity.

(vi) Supporting devices to be connected directly to building structure.

(vii) Support exposed conduit and conduit installed in space above suspended ceilings utilizing hangers, clamps or clips.

(viii) Support conduit on each side of bends and on spacing in accordance with Canadian Electrical Code.

(ix) Do not fasten supports to piping, ductwork, mechanical equipment, or other conduit.

(x) Install surface mounted cabinets and panelboards with minimum of four anchors.

(xi) Bridge studs top and bottom with channels to support.

(j) The Design-Builder will provide outlet boxes as per the following requirements:

(i) All metal boxes will be hot dip galvanized steel, conforming to CSA Standards.

(ii) Outlet boxes in non-combustible construction will be galvanized steel, gangable sectional type sized to suit the number of conductors.

(iii) Outlet boxes on exterior walls will be cast corrosion-resistant deep type, Crouse Hinds FS and/or FD series, air tight with approved vapor barrier device, gasketed and sealed.

(iv) Boxes for ceiling to be Thomas & Betts No. 54151 receiving at least two 21mm (3/4") conduit; otherwise, No. 54171.

(v) Boxes for flush mounted switches, receptacles, and low tension outlet devices, except in masonry walls, to be Thomas & Betts No. 1104 or 52171 with matching plaster cover for single or two gang outlets. For larger boxes use GSB solid type or special units as required. In masonry work use Thomas & Betts CIMBS series boxes.

(vi) Boxes for surface mounted switches, receptacles, and low tension devices to be 100mm (4") square Thomas & Betts 52151 or 52171 with 8300 series tailor covers or 2020 series with matching cover.

(vii) Communication system (Voice & Data) and A/V system (Audio/Visual) outlet boxes will be two-gang, minimum 90mm deep masonry outlet boxes (MBD-2) or deep dual gang surface mount outlet boxes. When it is necessary to mount an outlet box in a wall depth of 65mm, a 65mm deep masonry willow two-gang outlet box (MBS-2) will be used. Unless specified to the contrary, an electrical box with a "mud ring" is not acceptable. Approved low voltage communication rings can be used where specified.

(viii) Flush floor boxes must be specifically designed to accommodate high performance communications outlets. Selection must be confirmed with the Owner during the design phase.

(ix) Unless noted otherwise, flush floor outlets for power, communications and video in a floating floor will be T&B #68S series complete with volleyball socket deck plate and cap.

(x) All outlet boxes to be flush mounted, except in service rooms and in spaces above removable ceilings. Flush mounted outlets will be mounted flush to the surface of the wall and all gaps at the edges of the outlet box will be filled and finished.

(xi) Adjust position of outlets in finished masonry walls to suit masonry course lines. Coordinate cutting of masonry walls to achieve neat openings for all boxes. All cutting of masonry work for installation of electrical fittings to be done using rotary cutting equipment. Coordinate with the masonry contractor.

(xii) Where a two gang box is required for single gang device, provide plate with one gang opening designed to fit over a two gang box.

(xiii) No sectional or handy boxes unless specifically requested.

(xiv) For outlets mounted in exterior walls ensure that there is insulation behind outlet boxes to prevent condensation through boxes.

(xv) For outlets mounted above counters, benches, or splashbacks, coordinate location and mounting heights with built-in units.

(xvi) Back boxes for all low tension system equipment to be provided in accordance with specific manufacturer's recommendations and as specified in the low tension sections of these specifications.

(xvii) Separate outlet boxes located immediately alongside one another to be mounted at exactly the same height above the finished floor. Where the outlet boxes contain devices of the same system, gang the boxes together.

(xviii) Where outlet boxes penetrate through a fire separation, ensure that they are tightly fitted with non-combustible material to prevent passage of smoke or flame in the event of a fire.

(xix) For concrete slabs and tilt walls, the outlet boxes will be recess mounted flush in the concrete.

(k) The Design-Builder will provide conduit fasteners as follows:

(i) One hole steel straps to secure surface conduits 50mm and smaller.

(ii) Two hole steel straps to secure surface conduits larger than 50mm.

(iii) Beam clamps to secure conduits to exposed steel work.

(iv) Chanel type supports for two or more conduits at 1m on centre.

(v) Threaded rods, 6mm diameter, to support suspended channels.

(l) The Design-Builder will provide conduit fittings as follows:

(i) Comply with CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating same as conduit.

(ii) All EMT conduit fittings to be steel, set screw type. No die-cast.

(iii) All connectors to have plastic bushing.

(iv) Use only WP fittings for conduit installation exposed to weather.

(m) The Design-Builder will provide expansion fittings for rigid conduit as follows:

(i) WP expansion fittings with internal bonding assembly suitable for 100mm linear expansion.

(ii) Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19mm deflection.

(iii) WP expansion fittings for linear expansion at entry to panel.

(n) The Design-Builder will provide and install raceways that comply with applicable codes and will:

(i) Utilize EMT but rigid PVC conduit will be used in/below concrete slabs for underground services or to serve floor mounted devices. The use of electrical non-metallic tubing (ENT) is not acceptable. No in-slab conduit is acceptable except where required explicitly for floor boxes at slab-on-grade locations. Where in-slab conduit is installed, it will be recorded accurately in as-built drawings provided to the Owner.

(ii) Utilize flexible metallic conduit for vibration isolation of equipment such as motors and transformers. Liquid tight flexible metallic conduit will be used for mechanical equipment in damp or wet locations and for kitchen equipment connections.

(iii) Provide barriers to appropriately separate cables and conductors of different voltages or system types.

(iv) Only fill an equivalent of 25% of the calculated cross-sectional area of the tray including annular spacing between cables provided.

(v) Provide matching empty raceways equal to minimum 50% of the total installed group wherever multiple raceways are required in a group, such as a duct bank interconnecting two or more major areas.

(vi) Facilitate easy access to other systems and equipment, including mechanical equipment, building systems access ways, and architectural building components which require periodic inspection or maintenance.

(vii) Be designed and installed without sharp edges or sharp bends so that cables can be pulled in or laid in and removed without damage to the cables. Manufacturer’s maximum bend radii will be observed.

(viii) Be continuously bonded with a bonding conductor installed in raceway.

(o) The Design-Builder will provide:

(i) Pullstrings in all conduits.

(ii) Communications junction boxes will be minimum 300mm x 300mm x 150mm deep.

(iii) 78mm conduit from the electrical room to the roof for future photo-voltaic system panels. Provide approved roof jacks or other approved roof penetration.

(iv) A 78mm conduit from electrical and Communications Rooms to the parking lot for future power and data cabling to parking meters.

8.5.14 Lighting

8.5.14.1 The Design-Builder will provide a lighting system that complies with the following:

(a) Optimize the use of daylight achieved through a combination of Natural Light and luminaires complete with controls.

(b) All spaces will have a manual override for daylight harvesting.

(c) All luminaires and all associated supplies will be readily available locally (on Vancouver Island). Stockable items available in Metro Vancouver would also be considered acceptable. No specialty or custom items unless approved by the Owner.

(d) All spaces used by renters after hours will have programmable override lighting switches that allow for at least two hours override. Exact locations will be confirmed in consultation with the Owner during design development.

(e) Exterior and interior lighting will create a safe and secure environment for students and Staff.

(f) Lighting will comply with all characteristics recommended by the Illuminating Engineering Society of North America (IESNA).

(g) Required Lighting Levels

Teaching Areas	**Average**
Regular classrooms, reading areas, seminar rooms	400 - 500 Lux
Stack areas of Learning Commons	300 Lux
Laboratories, Shops, Drafting, Foods rooms	750 Lux
Gymnasium	400 - 500 Lux
Washrooms, change rooms, shower	200 Lux
Mechanical/Boiler/Electrical rooms	300 Lux
Offices	400 – 500 Lux
Storage Rooms	150 Lux
Hallways, Stairs	250 – 300 Lux

8.5.15 Luminaire Construction and Lighting Components

8.5.15.1 The Design-Builder will provide luminaires and light sources meeting the following requirements and standards:

(a) Selection of luminaires and light sources will meet the stated energy efficiency and quality and quantity requirements but will also meet the objective of providing both a comfortable working environment and an environment conducive to learning and education.

(b) Luminaires in all areas will be constructed to require minimal cleaning and will permit practical and easy access and disassembly. All lighting components will be institutional grade.

(c) Luminaires with integrated daylight harvesting sensors will not be permitted.

8.5.15.2 The Design-Builder will provide no less than two spare luminaires for each installed luminaire type for all common and teaching areas (including classrooms, corridors, multipurpose space, learning commons, administration areas, NLC).

8.5.16 Exterior Lighting

8.5.16.1 The Design-Builder will provide LED exterior lighting according to the following requirements:

(a) Exterior luminaires will be vandal resistant type complete with LED light source.

(b) Lighting in parking areas will be Area Light, single or multi-head pole mounted, dark sky compliant. Die cast aluminum housing, corrosion resistant polyester powder painted minimum 2 mil. thickness, structured LED arrays and optical assembly to optimize application efficiency and minimize glare, 70 CRI at 3000K, 50,000 hours at L85, IP65 rated optical enclosure. Acceptable manufacturer - Philips EcoForm Series, Cooper's Gleon or acceptable equivalent.

(c) Lighting in pedestrian & circulation areas will be Post Top, single post-top indirect area light, dark sky compliant. Die cast aluminum base and body housing, one piece spun aluminum top upper housing, corrosion resistant polyester powder painted minimum 2 mil. thickness, structured LED arrays and optical assembly to optimize application efficiency and minimize glare, 70 CRI at 4000K, rated life 100,000 hours. Acceptable manufacturer — Philips UrbanScape MPTC, Cooper Invue ARB Arbor, Cooper Invue MSA Mesa or acceptable equivalent.

(d) Lighting in building mounted area/flood lighting will be wall mounted area light, dark sky compliant. Cast aluminum housing, corrosion resistant polyester powder painted minimum 2 mil. thickness, structured LED arrays and optical assembly to optimize application efficiency and minimize glare, 70 CRI at 3000K, 50,000 hours at

L85, IP65 rated optical enclosure. Acceptable manufacturer — Philips EcoForm Series, Cooper's Gleon or acceptable equivalent.

(e) Lighting under canopies will be surface mounted area light, dark sky compliant. Die cast aluminum housing, opal polycarbonate lens, corrosion resistant polyester powder painted minimum 2 mil. Thickness. Acceptable manufacturer — Kenall MR13FFL Series, Luminaire Lighting ARV13-21.5W Series, Design Plan Ring Series, Cooper top-tier, or acceptable equivalent.

8.5.17 Interior Lighting

8.5.17.1 The Design-Builder will provide and install interior lighting as per the following requirements:

(a) Lighting in areas where computer terminals and similar screens will be used will be specifically designed to eliminate direct and indirect glare and will meet or exceed the IES recommended cut off for VDT luminaires.

(b) Luminaires in classrooms and administrative office areas will be linear LED indirect/direct type.

(c) Suspended linear luminaires will be used (unless noted otherwise) where ceiling height permits. Acceptable manufacturers: Ledalite, Pinnacle, LiteControl, Finelite or acceptable equivalent.

(d) Where ceiling height is not suitable for suspended linear luminaires: Recessed 1220mm (4') length 610mm (2') or 305mm (1') width, one piece enclosure hinges down as an assembly for easy access, T-hinges for secure retention, guide-post loaded latches, curved acrylic lens. Acceptable manufacturers: Philips Daybrite Soft Trace series, Pinnacle CJ series or acceptable equivalent.

(e) Acrylic lensed recessed or surface luminaires will be used in other areas such as corridors, storage rooms, and stairwells. Prismatic lenses will be minimum 3mm thick.

(f) Suspended linear luminaire will include the following: direct-indirect optics, extruded aluminium housing, perforated housing, blade louver or semi-specular reflector down light optical control, length to suit, white or silver powder coat finish, suspended on aircraft cable.

(g) Service rooms will be provided with industrial LED luminaires complete with spring loaded lamp holders, wireguard, and minimum 10% uplight.

(h) LED recessed downlights will be considered for supplemental lighting in public areas, staff rooms and meeting rooms.

8.5.17.2 The Design-Builder will provide lighting in the Gymnasium with the following specifications:

(a) LED Industrial High—Bay, die cast aluminum driver housing, Solite tempered glass lens with molded silicone rubber gasket sealing the optical compartment, polyester powder finish on all die cast parts, field replaceable LED light engine and driver, 0-10V control dimming driver, 100,000 hours at 45°C ambient at L70 lifetime. Acceptable manufacturers: Philips Daybright HBL Series, GE Current Albeo ABR2 or acceptable equivalent.

8.5.17.3 The Design-Builder will provide lighting in the Storage, Mechanical, and Ancillary spaces with the following specifications:

(a) Utilize standard specification grade commercial LED products. Generally, recessed 1220 mm (4') length 610mm (2') or 305 mm (1') width, steel framed, 0.125" acrylic lens with hinges and positive action cam latches. Acceptable manufacturers: Peerless, Philips, Metalux, Thomas, CFI or acceptable equivalent.

8.5.17.4 The Design-Builder will provide lighting where suitable with the following specifications:

(a) LED Troffers: Philips Daybright, Lithonia, Metalux or acceptable equivalent.

(b) LED Downlights: Philips Lightolier Calculite, Portfolio or acceptable equivalent.

8.5.17.5 The Design-Builder will allow for feature lighting to emphasize art throughout the Facility and in the following areas:

(a) Multi-Purpose Space;

(b) Primary corridors;

(c) Gathering spaces (i.e. Drama entry);

(d) High Tech Board Room;

(e) Learning Commons;

(f) Indigenous Language & Culture Centre; and

(g) Areas identified by the Owner during the design phase.

8.5.18 Exit Lights

8.5.18.1 Basic Requirements

(a) The Design-Builder will mount exit lights to maximize visibility from all directions by adhering to the following:

(i) Mount clear of mechanical ductwork and piping.

(ii) Wall mount above exit doors wherever possible, otherwise when ceiling mounted provide adequate support for the outlet box independent of the ceiling.

(b) The Design-Builder will provide Exit lights in accordance with BC Building Code requirements, CSA C-860, and Appendix 1B - Room Data Sheets.

8.5.18.2 Performance Requirements

(a) The Design-Builder will provide exit lights according to the following requirements:

(i) Pictogram exit signs to be 120 to 347 volt universal AC dual tap with LED assemblies consuming a maximum total of 2 watts.

(ii) Housings to be extruded aluminum in all areas except:

1. Gymnasium and Fitness Room will have soft-edge high abuse PVC housing.

(b) All emergency lighting will be powered from the centralized emergency power source.

(c) Provide 15 amp, 120 volt emergency circuit and single receptacle. Provide lock dog for circuit breakers.

(d) Provide requirements for testing in framed glass for mounting in main electrical room in accordance with the latest edition of the Canadian Electrical Code requirements.

(e) Provide identification on each remote head base indicating the Emergency Power Supply servicing the specific head. The labeling will include the unit (E1) name plus the room number in which the power supply is located; ie. “ELPS # 1 – Elec. B1234”. Labels will be machine printed (clear adhesive with black lettering) or Lamicoid.

(f) Provide, and post, complete instructions within a framed glass display, on the operation and care of the emergency power supplies, including directives on mandatory testing at least once a month in compliance with CEC 46-102. These instructions are to be posted within the main electrical room or other location as directed by the Owner’s maintenance personnel.

(g) Provide clear lexan or PVC vandal guards on all remote lamps.

(h) Acceptable manufacturers:

(i) Beghelli;

(ii) Lumacell; or

(iii) Ready-Lite.

8.5.19 Lighting Control

8.5.19.1 Basic Requirements

(a) Lighting controls will comprise a significant part of both of the energy management of the Facility and of the flexibility required to adjust lighting to suit functions and activities. Requirements for the low voltage lighting control system complete with local low voltage switches will be provided as stated in the mechanical requirements to form a complete and operable system. Low voltage relay panels which are not located in electrical rooms will be installed in a panelboard enclosure matching the adjacent lighting branch breaker enclosure and trim. Remote panels / relay modules in accessible locations will be considered in consultation with the Owner.

(b) The Design-Builder will provide master low voltage switches in the General Office for all corridors.

(c) All relay panel interiors will be pre-assembled complete with the necessary relays, transformers and devices. Relay panel interiors are to be separate from enclosure so as to permit easy mounting, conduit installation and wire pull to enclosures. Interiors to be inserted last and connections made.

(d) The Design-Builder will provide a complete programmed and commissioned low voltage lighting control system to control all interior and exterior luminaires. The system will include all panels, relays, transformers, approved BACNet low voltage relay controllers, low voltage controller programming, and any other devices required for a complete and operable system.

(e) The Design-Builder will provide the entire low voltage system, including switches, relays, cabinets, lighting controllers, switch wiring and luminaire wiring. The system will have a BACNet interface for the connection by the DDC contractor to the DDC system. All communication from the low voltage lighting system to the DDC system will be via a BACNet interface. A point to point interface is not acceptable. The Design-Builder will coordinate all work with DDC contractor.

(f) The Design-Builder will integrate occupancy sensor controls in corridors and other circulation areas with the BMS as required.

(g) Lighting control will permit simple and integrated control of lighting; controls will be easily operated and conveniently and appropriately located for each area and function.

(h) All lighting in corridors, public, and administration areas will be capable of being switched from the general office and the engineer’s office. Install switching to allow for 50% of the general lighting to be turned off during low occupancy periods.

(i) The BMS will be used for remote control of the lighting.

(j) Multi-level switching of luminaires will be provided in classrooms, gymnasiums, and similar spaces to allow for lower lighting levels during presentations and similar events. Separate switches will be provided for each row of luminaires on teaching walls and as determined in consultation with the Owner.

(k) The Design-Builder will provide for Teaching Mode and Audio-Visual Mode illumination levels in each instructional space in accordance with IESNA Lighting Handbook 10th Edition. “All Off” will not be considered as an illumination level.

(l) Integrate day-light harvesting and automatic dimming in instructional spaces, corridors and circulation areas where appropriate. Consider effective locations, mounting and ability to commission day light sensors.

(m) Where occupancy sensors are installed, other than washrooms, local switches will be provided in the room to allow the lights to be turned on manually and turned off automatically or manually. Automatic off after 15-30 minutes of room being vacated. Confirm off time duration with the Owner during design phase.

(n) Line voltage vacancy sensor control in small not regularly occupied rooms such as Janitor rooms, Storage rooms and Service rooms will be considered acceptable.

(o) Exterior lighting will be automatically controlled via a photocell and/or time clock, complete with manual override switches located in the general office and the building engineer’s office.

(p) The Design-Builder will provide light programming as determined in consultation with the Owner.

8.5.19.2 Performance Requirements

(a) The Design-Builder will provide locked enclosures or key-operated switches to protect lighting controls located in publicly accessible areas from unauthorized operation.

(b) The Design-Builder will provide #18 AWG twisted pair cabling between all relay cabinets.

(c) The Design-Builder will coordinate switch and cabinet mounting heights with architectural details and adjust, if required, to coordinate with paneling, dados, and masonry course lines.

(d) Switches installed in recessed boxes in Gymnasium and General Office will have beveled, hinged latching covers.

(e) Low voltage wiring will be LVT jacketed type, No. 18 AWG, colour coded and installed in conduit.

(f) Leads for line and low voltage connections will be 254mm length minimum.

(g) Strap or clip wiring into position.

(h) Identify line voltage conductors of each relay and provide directory, attached to inside of cabinet door, correlating identification of conductor where area controlled by relay.

(i) The entire DDC/low voltage lighting control system will be commissioned by the DDC contractor in coordination with the Design-Builder. Provide a copy of the DDC Commissioning Reports and test in the Division 26 O&M manuals.

(j) The Design-Builder will provide a separate 4 hour demonstration for the lighting control system with the Owner's identified Staff.

(k) The Design-Builder will provide lighting controls rated for excessive moisture or chemicals that might cause deterioration where appropriate.

(l) The Design-Builder will zone and subdivide lighting in open and common areas to permit community use, energy management, and control of lighting levels.

(m) Lighting control relays mounted in relay panels will be full load relays suitable for all types of lamp loads up to 20 Amperes. Load contacts will be able to sustain 1500 amp fault currents for up to 20 milliseconds.

(n) Relays will be contained in a molded case containing both low and high voltage terminals and will have a built-in operating lever marked ON/OFF for manual switching at the relay panel.

(o) Switching the relay will be accomplished with one signal wire and a common return. The signal wire will be able to signal ON and OFF and will also carry status current that indicates if the relay is ON or OFF.

(p) UL Listing 20A: 120 & 277 VAC; CSA 20A: 120,277 & 347 VAC.

(q) Acceptable manufacturer: Douglas WR-6161.

(r) The Design-Builder will provide factory pre-assembled relay panels. The panel's enclosure will be for surface of flush installation, with a screw-on cover or a hinged door assembly as required.

(s) Where panels are provided in finished walls, the Design-Builder will provide spare conduit and infrastructure from the panel to the accessible ceiling for ease of maintenance in the future.

(t) Relay panels will consist of the following:

(i) UL/CSA approved;

(ii) Suitable divider separating class 1 and class 2 compartments;

(iii) Control transformer 40/75 VA, UL/CSA approved for class 2 circuits; and

(iv) Low voltage relays as required. Control devices as required.

(u) Acceptable manufacturer: Douglas PWEx Series or acceptable equivalent.

(v) Two-Wire LED Switch will be push-button type, with plastic cap to permit holding an identification label, with LED indicators. Press button once for ON, press again for OFF.

(w) Acceptable manufacturer: Douglas WSW-35 or acceptable equivalent.

(x) Two-Wire Key Operated Switch: Douglas WSK-3502 or acceptable equivalent.

(i) Switches to be used for corridor lights.

(ii) Switch to be momentary tumbler type.

(iii) Switches will have a plastic cap to permit holding an identification label.

(y) The Design-Builder will provide standard decorator style plates for switches.

(z) Low Voltage Controllers will be as follows:

(i) Manufactured by Delta DLC – P1012 through DLC-P1036, Douglas Dialog, Acuity nLight or acceptable equivalent.

(ii) BACnet connections and graphic representation of the lighting controllers will be by the controls contractor.

(aa) Occupancy sensors will be dual technology with passive infrared and microphonic technologies.

(bb) The Design-Builder will provide wireguards for occupancy sensors in gyms and change rooms and areas subject to vandalism or damage.

(cc) Occupancy sensors in public areas will be masked to prevent unwanted operation.

(dd) The Design-Builder will provide mounting hardware as required to maximize coverage.

(ee) Acceptable manufacturer: Sensor Switch or acceptable equivalent.

(ff) Coordinate switch and cabinet mounting heights with architectural details and adjust, if required, to coordinate with paneling, dados, and masonry course lines.

(gg) Switches installed in recessed boxes in Gymnasium and General Office to have beveled, hinged latching covers.

(hh) Low voltage wiring to be LVT jacketed type, No. 18 AWG, colour coded and installed in conduit.

(ii) Leads for line and low voltage connections to be 254mm length minimum.

(jj) Strap or clip wiring into position.

(kk) Identify line voltage conductors of each relay and provide directory, attached to inside of cabinet door, correlating identification of conductor where area controlled by relay.

(ll) The entire DDC/low voltage lighting control system will be commissioned by the DDC contractor in coordination with the Design-Builder. Provide a copy of the DDC Commissioning Reports and test in the electrical O&M manuals.

8.5.20 Drama Classroom/Blackbox Theatre Lighting

8.5.20.1 The Design-Builder will provide all infrastructure required for a theatrical lighting system.

8.5.20.2 The lighting will be designed by a theatre consultant, with the following minimum requirements. The Design-Builder will design lighting in consultation with the Owner. The Owner will advise on the system and lighting selection:

(a) Three electric battens, one in front. All battens with lowering provision to allow instruments to be set, tested, and aimed from floor level.

(b) 96 dimmers and 120 plug points.

(c) Dimmer systems will be UL and cUL listed.

(d) Four DMX outlets on each batten.

(e) Dimming console in control room and integration with general lighting.

(f) Fully digital dimmer cabinets designed specifically for architectural and entertainment lighting applications.

(g) Wall-mounted, convection cooled dimmer rack that does not require fans.

(h) Acceptable manufacturer: The control electronics will provide the following control and communication inputs as standard. The Design-Builder may recommend alternate manufacturers however the Owner reserves the right for final selection and approval prior to procurement.

(i) One optically isolated DMX512 control input.

(ii) An RS485 control input for Vision.net architectural control. Vision.net is a control system comprised of architectural style panels for recording and playback of presets in individual assigned "rooms".

(iii) There will be two programmable panic inputs.

(iv) One RS232 serial programming port for remote programming using PC based configuration software.

8.5.21 Mechanical Equipment Coordination

8.5.21.1 Basic Requirements

(a) The Design-Builder will provide electrical power to all mechanical equipment as required for proper operation, protection and maintenance of the equipment. Materials and installation methods will result in safe reliable and serviceable mechanical equipment and systems in the Facility.

(b) The Design-Builder will confirm final connections, loads and locations of motors prior to installation.

(c) Motors for mechanical equipment installed by the Design-Builder's mechanical contractor. Coordinate with final mechanical design drawings and shop drawings for locations and electrical requirements.

(d) Provide motor protection starters switches where required, coordinate with mechanical.

(e) Single phase manual motor protection switches to be either toggle or key operated complete with pilot light. Flush or surface mounted as indicated; key operated where indicated.

(f) In finished areas, provide flush mounted motor protection switches complete with stainless steel cover plates.

(g) Select heaters to suit full load current of motors installed.

(h) Provide a separate disconnect switch on the line side of each starter.

(i) Provide disconnect switches for all equipment in accordance with CEC requirements.

(j) Install motor and circuit disconnect switches as required by Code.

(k) Install keyed switches in all public areas.

(l) All disconnects to be complete with lamicoid name tags.

8.5.21.2 Performance Requirements

(a) The Design-Builder will:

(i) Provide institutional or industrial quality cables, connectors, conduit systems, fittings and hardware used to make connection to mechanical equipment and will be selected and installed to provide for a high level of reliability, durability and ease of maintenance of the equipment.

(ii) Provide connections to sinks with electronic hands-free type faucets.

(iii) Ensure connections made to motors and/or motor driven equipment or equipment with noticeable levels of vibration are of a type specifically designed to accommodate the vibration.

(iv) Provide for the eventuality that equipment will be replaced in the future with upgraded and dissimilar equipment types and design connections to mechanical equipment accordingly.

(v) Three Phase Motor Disconnect Switches will be 3 pole, fused or unfused to suit, 250 volt as required in EEMAC Type 1, 3 and/or 4 enclosures.

(vi) All exterior disconnects to be weatherproof.

8.5.22 Poles and Pole Bases

8.5.22.1 Basic Requirements

(a) The Design-Builder will ensure the following:

(i) All poles and pole bases will be engineered to withstand local wind and ice loading conditions, as well as the weight of all equipment mounted on the pole.

(ii) Each pole will be CSA approved and will bear required marking(s).

(iii) Pole finish to be non-corrosive type. Paint to be applied via powder coat method.

(iv) Each pole base will be precast reinforced concrete, and will be of size and configuration suitable for associated pole and electrical equipment. Bases will be pyramid style unless otherwise approved by the Owner.

8.5.22.2 Performance Requirements

(a) The Design-Builder will install all poles complete with TCT Wiresentry anti-theft protection, manufactured by Trans Canada Traffic, White Rock, BC.

(b) Approved Manufacturer's: Foxfab Metal Works Inc.; Nova; West Coast Engineering Group.

8.5.23 Synchronized Clocks

8.5.23.1 Basic Requirements

(a) The Design-Builder will provide a complete and operating digital-network-synchronized clock system and will integrate with the PA system throughout the Facility.

(b) The Design-Builder will provide a connection between the central clock and the time server and will coordinate with the Owner's IT Staff for the requirement for programming and commissioning.

(c) The Design-Builder will provide one wired 305mm diameter analog clock in all instructional spaces, General Office and Staff Room, except the Gymnasium will have two wired 406mm diameter clocks complete with wireguards.

(d) The Design-Builder will provide recessed outlets for all clocks.

(e) All equipment supplied will be the standard product of a single manufacturer of known reputation and minimum of 10 years' experience in the industry and readily available on Vancouver Island.

(f) The Design-Builder will provide a certificate of manufacturer's installation training with the submittal.

(g) The Design-Builder will coordinate clock locations and mounting heights with architectural details during design development and as per Appendix 1B - Room Data Sheets.

(h) Acceptable manufacturers: Bogen, Valcom or acceptable equivalent.

8.5.24 Fire Alarm

8.5.24.1 Basic Requirements

(a) The fire alarm system will be designed, supplied, installed, and commissioned by the Design-Builder to meet the latest applicable standards, including:

(i) CAN / ULC S524 Standard for Installation of Fire Alarm Systems;

(ii) CAN / ULC S537 Standard for Verification of Fire Alarm Systems;

(iii) Elevator Code CAN/CSA-B44;

(iv) ULC-S525 Audible Signal Appliances Fire Alarm;

(v) CAN/ULC-S524 Control Units Fire Alarm Systems;

(vi) ULC-528 Manually Actuated Signaling Boxes;

(vii) CAN/ULS-S529 Smoke Detectors Fire Alarm Systems;

(viii) ULC-S530 Heat Actuated Fire Detectors;

(ix) British Columbia Building Codes;

(x) Canadian Electrical Code; and

(xi) All requirements of the Authority Having Jurisdiction.

(b) All equipment and components will be new, and the manufacturer's current model.

(c) All equipment and components will be installed in strict compliance with manufacturers' recommendations.

(d) Terminal boxes, junction boxes and cabinets will be CSA/ULC listed for their purpose and use.

(e) Initiating circuits will be arranged to serve like categories (manual, smoke, water flow). Mixed category circuitry will not be permitted except on signaling line circuits connected to intelligent reporting devices.

(f) The FACP will contain a microprocessor based Central Processing Unit (CPU). The CPU will communicate with and control the following types of equipment used to make up the system: intelligent detectors, addressable modules, printer, annunciators, and other system controlled devices.

(g) Provide a Universal Digital Alarm Communicator Transmitter (UDACT) for communicating digital information between a fire alarm control panel and a ULC Listed central station.

(h) Provide an Active Graphic LED Annunciator with LED Alphanumeric display and Graphic Zone Map.

(i) Provide all waterflow, sprinkler, and stand pipe supervisory switches as per manufacturer's recommendations and switches will annunciate separately.

8.5.24.2 Performance Requirements

(a) Provide a fully addressable, single stage computer based fire alarm system throughout the Facility in accordance with all applicable codes and standards.

(b) The control panel will be housed in a ULC listed cabinet suitable for surface or semi-flush mounting. Cabinet and front will be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.

(c) The door will provide a key lock and will include a glass or other transparent opening for viewing of all indicators.

(d) All interfaces and associated equipment are to be protected so that they will not be affected by voltage surges or line transients.

(e) The alphanumeric display annunciator will be a supervised, back-lit LCD and LED active display containing a minimum of 80 characters for alarm annunciation in clear English text.

(f) The LCD annunciator will display all alarm and trouble conditions in the system and will be programmed to match graphic zone map labeling.

(g) LCD display annunciators will mimic the main control panel 80 character display and will not require special programming.

(h) The annunciator will have switches which will be programmed for system control such as, Global Acknowledge, Global Signal Silence and Global System Reset. Provide a keyed switch to disable these switch inputs on the front plate. Keying will be to the Owner’s requirements.

(i) An active scaled, multi-color, high quality graphic floor plans indicating zone maps and key fire alarm information will be integrated into the annunciator with LED lighting up the various alarm and trouble zones. Provide a duplicate passive zone map in a metal frame adjacent to the fire alarm control panel.

(j) Submit the graphic zone map to the local fire department for approval prior to final production. Submit proof of acceptance by the fire department.

(k) The FACP will be addressable control panel. Acceptable manufacturer: Simplex 4100ES, Edwards EST3 or acceptable equivalent.

(l) Heat detectors will be mechanical type complete with addressable modules. Acceptable product: Simplex or acceptable equivalent.

(m) Smoke detectors will be photoelectric type. Acceptable product: Simplex or acceptable equivalent.

(n) Manual stations will be pull lever, wall mounted, semi-flush type, non-coded, single stage addressable. Acceptable product: Simplex or acceptable equivalent.

(o) Auto dialer will be Maxsys #4020 or acceptable equivalent.

(p) Strobe Lights will be used for visible notification at 15/30/75/110 Candela, red with white lettering and synchronizing module as required by Simplex.

(q) Audible Signal Devices including bells will be continuous sounding in accordance with the Owner's standards. Coordinate non-temporal pattern with the Owner and Authorities Having Jurisdiction.

(r) LED active graphic display remote annunciator will be provided with an LCD display readout.

(s) Provide 25% spare zones for future.

(t) Provide indicators for trouble signals and silencing pushbutton.

(u) Provide annunciators in electrical room and at main entrance at a minimum.

(v) Provide record drawings, operation and maintenance manuals and fire alarm verification in accordance with this Agreement.

(w) The UDACT will be a remote device and will have the ability for remote mounting. Integral UDACT to the fire alarm control panel is not acceptable.

(x) The UDACT will transmit the following:

(i) Alarm signal;

(ii) Trouble signal; and

(iii) Automatic self-test report every 24 hours.

(y) The UDACT will have 60 hours of standby power. An alarm output contact for alarm or dialer failure will be connected to the fire alarm control panel to annunciate as "Dialer Trouble".

(z) The UDACT will be an Ademco V32FIREKT remote autodialer or a Simplex SafeLINC, DSC GS3060 communicator. The Design-Builder will confirm with the Owner. The UDACT will be compatible with the fire alarm control panel.

(aa) Manual pull stations in high abuse areas (such as gymnasiums) will have tamper resistant covers and be recessed in a wall cavity.

(bb) Door holders will be 120V AC, flush mounted where possible, Simplex 2088-0014-2 Series (Flush) or acceptable equivalent.

(cc) Initiation Device Circuits (IDC) will be wired Class B.

(dd) Notification Device Circuits (NDC) will be wired Class B.

(ee) Alarm signals arriving at the main FACP will not be lost following a power failure (or outage) until the alarm signal is processed and recorded.

(ff) Power Supply:

(i) Circuit number will be clearly identified on both the electrical panel directory and on the fire alarm UDACT.

(ii) Install two telephone lines ahead of the PBX (from the telephone main terminal board) directly to the UDACT.

(iii) Provide a remote antenna in a secure location for the GSM communicator up to 100’ away with wiring in conduit to maximize the signal strength for the communicator. Coordinate exact location with the Owner prior to rough-in.

(iv) The entire remote monitoring system will be installed in accordance with CAN/ULC-S561 “Installation and Services for Fire Signal Receiving Centres and Systems”.

(v) The Design-Builder will coordinate with the Owner to set up an account with a remote ULC approved monitoring station. The Design-Builder will coordinate with the Owner to set up the cellular GSM telecommunications account for the UDACT.

(vi) The power supply will operate on 120 VAC, 60 Hz, and will provide all necessary power for the FACP.

(vii) It will provide 5.0 amps of usable Notification appliance power, using a switching 24 VDC regulator.

(viii) It will provide a battery charger for 24 hours of standby using dual-rate charging techniques for fast battery recharge.

(gg) The fire alarm control panel will provide dry contacts for shutdown, alarm, and trouble signals to the UDACT. The wire connections between the UDACT and the fire alarm control panel will be supervised.

(hh) The Design-Builder will provide Internet-Based Communications Link so the entire fire alarm system status can be monitored with password protection from a web browser through the internet. Incorporate the Simplex BACpac Ethernet module 4100-6069 or acceptable equivalent. Coordinate with the Owner and obtain an IP address for the Owner wide area network. Provide a patch cord to the adjacent data outlet. Program the system to email the appropriate maintenance personnel in the event of any alarm or trouble condition showing detailed information of the event. Provide testing and commissioning of the internet communications through the Owner’s network. Include all testing and Commissioning Reports in the O&M manuals.

(ii) Provide the following form C output contact for the DDC contractor to connect to:

(i) System in alarm; and

(ii) System in trouble.

(jj) Coordinate with DDC contractor to provide commissioning and testing of the fire alarm system interface with the DDC system for inclusion in the O&M manuals.

(kk) Duct Smoke Detectors: Simplex 4098-9601 complete with 9707 duct housing or approved equivalent.

(ll) Waterflow Switches will be supplied and installed by the Design-Builder's mechanical contractor and wired as per manufacturer's instructions by the Design-Builder's electrical engineer.

(mm) Sprinkler and standpipe valve supervisory switches will be supplied and installed by the Design-Builder's mechanical contractor and wired as per manufacturer's instructions by the Design-Builder's electrical contractor.

(nn) All supervisory switches are to annunciate separately. Provide dedicated addressable modules.

(oo) Isolator modules will be provided to automatically isolate wire-to-wire short circuits on an SLC Class A or Class B branch. The isolator module will limit the number of modules or detectors that will be rendered inoperative by a short circuit fault on the SLC loop segment or branch. At least one isolator module will be provided for each floor or fire compartment of the building.

(pp) The isolator module will mount in a standard 4-inch (101.6 mm) deep electrical box or in a surface mounted backbox. It will provide a single LED that will flash to indicate that the isolator is operational and will illuminate steadily to indicate that a short circuit condition has been detected and isolated.

(qq) Conduit fill will not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.

(rr) Cable must be separated from any open conductors of power, or Class 1 circuits, and will not be placed in any conduit, junction box or raceway containing these conductors.

(ss) Wiring for 24 volt control, alarm notification, emergency communication and similar power-limited auxiliary functions will be run in the same conduit as initiating and signaling line circuits. All circuits will be provided with surge protective devices and the system will be designed to permit simultaneous operation of all circuits without interference or loss of signals.

(tt) Conduits will not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.

(uu) The Design-Builder will provide and install spare conduit as required for future Building expansion.

(vv) Conduit will be 3/4 inch (19.1 mm) minimum.

(ww) All low tension and 120V for the fire alarm system wiring will be installed in conduit.

(xx) Wiring will be in accordance with local, provincial and federal standards. Number and size of conductors will be as recommended by the fire alarm system manufacturer, but not less than 18 AWG for initiating device circuits and signaling line circuits, and 14 AWG for notification circuits.

(yy) All wire and cable will be listed and/or approved by a recognized testing agency for use with a protective signaling system.

(zz) Wiring used for the multiplex communication loop will be twisted and shielded and support a minimum wiring distance of 10,000 feet (3,048 m). The system will support up to 3,000 ft. (914 m) of untwisted, unshielded wire (loop 1 only). The system will permit use of IDC and NAC wiring in the same conduit with the communication loop.

(aaa) All field wiring will be completely supervised. Provide colour-coding and identify cable markers at all cable ends. Provide identification on wiring identify function as alarm zone or signal circuiting; i.e. alarm zone #3 = A3, etc.

(bbb) Wiring to door holders will be in a designated conduit system and will not contain other component wiring.

8.5.25 EV Charging

8.5.25.1 The Design-Builder will provide EV electrical distribution panel in the main electrical room with adequate capacity to support Level 2 EV charging in all required areas.

8.5.25.2 The Design-Builder will provide all infrastructure from the EV electrical distribution panel in main electrical room to EV charging stations in the following areas:

(a) minimum one Level 2 charging station in the main loading area with location to be confirmed in consultation with the Owner;

(b) minimum two Level 2 charging stations in the main parking area with locations to be confirmed in consultation with the Owner. No grouping more than two chargers per station/infrastructure will be allowed;

(c) minimum one Level 2 charging station in the Automotive Shop with location to be confirmed in consultation with the Owner; and

(d) infrastructure (conduit and space allowance for future distribution panels) for a minimum of four future Level 2 charging stations in the main parking area with locations to be confirmed in consultation with the Owner. No grouping more than two chargers per station/infrastructure will be allowed.

8.5.25.3 Infrastructure will be terminated in lockable box.

8.5.26 Renewable Energy

8.5.26.1 The Design-Builder will provide the following infrastructure to support future renewable energy systems:

(a) One 50mm conduit from the main electrical room to roof area.

(b) Space and capacity in main electrical distribution for a minimum 100-amp 3 phase overcurrent device.

(c) Accessible wall space within electrical room housing distribution above, with a minimum of 750mm x 750mm, for a future grid tie inverter.

(d) Provide infrastructure to add a future weather station for data monitoring purposes. Final requirements to be confirmed with the Owner during the design development stage.

8.5.27 Operating and Maintenance Instructions

8.5.27.1 Requirements for Manuals

(a) The Design-Builder will provide a minimum of three copies of complete and approved operating and maintenance instructions for all electrical equipment and systems supplied before substantial completion. The Design-Builder will provide additional copies if required under the General Requirements. In addition, the Design-Builder will provide the Owner with a manual in a searchable PDF format on USB stick. As-Built Drawings to be included on the USB stick.

(b) Binders will be three-ring, hard-cover, loose-leaf type and identified on the binding edges as “Maintenance Instructions and Data Book”, for Cowichan Secondary School.

(c) Terminology used in all the sections will be consistent.

(d) Volume one will contain the master index of all systems, the name of the subcontractor, electrical subcontractors and the date of substantial performance for the contract.

(e) Volume one will contain a section with all necessary warranty information.

(f) Each binder will have a complete index for all volumes.

(g) Each binder will be no more than half filled.

(h) There will be a separate section for all materials used on the project which fall under the WHMIS legislation. There will be an MSDS, hazard data sheet, for each of the materials.

(i) There will be a separate section for all Insurance Certificates, Test Certificates, Verification Forms and Test Forms.

(j) All relevant information relating to a system or product will be contained within one binder.

(k) The manual sections will follow the specification sections.

(l) Any diagrams, installation drawings, single line diagrams charts, etc. will be mechanically reduced while maintaining full legibility to standard page size. If this cannot be achieved they will be carefully folded and contained within a clear plastic wallet within the manual.

8.5.27.2 Data for Manuals

(a) Equipment data provided by the Design-Builder will contain:

(i) Operating instructions.

(ii) Operating conditions such as temperature and pressure.

(iii) Location of equipment.

(iv) Name and contact info of suppliers.

(v) Maintenance instructions and schedules for one year routine.

(vi) Recommended list of spare parts.

(vii) Maintenance schedule.

(viii) A trouble shooting table showing where to look for problems under various conditions of malfunction.

(ix) All wiring diagrams.

(x) Equipment operating curves.

(xi) Equipment nameplate data and serial numbers.

(b) System data will contain:

(i) A listing of all systems.

(ii) All panels, mechanical distribution panels, and fire alarm schedules and locations.

(iii) Equipment name tags.

(iv) Cleaning, maintaining and preserving instructions for all material, products and surfaces. Include warnings of harmful cleaning, maintaining and preserving practices.

(c) Additional manuals will be provided for:

(i) Switchboards and power distribution systems.

(ii) Lighting systems.

(iii) Emergency power systems.

(iv) Fire alarm systems.

(d) As-Built documentation will contain:

(i) Reviewed As-Built Shop Drawings.

(ii) As-Built Construction Drawings.

(iii) Originals of test forms.

(iv) Originals of test certificates.

8.5.27.3 Operating Instructions

(a) Instruct the Owner's Representative in all aspects of the operation and maintenance of systems and equipment.

(b) Instruct the Owner for a minimum of five working days.

(c) All instruction sessions to be video-taped and copy must be provided to the Owner and the Owner's Consultant.

(d) At the time of final review, the Design-Builder will provide a sheet for each system and piece of equipment showing the date instructions were given. Each sheet will show the duration of instruction, name of persons receiving instruction, other persons present (manufacturer's representative, Owner's Representative, etc.), system or equipment involved and signature of the Owner's Staff stating that they understood the system installation, operating and maintenance requirements. This information will be inserted in the manuals after all instructions have been completed.

(e) The Design-Builder will review all information with the Owner's Representative to ensure that all information required has been provided.

(f) Electrical equipment and systems to be included in the instruction requirements will include the following:

(i) Switchboards and related power distribution equipment.

(ii) Emergency generator.

(iii) Automatic transfer switches.

(iv) Fire alarm systems.

8.5.27.4 Trial Usage

(a) The Owner will be permitted trial usage of systems or parts of systems for the purpose of testing and learning operational procedures. Trial usage will not affect the warranties nor be construed as acceptance, and no claim for damage will be made against the Owner for any injury or breakage to any part or parts due to the tests, where such injuries or breakage are caused by a weakness or inadequacy of parts, or by defective materials or workmanship of any kind.

8.5.28 Commissioning

8.5.28.1 General

(a) In accordance with ASHRAE Guideline 0, The Commissioning Process, the term commissioning will be taken in these specifications to mean a quality oriented process for achieving, verifying and documenting that the performance of Facility, systems, and assemblies meets defined objectives and criteria.

(b) The following systems will be commissioned:

(i) emergency lighting system;

(ii) fire alarm system;

(iii) structured cabling system;

(iv) cable television system;

(v) telephone system;

(vi) main distribution panel;

(vii) uninterruptible power supplies;

(viii) generator (if required);

(ix) SPD system;

(x) lighting control system;

(xi) security and access control system;

(xii) not used;

(xiii) public address, clock and gymnasium sound systems; and

(xiv) CCTV system.

8.5.28.2 Products

(a) For each system, a separate report (a "**Commissioning Report**") will be submitted. Each report will be in typewritten format and will clearly indicate each component and function tested and the corresponding test results for each test required by the specifications or by the Commissioning Agent. Prior to commissioning any system, the Design-Builder will submit the proposed report format to the Commissioning Agent for approval. Any test results submitted in a format not approved by the Commissioning Agent will be rejected at the discretion of the Commissioning Agent.

(b) Unless indicated otherwise, the above documents will be submitted in either hard copy or PDF format. Word or Excel files are not acceptable. Scans are also not acceptable.

(c) Each report will indicate the name(s) of the personnel who performed the actual commissioning inspections and tests on site.

(d) Each report will include a cover letter, bearing the letterhead of the person commissioning the system (the "system commissioning agent") and signed by an authorized staff member of the system commissioning agent, clearly stating for each system that it has been commissioned by the agent, that the results of the commissioning are documented in the attached Commissioning Report, and that, in the opinion of the system commissioning agent, the system is fully functional as intended. If for any reason, in the opinion of the system commissioning agent, the system is not fully functional, any and all deficiencies will be clearly identified in the letter and a timeline given for their correction.

8.5.28.3 Execution

(a) For each system and/or piece of equipment described below, a visual inspection will be made of all components to ensure a good operating condition. This requirement is separate from other Project Commissioning Plans and undertakings.

(b) For each system and/or piece of equipment described below: wherever deficiencies are observed, corrective measures will be taken. In the report, include a description of each deficiency and the corrective measure to be undertaken, including a schedule of dates for completion of the remedial work. Upon completion of the corrective measures, provide a subsequent written report to be added to the original submission.

(c) Record all tests and observations. Where no written record is made in the report, it will be assumed that no test or observation was made.

(d) Coordinate all electrical systems commissioning to ensure all systems meet the requirements.

(e) Emergency Lighting System

(i) The Design-Builder will cause the emergency lighting system installer to commission the emergency lighting system in coordination with the Commissioning Agent and the electrical contractor.

(ii) Each remote head, battery pack, emergency ballast, and exit sign will be tested to verify that it functions as intended under loss of power to the lights in the respective areas served by this equipment. Voltage readings are to be taken at each remote head and associated source. Using these readings, the voltage drop will be calculated at each remote head location, and will be expressed as a percentage of the source voltage. Any device locations for which the voltage drop is shown to exceed the tolerances of the applicable codes will necessitate the upgrading of wiring to those locations as required complying with code tolerances. Where wiring upgrades are made, test and verify again to ensure compliance. All costs associated with any remedial work will be borne by the Design-Builder only. No extras will be considered.

(iii) For each space in which emergency illumination is provided, the emergency lighting system commissioning agent will turn off the breakers for all circuits, and only for those circuits, that provide power to the luminaires in the respective space. If the emergency lighting equipment in question illuminates to its full brightness that equipment will receive a ‘pass’; if not, a ‘fail’.

(iv) The Commissioning Report for the interlock and operation of the emergency lighting systems will individually identify all equipment tested, including luminaire identification, location, breakers that were turned off, and test results. Any interlocks in on-compliance (fail) with proper operation as defined in the applicable electrical code will necessitate the replacement and retesting / verification, including the required remedial work, without additional costs to the Owner; no extras will be considered.

(f) Fire Alarm System

(i) The Design-Builder will cause the fire alarm system manufacturer to commission the fire alarm system in coordination with the Commissioning Agent and electrical contractor.

(ii) Each component of the fire alarm system will be tested in accordance with CAN/ULCS537-04 and CAN/ULCS1001.

(iii) The Commissioning Report will be formatted to the standard of CAN/ULC-S537-04 Appendix C.

(iv) A final fire alarm verification certificate must also be provided with the Commissioning Report.

(v) The Commissioning Report will indicate that, if applicable, the WAN connection and/or DDC connections have been tested and are working correctly.

(g) Structured Cabling System

(i) The Design-Builder will cause the structured cabling system installer to commission the structured cabling system in coordination with the Commissioning Agent and electrical contractor. The Design-Builder will ensure the installer is certified by the system manufacturer.

(ii) Each permanent link will be tested for all parameters necessary to verify conformance to the specified TIA system category and to the manufacturer's certification requirements.

(iii) The Commissioning Report will indicate each link tested, and for each will include the link identifier, location, minimum passing value for each parameter, and actual measured value.

(iv) The Commissioning Report will be submitted in both hard and soft copy formats.

(v) A 25 year warranty certificate is also be provided by the manufacturer and will be included in the Commissioning Report.

(h) Cable Television System

(i) The Design-Builder will cause the cable television system installer to commission the cable television system in coordination with the Commissioning Agent and electrical contractor. The Design-Builder will ensure the installer is certified by the system manufacturer.

(ii) The installer will align and balance the system in accordance with the manufacturer's recommendations.

(iii) Each subscriber drop will be tested for all parameters necessary to verify conformance to the manufacturer's recommendations.

(iv) The Commissioning Report will indicate each subscriber drop tested, and for each will include the drop identifier, location, minimum passing value for each parameter, and actual measured value. Parameters tested will include, but not be

limited to distortion, signal uniformity, and signal to noise ratio. Final settings of the gain of each amplifier will be included.

(v) The Commissioning Report will be submitted in both hard and soft copy formats.

(i) Telephone System

(i) The Design-Builder will cause the telephone system installer to commission the telephone system in coordination with the Commissioning Agent and electrical contractor. The Design-Builder will ensure the installer is certified by the system manufacturer.

(ii) The installer will program all features and extensions to the requirements of the Owner.

(iii) Provide machine printed extension labels and listings for all phones.

(iv) The Commissioning Report will provide a description of each features and programming that has been installed for the system. The report will indicate that all features and programs for all phones have been tested and are working correctly.

(v) The Commissioning Report will be submitted in both hard and soft copy formats.

(j) Main Distribution Panel

(i) The Design-Builder will cause the main distribution panel (MDP) installer to commission the MDP in coordination with the Commissioning Agent and the electrical contractor.

(ii) Bus resistance will be measured and recorded.

(iii) Electrical and function tests will be performed to verify that all components and systems perform as intended. Such tests will include, but not be limited to the contact resistance of the main breaker, as well as its short, long, and ground fault delay pickup and delay time settings (where applicable), instantaneous pickup (where applicable), and a trip unit self-test.

(iv) Feeder terminations will be tested and voltage and amperage readings listed. Wherever readings do not comply with the tolerances of the applicable electrical code the Design-Builder will undertake remedial work, including, where necessary, replacement of connectors, fittings, and feeder wiring. Where replacements and/or other remedial work are required, test and verify again to ensure compliance. All costs associated with any remedial work will be borne by the Design-Builder only. No extras will be considered.

(v) Insulation resistance will be measured and recorded.

(vi) All digital meters will be commissioned and included as a separate section in the report. Indicate that all WAN connections and/or DDC connections have been tested and are working correctly.

(k) Uninterruptible Power Supplies (UPS)

(i) The Design-Builder will cause the UPS manufacturer to commission the UPS in coordination with the Commissioning Agent and the electrical contractor.

(ii) Electrical and function tests will be performed to verify that all components and systems perform as intended.

(iii) The commissioning process will include a full load transfer to the UPS batteries.

(iv) The commissioning process will include, where applicable, review of the ventilation and cooling provided for the room(s) housing the UPS equipment. Verify that all necessary ventilation and cooling equipment functions adequately under emergency load conditions.

(v) The Commissioning Report will indicate that the WAN connection and/or DDC connections have been tested and are working correctly.

(l) Surge Protective Devices (SPD)

(i) The Design-Builder will cause the SPD manufacturer to commission the SPD in coordination with the Commissioning Agent and the electrical contractor.

(ii) Electrical and function tests will be performed to verify that all components and systems perform as intended.

(iii) The Commissioning Report will indicate that the WAN connection and/or DDC connections have been tested and are working correctly.

(m) Low Voltage Lighting Control System

(i) The Design-Builder will cause the low voltage lighting control system manufacturer to commission the system in coordination with the Commissioning Agent, the installing contractor, the low voltage lighting control supplier, the controls contractor and the electrical contractor.

(ii) Electrical and function tests will be performed to verify that all components and systems perform as intended.

(iii) The commissioning process will include a test of any provisions in the control system for operation of emergency lighting.

(iv) The commissioning process will include a test of any provisions in the control system for operation of interfaces with alarm systems.

(v) Each lighting zone will be tested to ensure that it is controllable as intended. Where multiple points of control, (including switches, dimming controls, occupancy sensors, and daylight sensors) are provided for a given zone, each control will be tested. Controls that operate more than one zone will be tested for each zone.

(vi) Where the lighting control system includes dimming capability, each dimming control will be tested to ensure that each applicable zone dims as intended.

(vii) Where the lighting control system includes preset scenes, each instance of each preset scene will be tested to ensure that it functions as specified.

(viii) Where the lighting control system includes daylight sensors, the functionality of each sensor will be tested to ensure that it functions as specified.

(ix) The Design-Builder will cause the low voltage lighting control system manufacturer, Commissioning Agent and electrical contractor to provide on-site training to designated members of the Owner's maintenance Staff. Include a detailed description of the training given in the Commissioning Report.

(n) Security and Access Control System

(i) The Design-Builder will cause the security and access control system installer to commission the system in coordination with the Commissioning Agent and the electrical contractor.

(ii) Electrical and function tests will be performed to verify that all components and systems perform as intended.

(iii) The Commissioning Report will indicate that the WAN connection and/or DDC connections have been tested and are working correctly.

(o) Not Used

(p) PA, Clock and Gymnasium Sound Systems

(i) The Design-Builder will cause the system manufacturers to commission the system in coordination with the Commissioning Agent and the electrical contractor.

(ii) Electrical and function testing will be undertaken to ensure the system components and operation meet the full intent of the documentation.

(iii) The Design-Builder will cause the manufacturer, Commissioning Agent and the electrical contractor to provide on-site training to designated members of the Owner's Staff. Include a detailed description of the training given in the Commissioning Report.

(q) CCTV System

(i) The Design-Builder will cause the CCTV system manufacturer to commission the system in coordination with the Commissioning Agent and the electrical contractor.

(ii) Electrical and function testing will be undertaken to ensure the system components and operation meet the full intent of the documentation.

(iii) The Design-Builder will cause the manufacturer, Commissioning Agent and the electrical contractor to provide on-site training to designated members of the Owner's Staff. Include a detailed description of the training given in the Commissioning Report.

(r) Demonstration of Complete Electrical Systems

(i) At completion of the project, check through all electrical systems with the Owner. This check to include instructing the Owner in operating and maintenance procedures. Allow for eight hours of on-site instruction after building occupancy at times selected by the Owner.

(ii) Instructions will be carried out by the Design-Builder's electrical project superintendent or other senior official of the Design-Builder as approved by the Owner's Consultant.

(iii) Final demonstrations are to be recorded on video recordings with four copies provided with the Maintenance Manuals for reference by the Owner / user groups.

(s) Testing

(i) Test and check all portions of the electrical systems for satisfactory operation. All test results to be documented in the Operation and Maintenance Manuals.

(ii) Before energizing any portion of the electrical systems, perform Megger tests on all feeders. Space results to conform to the all applicable codes, to the satisfaction of the authorized inspection authority and the Owner. Megger tests on all feeder conductors to be done in the presence of the Owner and/or the Owner's Representative, suitably logged, tabulated,

signed and included in the Operation and Maintenance Manuals.

(iii) Upon completion of building and immediately prior to final inspection and takeover, check load balance on all feeders at panelboards. Tests to be carried out by turning on all possible loads and checking load current balance. If load unbalance exceeds 15 per cent, reconfigure circuits to balance load. Readings to be logged, tabulated and incorporated into the Operation and Maintenance Manuals.

(iv) Take clip-on ammeter readings on all phases of all mechanical equipment motors with motors running under full load condition. Readings to be logged, tabulated and incorporated into the Operation and Maintenance Manuals.

8.6 Division 27 - Communications

8.6.1 General

8.6.1.1 Appendix 1D - Systems Responsibility Matrix provides a summary of the party's responsibilities related to design and construction of the building systems.

8.6.1.2 The Design-Builder will provide conduit infrastructure from the street to the MTRs for CATV.

8.6.1.3 The Design-Builder will design the controls system as a BMS which allows monitoring and operation of the entire Facility from a single location or through a remote internet connection.

8.6.1.4 The Design-Builder will provide one Data Drop to each power distribution unit (PDU) to enable remote management and control via the Owner's network.

8.6.1.5 The Design-Builder will provide 4 lines from the main telephone backboard ahead of the PBX and 4-pair category 6A telephone cable in 25mm conduit to the fire alarm monitoring equipment, intrusion alarm monitoring equipment and elevator monitoring equipment for remote monitoring station tie-in.

8.6.1.6 Refer to electrical requirements in this Section (Div. 27) as well as all other applicable sections.

8.6.1.7 The conduits, pathways, room layouts, and design will comply with the TIA/EIA-569-C Commercial Building Standard for Telecommunications Pathway and Spaces, latest edition.

8.6.1.8 The Design-Builder will consult with the Owner and meet all of the Owner's policies and standards for all connections to the Owner's data, voice, audio, video and wireless networks.

8.6.1.9 The Design-Builder will comply with the clearance requirement and recommendations for all equipment and systems including TIA and BICSI.

8.6.1.10 The Design-Builder will coordinate with the Owner as it relates to the design and implementation of all IT and Telecommunications infrastructure defined within this section of the Schedule 1.

8.6.1.11 The Design-Builder will provide communication outlets in the Teaching Kitchen in correspondence to Appendix 1F - Furniture, Fixtures & Equipment List.

8.6.1.12 Communications Rooms will be located away from wet areas and/or drainage pipes. The Design-Builder will provide water ingress mitigation measures for all Communications Rooms not only for flooding from outside the Facility but also from within the Facility.

8.6.2 Structured Cabling System

8.6.2.1 Basic Requirements

(a) The Design-Builder will provide and install a complete category 6 (CAT6) (unless noted otherwise, wireless infrastructure will be CAT6A) structured cabling solution throughout the Facility. Refer to Appendix 1B - Room Data Sheet for minimum number of Data Drops.

(b) The cabling infrastructure will be designed by a Registered Certified Data Designer (RCDD) and will be to the latest TIA/EIA standards including:

(i) TIA/EIA 569-C;

(ii) TIA/EIA 568-C.1, C.2 and C.3 Commercial Building Cabling Standards and Optical Fibre Cabling Standards;

(iii) TIA/EIA 526-7-98 and TIA/EIA 526-14-A-98 Standards for Optical Power Loss measurement of single mode and multimode fibre cable plant;

(iv) TIA/EIA 606 Standard the Administration Standard for the Telecommunications Infrastructure of Commercial Buildings; and

(v) ANSI/TIA-607-D Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.

(c) The structured cabling component will be of the same manufacturer and will be supplied and installed by a data subcontractor who is certified by the manufacturer's best available warranty/certification.

(d) The Design-Builder will provide 2 spare patch panel ports for each patch panel location. Spare ports are to be continuous starting after the last wired data port of the last / lower patch panel in the column.

(e) The Design-Builder will provide sufficient telecommunications outlets and outlet/connectors in rooms that have or are anticipated

to have data, phone, video, or other end-use devices in consultation with the Owner during design development.

8.6.2.2 Performance Requirements

(a) The Design-Builder will provide:

(i) A star wired cabling system to wire all telecommunication outlet locations back to Telecommunications Rooms and all Telecommunications Rooms back to the Main Telecommunications Room (School Network).

(ii) Blank inserts for all unused cover plate openings.

(iii) Minimum of 2 category 6 (unless noted otherwise) cables fully terminated on RJ45's at each device location and will be run back to the TRs.

(iv) Maximum of 30% of the calculated cross-sectional area of the conduit pathway and maximum 25% fill of the tray including annular spacing between cables provided.

(v) Minimum, a 24 Strand OM5 Multi-Mode fiber from the MTRs to each TR and EF. Additionally, provide single mode fiber cables to EF. Additionally, provide 12 strand single mode fiber cables between the MTR (School Network) and EF.

(vi) Spare capacity in TRs as per TIA/EIA 569-C Commercials Building Standard for Telecommunications Pathways and Spaces. All cabling will be run in conduit or cable tray. J-hooks will not be permitted.

(vii) Sufficient Data Drops for specialized systems.

(viii) Record drawings, operation and maintenance manuals and test results in accordance with the this Agreement.

(ix) Terminate all horizontal cabling on standard density RJ45 rack mounted rack mounted patch panels in MTRs and TRs. Follow TIA/EIA T568A Pin configuration. No horizontal cabling will be permitted to terminate on IDC block.

(x) Standard (flat) front patch panels with a maximum of 24 ports per panel. Patch panel terminations will be modular 8P8C jacks complying with ANSI/TIA-568-C.2 requirements for Category 6A.

(xi) Supply and install front mount wire management accessories to permit neat cross connect to systems equipment and rear mount cable management for maintaining minimum bend radii. Front management should be configured for 1U for each 1U of patch panels.

(xii) Sufficient quantity of patch cords for a complete and operational system. Confirm exact patch cord lengths with the Owner prior to placing order.

(xiii) Terminations for all fibre optic cables on rack mounted enclosure. Fibre optic cables will be terminated on both ends with LC type connector.

(xiv) PDU rated for 20A at 120V, 1-phase and is furnished with 24 x 5-20 receptacles. will Acceptable manufacturer: Eaton Switched ePDU series, model no. PW102SW0U151.

(xv) Provide one Data Drop to each PDU to enable remote management and control via the District network.

(xvi) Route all communications wiring by means of conduit and/or cable tray except where noted otherwise.

(xvii) Install cable along or at right angles to building lines unless impracticable to do so. Verify specific cases of deviation in advance with the Owner's Representative.

(xviii) Size boxes and housings to accommodate cable population and minimum bending radii as listed in the EIA/TIA 569-B.

(xix) All cables will be installed free from defects, including kinks and excessively tight bends.

(xx) Do not exceed manufacturer's recommended maximum pulling force.

(xxi) Where overhead distribution is used, provide 1m of excess cable in the accessible ceiling space above each communications outlet.

(xxii) Secure cables neatly into logically grouped bundles using Velcro strapping for all category rated cables.

(xxiii) Cables will be installed as per the following minimum requirements:

1. 6" (127 mm) from power lines feeding loads no greater than 2 KVA.
2. 12" (300 mm) from power lines feeding loads between 2 and 5 KVA.
3. 24" (610 mm) from power lines feeding loads greater than 5 KVA.
4. 12" (300 mm) from fluorescent light fixtures.
5. 48" (1220mm) from distribution transformers.

6. Where cables and/or power lines are installed in conduits, a nearer proximity is permitted. Refer to the BICSI Telecommunication Distribution Methods Manual, Eleventh Edition, or consult with the engineer of record.

(xxiv) Unless noted otherwise, in this section the term “cabling space” will mean the readily accessible space above an accessible ceiling.

(b) Acceptable manufacturers: CommScope Systimax, Siemens, AMP NETCONNECT, Belden, Leviton, Panduit.

8.6.3 Telecommunications Racks and Cabinets

8.6.3.1 The Design-Builder will:

(a) Provide all racks and cabinets as necessary for the Facility, except where specified otherwise in this Schedule.

(b) Provide minimum 20% spare capacity for expansion.

(c) Locate all cabinets with proper clearance, one metre on three sides.

(d) Provide racks that are heavy duty enclosures, 48U, 750mm wide, minimum 1070mm deep, gangable with lockable perforated doors.

8.6.3.2 The Design-Builder will provide the following for each rack:

(a) Two dedicated 20A receptacles mounted at bottom of frame.

(b) Two vertical power distribution unit bars mounted to the frame.

(c) Empty bottom 1/3 of the rack. Racks will only be filled in the top 2/3 of the rack.

(d) Bonding Lug.

(e) Hinged channels for vertical patch cord management and on relay frames on either side from top to bottom (no horizontal cables will be installed in the channel.) Where relay racks are to be ganged together, provide a minimum 6” wide hinged trough in between racks.

(f) Horizontal cable managers fabricated from steel, with standard 19” rack mounting, 1 RU in height and 4 D-rings each ring at 76mm x 89mm (3"x3.5").

(g) Horizontal cable managers placed above and below each patch panel.

(h) One additional horizontal cable manager for every patch panel installed.

8.6.3.3 Approved Manufacturer: APC NetShelter SX series, Hammond Manufacturing H1 Series or acceptable equivalent.

8.6.3.4 Rack elevation layout will use the following scheme: patch panel, horizontal cable manager, edge switch, horizontal cable manager, patch panel, horizontal cable manager, edge switch, horizontal cable manager and so on. Further confirmation required in consultation with the Owner during design development.

8.6.3.5 Support of cabinets by conduit, pipes, ducts, wire or any other non-structural component is not acceptable.

8.6.4 Communications Rooms

8.6.4.1 Entrance Facility

(a) The Design-Builder will provide an EF in the Facility that will accommodate the following:

(i) the demarcation of the incoming telecommunications service;

(ii) minimum of two 104mm (4”) service ducts into the EF for the utility service box;

(iii) telephone;

(iv) data network wide area network; and

(v) CATV.

(b) The EF will be designed in accordance with the TIA/EIA-569-C Standard.

8.6.4.2 Main Telecommunications Room (School Network)

(a) The Design-Builder will provide an MTR (School Network) in the Facility that will accommodate the following:

(i) core network switches that will be connected to each TR;

(ii) edge switches;

(iii) servers;

(iv) space for minimum four racks, three will be provided by the Design-Builder;

(v) minimum one metre clearance between wall mounted equipment and front, back and one side of rack rows;

(vi) 19 mm (3/4”) GIS birch or fir plywood backboard, painted with two coats of fire retardant white paint, on all MTR (School Network) walls; and

(vii) connection to UPS as well as normal power.

8.6.4.3 Main Telecommunications Room (Island Health Network)

(a) The Design-Builder will provide a MTR (Island Health Network) located inside the Health and Wellness Centre so that all the outlets required for the Island Health network can reach the MTR (Island Health Network) within the maximum channel length of 90 metres.

(b) The MTR (Island Health Network) will accommodate the following:

(i) core network switches;

(ii) edge switches;

(iii) servers;

(iv) space for minimum two racks, one will be provided by the Design-Builder;

(v) minimum one metre clearance between wall mounted equipment and front, back and one side of rack rows;

(vi) 19 mm (3/4”) GIS birch or fir plywood backboard, painted with two coats of fire retardant white paint, on all MTR (Island Health Network) walls; and

(vii) connection to UPS as well as normal power.

8.6.4.4 Telecommunications Room

(a) The Design-Builder will provide at least one Telecommunications Room per floor. The Design-Builder will provide additional TRs where required to conform to the 90 metre horizontal cabling limitation. The MTR (School Network) can serve as a TR for the floor it is on or portion thereof.

(b) TRs will be stacked vertically above the MTR (School Network). Additional TRs on a floor will be stack vertically in their respective areas.

(c) The Design-Builder will ensure each TR only serves the floor they are on and placed to maximize the area they serve.

(d) The Design-Builder will ensure the maximum cable distance from telecommunication outlet to TR patch panel termination is 90 metres.

(e) The Design-Builder will provide TR(s) in the Facility that will accommodate the following:

(i) edge switches;

(ii) space for minimum two racks, one will be provided by the Design-Builder;

(iii) minimum one metre clearance between wall mounted equipment and front, back and one side of rack rows;

(iv) 19 mm (3/4") G1S birch or fir plywood backboard, painted with two coats of fire retardant white paint, on all Telecommunications Room walls; and

(v) connection to UPS as well as normal power.

8.6.4.5 The Design-Builder will ensure each TR only serves the floor it is on and placed to maximize the area it serves.

8.6.4.6 The Design-Builder will ensure the maximum cable distance from telecommunication outlet to TR patch panel termination is ninety 90 metres.

8.6.4.7 The Design-Builder will provide terminations for the following in rack mounted patch panels:

(a) backbone fibre; and

(b) horizontal copper cabling.

8.6.4.8 The Design-Builder will provide patch cords in sufficient quantity, based on the Owner's network design and approval, plus 10% spare.

8.6.4.9 Quantity of patch cords provided by the Design-Builder will be at least two patch cables per port/outlet. One of which will be 12" short patch cable used in the TR.

8.6.4.10 The Design-Builder will ensure 1.5 metre, black patch cord and end use device cables are dressed and concealed, to standard approved by the Owner.

8.6.5 Redundancy of Pathways and Spaces

8.6.5.1 The Design-Builder will provide a cable tray for telecommunications and public address cabling throughout the building in areas with accessible ceilings.

8.6.5.2 The cable tray design will adhere to the following:

(a) minimum 300 mm wide by 100 mm deep in hallways and TRs;

(b) separate telecommunications and public address cabling using cable tray barrier;

(c) basket type aluminum;

(d) sized for cable density plus future expansion based on TIA/EIA standards;

(e) install cable tray with clearances for easy addition or removal of cables and in compliance with all codes and regulations;

(f) remove any sharp edges, points or burrs;

(g) provide cable tray firestop fittings at each firestop penetration. Fittings will be sized to accommodate a 25% increase in cable capacity; and

(h) install seismic restraints for the cable tray according to ECABC Seismic Restraint Manual and the Design-Builder's seismic restraint engineer.

8.6.5.3 The Design-Builder will provide a zone conduit system in areas where cable tray is not feasible.

8.6.6 Fibre Backbone

8.6.6.1 Data fibre backbone cabling will be 24 strand OM5, 50/125 micron multimode fibre optic cable between the MTRs, each TR and EF. Additionally, provide 12 strand single mode fiber cable between the MTR (School Network) and EF.

8.6.7 Copper Backbone

8.6.7.1 The Design-Builder will provide copper backbone consisting of 5 cables of balanced twisted pair, 23 AWG solid copper, Plenum Rated FT-6/CMP or Riser Rated FT-4/CMR (as required by local codes) cable meeting all Category 6A transmission characteristics of ANSI/TIA/EIA-568-C.2 for data and voice backbone. If copper backbone distance exceeds 90 m, provide fibre backbone instead of copper backbone.

8.6.7.2 Where copper cabling is used, no cables will be used with greater than 25 pairs.

8.6.8 Horizontal Cable

8.6.8.1 The Design-Builder will provide 4-pair Category 6 Data Drop (unless noted otherwise), 24 AWG and 100 ohm.

8.6.8.2 The Design-Builder will provide horizontal cabling to connect telecommunications outlets/equipment with direct connect terminations back to the TR.

8.6.8.3 Horizontal cabling will not exceed 90m in length and be continuous without any splices. Maximum channel-length will not exceed 100m.

8.6.9 Bonding

8.6.9.1 The Design-Builder will provide a ground bus bar and appropriate bonding in each TR as per ANSI/TIA-607 and the following requirements:

(a) Bond patch panel equipment rack to nearest telecommunications ground bus using an unbroken run from the rack to the bus.

(b) For each telecommunications grounding busbar (TGB), provide bonding connection to the ground terminal of the nearest AC electrical panelboard.

(c) In buildings of non-combustible construction: In addition to the bonding connection to the nearest AC panel, provide a bonding connection to the nearest structural steel member.

(d) For distances not exceeding 100 ft., use minimum #6 AWG copper wire for the telecommunications bond. For longer distances, consult with the Owner's Representative.

8.6.10 Telecommunications Outlets

8.6.10.1 Basic Requirements

(a) Refer to Appendix 1B - Room Data Sheets and Appendix 1D - Systems Responsibility Matrix for system's scope.

(b) The Design-Builder will provide one duplex receptacle adjacent to every data port except in Telecommunications Rooms, Wireless Access Point locations, and telephone locations.

8.6.10.2 Performance Requirements

(a) The Design-Builder will provide sufficient telecommunications outlets that comply with the following:

(i) outlets will be as per T568A Wire Map configuration, with modular 8P8C jacks;

(ii) voice jacks will be white;

(iii) data jacks will be blue;

(iv) outlet plates will be single gang;

(v) outlet coverplates for wall mounted telephone handset jacks will be stainless steel complete with steel mounting studs; and

(vi) coverplates will be suitable for handsets to be installed.

(b) The Design-Builder will provide a duplex receptacle on UPS power and a data port for each printer.

8.6.11 Uninterruptable Power Supply (UPS)

8.6.11.1 The Design-Builder will provide uninterruptable power to Telecommunications Rooms, and spaces designated by the Owner in N+1 configuration.

8.6.11.2 The UPS design will be coordinated with the electrical division per the Uninterruptable Power Supply (UPS) section in this Schedule 1.

8.6.11.3 UPS will be sized to have a minimum runtime of 30 minutes.

8.6.12 Wireless Infrastructure

8.6.12.1 Basic Requirements

(a) Refer to Appendix 1D - Systems Responsibility Matrix for system's scope and responsibility.

(b) Wireless infrastructure will meet or exceed the latest industry standards including the latest editions of the following standards:

(i) ANSI/TIA/EIA-568-C.0, Generic Telecommunications Cabling for Customer Premises;

(ii) ANSI/TIA/EIA-568-C.1, Commercial Building Telecommunications Cabling Standard;

(iii) ANSI/TIA/EIA-568-C.2, Balanced Twisted Pair Telecommunications Cabling and Components;

(iv) ANSI/J-STD-607-A-2002, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications;

(v) BICSI Telecommunications Distribution Methods Manual, Eleventh Edition;

(vi) ANSI/TIA/EIA-569-B, Commercial Building Standard for Telecommunications Pathways and Spaces;

(vii) ANSI/TIA/EIA-606-A, Administration Standard for Commercial Telecommunications Infrastructure; and

(viii) IEEE 802.11 Telecommunications and information exchange between systems local and metropolitan area networks.

(c) The Design-Builder will provide a complete wireless network infrastructure throughout the Facility with no dead spots allowing wireless end-use devices access to the network and all its associated applications.

(d) The Design-Builder will conduct at least two post-deployment site surveys. One will be conducted shortly after all wireless equipment is deployed and another at least one month after the Facility is fully operational and all sources of potential interference are active.

(e) The Design-Builder will provide structured cabling to connect the wireless access points to the local TRs.

8.6.12.2 Performance Requirements

(a) The Design-Builder will provide seamless Wireless Access Point (WAP) coverage by placing them in a 10.0 m x 10.0 m grid pattern.

(b) The Design-Builder will provide testing of the wireless local area network (WLAN) to ensure proper speeds.

(c) The Design-Builder will provide reports showing signal strengths in all rooms and areas in the School.

(d) The proposed solution will be able to support the following criteria:

(i) Two wireless end-use devices per Staff/student in classrooms including Shops.

(ii) Four wireless end-use devices per Learning Community Collaboration space.

(iii) 25 wireless end-use devices per Learning Community Breakout Space.

(iv) 225 wireless end-use devices in large common areas including Learning Commons.

(v) 375 wireless end-use devices in the Multi-Purpose Space.

(vi) Additional 15% of total users for guests.

(vii) Each WAP will have two fully terminated Category 6A drops.

(viii) WAPs will be Power-over-Ethernet (PoE).

(e) The Owner will provide PoE switches as required. One D-Link Layer 3 3130 PoE where the WLAN meets the School LAN and additional D-Link Layer 3, 3130 PoE switches, as required for the remaining ports. Exact specifications and model will be provided at the time of procurement. This information is provided as a guideline only.

(f) Provide record drawings and operation and maintenance manuals in accordance with the Design-Build Agreement.

(g) The Owner will supply Ruckus 750 WAPs or latest model available at the time of procurement to the Design-Builder installer. Refer to Appendix 1D – Systems Responsibility Matrix.

8.6.13 Network Equipment

8.6.13.1 Basic Requirements

(a) Refer to Appendix 1D - Systems Responsibility Matrix for system's scope and responsibility.

(b) The Owner will provide all active equipment for the School network including firewall, core and edge switches. The Owner currently uses D-Link platform. The Owner will work with Island Health to provide the switches required for the Island Health network. The Design-Builder will provide all active equipment for the FM Network utilizing the same D-Link platform. "**FM Network**" means the

Building's facility maintenance network and includes the BMS network and the Building's mechanical systems, electrical systems, metering systems, intrusion detection, and other building systems.

(c) The Design-Builder will provide all infrastructure to support the School network.

8.6.14 Audio Visual Systems

8.6.14.1 The Design-Builder will provide and install conduit, outlet boxes, wiring and equipment as well as provide testing and commissioning for the complete audio visual systems throughout the Facility.

8.6.14.2 Audio visual systems will be provided in the following areas:

(a) Dance / Yoga Studio;

(b) Gymnasium;

(c) Multi-Purpose Space;

(d) Drama classroom / Black box theatre;

(e) Fitness room:

(f) Meeting rooms;

(g) Super Lab;

(h) Studios (science labs);

(i) Classrooms;

(j) Inclusive Education Flex rooms;

(k) Common areas;

(l) High Tech Boardroom;

(m) Indigenous Language & Culture Centre;

(n) Health and Wellness Centre; and

(o) Refer to Appendix 1A(a) - Functional Program and Appendix 1B - Room Data Sheets for further locations.

8.6.14.3 The Design-Builder will provide the following equipment in each space requiring Audio Visual (AV) systems:

a) Power for the television(s).

b) Power for Apple TV device (Owner supplied/contractor installed).

c) Data Drop for Apple TV device.

d) Allow for wall mounted infrastructure, away from doors at height for comfortable viewing based on room design, dimensions, and site line analysis.

e) Provide in wall seismic backing of all display mounts.

f) Provide a minimum four ceiling mount speakers for video and AV presentations and speech reinforcement for the following spaces. Exact quantity to be determined in consultation with the Owner and to suit the room size and configuration:

(i) 6.00 Learning Commons (Library);

(ii) 6.04 Design Hub / Maker Space;

(iii) 7.01 Assembly / Lounge / Dining Area;

(iv) 8.01a Resource Room 1 – Skills for Life Flex Area;

(v) 8.02 Learning Assistance Resource Room;

(vi) 9.01a Indigenous Education Room Flex Area;

(vii) 10.01 Computer Lab 1;

(viii) 11.01 Main Studio;

(ix) 13.01 Main Studio;

(x) 14.01 Studio / Classroom;

(xi) 15.01 Studio 1;

(xii) 15.02 Studio 2;

(xiii) 15.04 Multi-Media Studio;

(xiv) 16.02 Foods 1;

(xv) 16.03 Foods 2;

(xvi) 21.01 Science Theory Studios (a-f);

(xvii) 21.02a Super Lab;

(xviii) 22.01 Flex Classroom;

(xix) not used;

(xx) not used;

(xxi) 22.09 Learning Community Breakout Space;

(xxii) 26.01 Gathering Place / Longhouse / Meeting Place / Learning Space; and

(xxiii) 28.01 High Tech Board Room.

g) A push-button control panel that will provide system on/off volume control, display control and input selection.

8.6.14.4 Infrastructure Requirements:

(a) All AV cabling will be in conduits. Conduits will be in walls, ceilings and floors and will not be visible;

(b) All power and communications cabling and outlets will be provided to support the AV systems; and

(c) No wiring will be visible.

8.6.14.5 The AV system will include all head-end including amp-mixer and speakers. Acceptable manufacturers: Bogen, Community, Crestron, TOA or acceptable equivalent.

8.6.14.6 Provide adequate receptacles where required to suit system functionality

8.6.14.7 Refer to Appendix 1B - Room Data Sheets for additional room requirements.

8.6.14.8 The Design-Builder will a provide wireless microphone as part of the AV system for the Gymnasium Activity Space, the Multi-Purpose Space, the Learning Commons, the Indigenous Language & Culture Centre and the High Tech Boardroom.

8.6.14.9 AV system will use the structured cabling system and will be integrated with the Owner's data network.

8.6.14.10 The Design-Builder will provide audio DSP (digital signal processor) to process audio signals. Employ echo cancellation on all microphone inputs.

8.6.14.11 The Design-Builder will meet with the Owner to determine exact specifications of equipment, room configuration, set up, and commissioning.

8.6.14.12 The Design-Builder will provide training for Facility staff of all AV equipment.

8.6.14.13 Unless otherwise specified by the Owner, the training will commence at least one month prior to completion.

8.6.15 Theatre Sound System

8.6.15.1 Design performance sound reinforcement system as part of the theatre design.

8.6.15.2 Minimum system requirements:

(a) 24 channel digital mixer, with USB recording capability in sound booth.

(b) Digital signal processing, including equalization, compression, and feedback prevention.

(c) Pre-programmed settings accessed from locked control on stage to provide basic functionality without access to mixing console.

(d) 24 input points on stage, connected to sound booth.

(e) Final requirements and locations will be confirmed in consultation with the Owner during the design development.

8.6.16 Video Conferencing Systems

8.6.16.1 Refer to Appendix 1D - Systems Responsibility Matrix for system's scope and responsibility.

8.6.16.2 Refer to Appendix 1B - Room Data Sheets for room requirements.

8.6.16.3 The Design-Builder will design, procure and install all infrastructure for full video conferencing systems and infrastructure in all rooms requiring audio/video conferencing including the following locations:

(i) 2.01 Meeting Room;

(ii) 22.01 Flex Classroom(s);

(iii) 28.01 High Tech Board Room; and

(iv) Refer to Appendix 1B - Room Data Sheets for further locations.

8.6.16.4 The Design-Builder will provide and install the following in consultation with the Owner's IT representatives:

(a) Provide a complete and fully operational push-button video conferencing control solution;

(b) Provide minimum 1080p video conferencing camera; and

(c) Video conferencing system CODEC.

8.6.16.5 The audio/video conferencing systems will comply with the latest IP based video conferencing standards including Infocomm.

8.6.16.6 The audio/video conferencing systems will integrate with ZOOM and MS Teams for core functionality.

8.6.16.7 The Design-Builder will provide wiring infrastructure, connectors and any miscellaneous equipment required to make the video conference system functional and which are not listed in Appendix 1F – Furniture, Fixtures & Equipment List.

8.6.16.8 The Design-Builder will design the video conference and audiovisual rooms in accordance with industry standards including ANSI/INFOCOMM and IESNA.

8.6.16.9 Video conferencing systems will use the structured cabling system and will be integrated with the Owner's data network.

8.6.16.10 The Design-Builder will provide training for Facility staff of all video conferencing equipment unless otherwise specified by the Owner. The training will commence at least one month prior to completion.

8.6.17 Integration Requirements

8.6.17.1 The Design-Builder will:

(a) design, procure, install, commission and integrate network architectures and telecommunication, security, and other Facility systems in accordance with Appendix 1D - Systems Responsibility Matrix; and

(b) coordinate the design of such architecture and systems, including functionality, with the Owner's IT representatives.

8.6.18 Telephone Equipment

8.6.18.1 Basic Requirements

(a) Refer to Appendix 1B – Room Data Sheets for locations where telephone connectivity is required.

(b) Refer to Appendix 1D – Systems Responsibility Matrix for system's scope and responsibility.

(c) The Design-Builder will provide integration with UPS.

(d) Telephones will be VoIP, with equipment supplied by the Owner. The Design-Builder will confirm with the Owner prior to procurement for the exact specification of the Owner supplied system and the configuration. The Design-Builder will provide all necessary infrastructure including wiring to make the system fully operational.

8.6.18.2 Performance Requirements

(a) The telephone system will be on UPS with enough capacity to operate the entire system for 30 minutes.

(b) The Design-Builder will provide integration and interfacing with the PA system to permit paging from administrative telephones through the PA system.

(c) Field Quality Control

(i) Make observations to verify that units and controls are properly labeled, and interconnecting wires and terminals are identified.

(ii) Testing: thoroughly test system to verify that all system features are fully operational.

(d) The Owner will provide complete attendant and telephone user training as required to provide a successful operating system.

(e) Provide warranty and service during the Warranty Period. All parts and labour to be provided at no charge. Provide same day service for regular service if call has been entered during the morning of the working day. Provide an emergency service call response of within two hours for a major system breakdown or a total system failure.

(f) The Design-Builder will provide all the necessary telephone interface modules and paging zone modules to integrate with the PA system.

(g) The incoming telephone service will be ordered by the Owner. The physical conduits and duct banks from the utility service to the entrance facility are to be provided by the Design-Builder.

(h) The Design-Builder will provide record drawings and operation and maintenance manuals in accordance with this Agreement.

8.6.19 Public Address (PA)

8.6.19.1 Basic Requirements

(a) Refer to Appendix 1D - Systems Responsibility Matrix for system's scope and responsibility.

(b) The Design-Builder will provide and install all equipment to provide a fully operational public address system for the Building including:

(i) ceiling/wall mounted speaker assemblies;

(ii) paging horns;

(iii) call initiation switches;

(iv) built in master clock;

(v) amplifiers;

(vi) power supplies;

(vii) volume attenuators;

(viii) terminal equipment;

(ix) wiring;

(x) program sources; and

(xi) equipment racks and cabinets.

(c) It will be possible to readily connect the system to the PSTN (Public Switched Telephone Network) by connecting it to analog CO trunks.

(d) The public address system will allow the user to select any room to play isolated and room-specific announcements.

(e) The Design-Builder will integrate the PA system with the Owner's supplied VoIP telephone system. The Design-Builder will coordinate with the Owner during the design and provide all PA system components required for a fully integrated and functional system.

8.6.19.2 Performance Requirements

(a) The Design-Builder will comply with the following:

(i) field wiring will be terminated on wall adjacent to rack using Telco 66 type blocks with labelling to indicate final architectural room number;

(ii) provide one zone along each building elevation;

(iii) provide separate paging zones for common area speakers on different floors;

(iv) each classroom/instructional space will be individually zoned;

(v) provide public address in every occupiable room and space except for the Quiet Room and Sensory Rooms. Main electrical, mechanical and Communications Rooms will be provided with a public address system;

(vi) all hallway speakers will be tapped at 1 watt maximum;

(vii) all classrooms speakers will be tapped at ½ watt maximum;

(viii) all outside horns will be tapped at 7.5 watts maximum;

(ix) large rooms will be tapped at 2 watts maximum;

(x) all major components will be fully pluggable by means of multi-pin receptacles and matching plugs to provide for ease of maintenance and service;

(xi) cables within terminal cabinets, equipment racks will be grouped and bundled as to type and laced with No. 12 cord waxed linen lacing twine or T&B "Ty-Rap" cable. Edge protection material will be installed on edges of holes, lips of ducts or any other point where cables or harnesses cross metallic edge;

(xii) cable conductors will be colour-coded and individual cables will be individually identified;

(xiii) cable shielding will permit connection to common ground at point of lowest audio level and will be free from ground at any other point;

(xiv) cable shields will be terminated in the same manner as conductors;

(xv) the cable shields will be grounded at the equipment end and insulated at the speaker end. Use heat shrink for insulation at speakers;

(xvi) the Design-Builder will provide all necessary surge protection on the AC power feed and on all station lines leaving or entering the building;

(xvii) install equipment in accordance with manufacturer's written instructions;

(xviii) it is only acceptable to run exposed low-voltage wiring above readily accessible, continuous ceiling areas;

(xix) ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments. Measure, record, and report ground resistance;

(xx) the Design-Builder will mount a main distribution frame behind the Integrated Electronic Communications Network console. All wires will be laid down on terminal punch blocks and identified by the actual room location served. All the communications points will be wired into this main distribution frame, laid down in sequence, and identified by which line it is on and the point position it serves. The terminal punch blocks and wiring will not be accessible without tools;

(xxi) except where specifically noted otherwise, all equipment supplied will be the standard product of a single manufacturer of known reputation and minimum of 10 years' experience in the industry. The supplying contractor will have attended the manufacturer's installation and service school. A certificate of this training will be provided with the Design-Builder's submittal; and

(xxii) where practicable, all system components will be by Valcom, Inc.

(b) Acceptable product: Valcom Multipath V2924A, Telecor XL or acceptable equivalent.

(c) Refer to Appendix 1B - Room Data Sheets for locations requiring PA.

8.7 Division 28 – Electrical Safety & Security

8.7.1 Intrusion Detection

8.7.1.1 Basic Requirements

(a) Appendix 1D - Systems Responsibility Matrix provides a summary of the party's responsibilities related to design and construction of the building systems.

(b) The intrusion alarm system will be designed, supplied, installed, and commissioned by the Design-Builder.

(c) Electrical/security locking requirements to be confirmed with the Owner during design development. The intrusion alarm system will consist of a control panel, Passive Infrared Detectors (PIR), magnetic door alarm switches, programming keypads, and interior sirens.

(d) Intrusion detection systems will be installed in all areas where protection of physical assets is critical.

8.7.1.2 Performance Requirements

(a) The intrusion detection system will utilize Passive Infrared Detectors (PIR) to monitor activity. PIR's will be wall mounted on 4" x 4" outlet box complete with single gang mud ring.

(b) PIR's will be ceiling mounted dual element motion detectors complete with mounting. Acceptable Product: DSC-BV300DP complete with tamper and wire guards or acceptable equivalent.

(c) Gym motion detection units to be DSC-BV300DP complete with tampers and wire guards or acceptable equivalent.

(d) All PIR's will be field adjusted as per manufacturer's specs.

(e) All PIR's will have the LED's disabled after the initial testing is done.

(f) All perimeter doors require double door contacts.

(g) The Design-Builder will provide all devices, wiring and pathways.

(h) Magnetic door switches will be flush mounted in door frames and will be supervised by the Main Control Panel. Switches will be supervised and individually wired to terminal cabinet. Door switches to be Sentrol 1078 or acceptable equivalent.

(i) Sirens will be DSC 3015 or acceptable equivalent. These will be installed complete with siren drive and separate power supply. Install sirens in all interior building areas as required to provide

suitable coverage. (Audible siren will be easily heard at all exterior entrances from outside the building).

(j) Wire and cable will comply with the following requirements:

(i) 6C#22 AWG “Z” stranded cable FT4 rated for all powered detection devices and 4C #22 AWG “Z” cable to all door contacts.

(ii) 2C#18 AWG stranded cable, FT4 rated for sirens.

(k) PIR’s will be installed in all ground floor perimeter rooms, and all hallways.

(l) Glass breaks will be installed as required by CPTED and on all perimeter glazing below 4000mm from grade. Acceptable Product: CK 1625T complete with tamper or acceptable equivalent.

(m) The intrusion detection system will be armed and disarmed by keypads. Keypads are to be provided at a minimum one in the main office, MTRs, MER, Gym, entrances, exits, near main entrance and as per the Room Data Sheets. Provide one keypad next to alarm panel.

(n) Acceptable keypad product: Maxsys LCD4501 complete with LCD display or acceptable equivalent.

(o) All keypads except for the main control panel keypad will have arming/disarming and programming capability turned off via programming and will only be used for system status display.

(p) The intrusion alarm panel will be provided and installed adjacent to the fire alarm panel in the electrical room. The alarm panel will be powered by a dedicated 120V, 15A circuit and be provided with batteries and UPS power. The alarm panel will be enclosed in a BEL Products K Series, K201608, or acceptable equivalent, enclosure. A telecommunications outlet will be provided adjacent to the alarm panel for monitoring purposes.

(q) The security alarm control panel will be Maxsys DSC-4020KT, or acceptable equivalent, CPU complete with additional DSC-PC4116, or acceptable equivalent, expansion boards for required zones and digital communicator for remote monitoring.

(r) The Design-Builder will be responsible for all programming.

(s) The Owner will supply all access codes and phone numbers to be programmed into the alarm system.

(t) The panel will be programmed in the standard CID (contact id) format.

(u) The Design-Builder will program the following:

(i) user code to bypass zones as well as installer codes, and user codes provided by the Owner;

(ii) periodic test transmission daily; and

(iii) bell restore after 4 minutes.

(v) The Design-Builder will not install a contractor's lockout enabler and will not program the following without prior approval from the Owner:

(i) forced arming;

(ii) auto-arming; and

(iii) auto-disarming.

(w) The Design-Builder will not access the system either physically or remotely without Owner's approval.

(x) The intrusion alarm system will report independently from the fire alarm system.

(y) Telephone line will be used for the primary monitoring method. Provide a GSM radio model GSM 3060 for back-up.

(z) Provide programming for up to eight partitions. Coordinate required partitioning with the Owner.

(i) Partitioning will typically involve establishing one partition consisting of the General Office, Learning Commons and Computer room operated by one reader located outside the General Office. One partition will include the remainder of the building in a secondary school application. A site may include one partition shared by both the gym and public use areas served by a distinct entry (if separated by corridor doors).

(aa) Triad DCPC 4204 power supply and 16 volt, 37 VA ATCFT3716 transformer.

(bb) The panel power supply will be a minimum 37 VA. It will be hard wired to a dedicated, non-switched source (i.e.no plug-in type transformers) and the circuit number be clearly identified on both the electrical panel directory and on the alarm panel.

(cc) Provide the following form C contact points for the DDC contractor to connect to:

(i) System armed (DDC system to sweep off all lights controlled by the low voltage lighting system 15 minutes after arming). Provide 7 points to monitor 7 partitions.

(ii) System disarmed (DDC system to turn on corridor lights). Provide 7 points to monitor 7 partitions.

(iii) System in alarm (DDC system to turn on all interior and exterior lights controlled by the low voltage lighting system). Provide 7 points to monitor 7 partitions.

(iv) Provide one point for School lockdown alarm.

(v) Provide one point for monitoring intrusion alarm system trouble.

(dd) All field device wiring will home run in conduit to a splitter box (24” x 6" x 4") located above the alarm panel enclosure. Daisy chains are not permitted. Adequate interconnecting conduits will be provided between the splitter and alarm panel enclosure. All wiring will be minimum 18 AWG, 4-conductor LVT. Red LVT is not permitted. Provide additional alarm panels if required to suit layout.

(ee) Provide record drawings and operation and maintenance manuals in accordance with this Agreement.

(ff) The Design-Builder will install the intrusion alarm system according to the following requirements:

(i) Install main control panel in the main electrical room and connect to UPS supplied ac power supply, and provide dc standby power. Coordinate for provision, and placing into service, of associated telephone line for remote monitoring and WAN connectivity.

(ii) Install proximity readers with remote system status LED indicators as shown on the drawings. Status LED’s will be clearly visible through the glazing adjacent to the main entry doors to each module. Wire the proximity readers with 6C #22 shielded stranded cable. Status LED indicators will be LCD display keypads.

(iii) Wire the keypads with 4C#22.

(iv) Install door switches only on doors where other methods of protection are not feasible or practical or would be subject to damage or vandalism. Where installed, provide and coordinate rough-in with the Design-Builder to ensure rough-in scheduling is coordinated with wall and door frame construction and installation. Door switches will be flush mounted in door frames and will be supervised by the main control panel. Wire door switches with 4C #22 shielded stranded cable. Red and black wires are twisted together for a tamper loop.

(v) Passive infra-red detection units will be ceiling or wall mounted and adjusted on site as recommended by the manufacturer and system installer. All P.I.R. units are to be individually wired to the terminal boards. Leave 6 m of slack cable at each detector location to permit adjustment of location. Manufacturer and installer to review and advise on

each device location prior to final installation. Wire passive infrared detection units with 6C#22 shielded stranded cable and installation height should be at minimum 2250 mm.

(vi) All system devices will be individually wired to the control panel in minimum 20mm EMT conduit.

(vii) Terminate all wiring on BIX blocks. No compression splices are to be used.

(viii) Security system circuit boards are to be installed in the minimum number of cabinets. Provide large cabinets for boards and terminations. The area will have sufficient room to allow the equipment required to expand the final security system by 30%. Shop drawings will include a scaled cad layout drawing of the interior of the cabinet showing cabinet dimensions, equipment locations, cable runs and cable management. Show equipment catalogue numbers on drawing.

(ix) Allow for complete system programming of the system to meet the Owner's requirements.

(x) Test each device to ensure correct operation and that wiring is properly supervised.

(xi) Ensure devices (zones) are shown correctly on control panel and all annunciation devices.

(xii) Provide certificate of installation and acceptance to the Owner upon completion.

8.7.2 Access Control

8.7.2.1 Basic Requirements

(a) The access control system will be designed, supplied, installed, and commissioned by the Design-Builder.

(b) The Design-Builder will comply with the latest version of the BCBC.

(c) The Design-Builder will coordinate with Division 8 Openings to ensure hardware is compatible and meets the requirements.

(d) The access control system will be compatible with desktop computer and mobile applications on an iPhone/iPad.

8.7.2.2 Performance Requirements

(a) Electrical/security locking requirements to be confirmed with the Owner during design development. The Design-Builder will provide the following system:

(i) The system must be compatible with the Owner's current standards. Acceptable manufacturers: Kantech, Lenel or open architectural solution utilizing Mercury boards.

(ii) Kantech, Lenel or acceptable equivalent head end, door controller for every eight readers.

(iii) RS-485 cable connection will not be permitted.

(iv) Interconnection to security alarm control panel.

(v) Power supply similar to security alarm control panel.

(vi) Kantech, Lenel or acceptable equivalent, proximity reader system to scan, read and load code from user's key fob's or proximity cards and report back to the door controller. Mount behind dark tinted lexan flush to wall surface.

(vii) Acceptable Manufacturers: Kantech, Lenel Proximity cards, or acceptable equivalent, fully programmed to the Owner's requirements.

(viii) Individually zoned and annunciated system devices.

(ix) Programmable control panels via the remote monitoring station's software or the system alpha-numeric keypad.

(x) Arming and disarming of the systems will be provided at the proximity reader keyfob access stations located throughout the building and the main intrusion keypads. Each event will be monitored at the remote station for logging.

(xi) System installation and programming to disarm the intrusion alarm system and enter as follows:

1. Touch the keyfob to the reader;

2. Door will release and remain unlocked for 8 seconds; and

3. If the door remains closed, the alarm will not be disarmed.

(xii) Provide programming system status to the Owner's requirements. Programming must be completed by manufacturer's certified installers. A manufacturer issued certificate will be verified prior to start of programming to ensure ongoing support from the manufacturer's representatives.

(xiii) A connection from the door access control system to the fire alarm system to allow the Owner to optionally release all electric door locking devices. Install connection to fire alarm system and get confirmation in writing from the Owner if the option is to be activated or not. Demonstrate to the Owner that

the option has been installed and works correctly when activated.

(xiv) Operation of any alarm initiating device to:

1. Cause interior and exterior sirens to operate;
2. Transmit signal to remote monitoring station;
3. Display zone and alarm device on keypad display; and
4. Display steady red and green at all system status LED's.

(xv) The system status LED's on keypad display will display as follows:

1. Multi partition system will have displays indicating:
   a. "R" for Ready;
   b. "A" for Armed; and
   c. "N" for Not ready.
2. LED's on proximity readers will have displays indicating:
   a. Readers outside
      i) Remain red and are only green temporarily as access is granted.
   b. Readers inside
      i) System unarmed "Green";
      ii) System armed "Red"; and
      iii) System in alarm "Red Green".

(xvi) The system will be equipped for monitoring by the Owner's designated monitoring agency.

(b) The Design-Builder will provide power and data connections for Maintenance PC for remote access to BMS panel.

(c) The Design-Builder will provide power connections to all roll shutters, blinds, and blackout curtains as per Appendix 1B - Room Data Sheets.

(d) Not used.

(e) The Design-Builder will program the access control system to turn on or turn off the security alarm system based on which proximity

card reader is being activated. Coordinate all programming with the Owner.

(f) The Design-Builder will coordinate door strikes with door hardware installer as early as possible to ensure a coordinated system. No extra costs will be considered for failure to coordinate door strikes with the door hardware installer.

(g) The Design-Builder will provide full-length, bended astragals on fire exits leading to outside. These doors to be “exit” only.

(h) The Design-Builder will provide card readers or electronic access:

(i) at all doors where access control is specified in the Room Data Sheets; and

(ii) at all doors in rooms or spaces for which there is no Room Data Sheet except for the following doors, which may be provided with either electronic or conventional key access:

1. doors to service rooms including telecommunications, electrical, fire sprinkler and mechanical;

2. mechanical roll up doors or security grates;

3. exterior ‘Exit Only’ doors;

4. operable glazed walls or overhead folding walls; and

5. doors to areas identified by the Owner during the design phase.

(i) The Design-Builder will coordinate with the Owner during the design phase for all additional requirements.

(j) The Design-Builder will allow for special situations such as double doors.

(k) The Design-Builder will allow for flexibility in the security design including hardware and electronic safety and security requirements.

8.7.3 Video Surveillance (CCTV)

8.7.3.1 Basic Requirements

(a) The Design-Builder will provide a complete video surveillance system, hereinafter referred to as close circuit television system (CCTV) monitoring system including cameras, camera enclosures, video recorder and video management software.

(b) Provide interior cameras at main entrances and exterior cameras in locations to be determined in consultation with the Owner. The exterior cameras to provide full coverage of the site including walkways, parking and all high risk areas.

8.7.3.2 Performance Requirements

(a) The Design-Builder will provide:

(i) A wall mounted rack style cabinet for all equipment in the MTRs.

(ii) Wiring will consist of 4 pair CAT 6 Data Drop with purple jacket to each camera location and to the building LAN. Cabling will be in 21mm (3/4") conduit to the head-end equipment.

(iii) Eight hours of training to the Owner's Staff showing the operations and programming functions of the system. Provide manuals for all the equipment in the system.

(b) The Design-Builder will install, wire and program the entire system. Program the system to enable remote access through a web browser from any of the Owner's computer workstations. Adjust all camera settings and positions to the Owner's satisfaction.

(c) Acceptable camera manufacturers: D-Link, Avigilon or acceptable equivalent.

(d) The Design-Builder will provide D-Link Layer 3, 3130 PoE gigabit switches, or acceptable equivalent in consultation with the Owner and to match what the Owner is providing for the student data network.

(e) Sample of acceptable cameras (location dependent) will be as follows:

Type	Camera	Remarks	Mount
.1	1MP-HD-DOME-DN	Heater	Base mount
.2	1MP-HD-H264-DC1	3-9mm	Goosenec/Pendant
.3	3MP-HD-DOME-DN	Heater	Pendant and Base mount
.4	2MP-HD-DOME-DN	3-9mm/htr	Gooseneck mount
.5	2MP-HD-H264-D1	Heater	Base mount

(f) Approved Network Video Management system: Latest enterprise D-Link, Avigilon or acceptable equivalent.

(g) Video recording devices shall be appropriately sized to record minimum 15 FPS and a resolution of 1080P, from all installed security cameras and for a minimum of 30 days.

(h) System output will need to be compatible with Blue Iris VMS for video review and extraction from Owner offsite VMS. If D-Link cameras and switching platform (used by the Owner) is utilized, the Owner will have storage offsite available for this project (and thus, no storage shall be allowed for by Design Builder). If system other than D-Link is utilized, then Design Builder will provide local storage and will integrate to Owner VMS offsite in consultation with the Owner.

8.7.4 Panic Duress

8.7.4.1 The Design-Builder will provide a panic duress system as per the following requirements:

(a) Wired intercom panic duress stations in all parking areas. Duress stations will be placed in well-lit areas, spaced such that no spot may be more than a maximum of 30 m from a duress station, maximum of 15m from the parking area edge, and at all parking area entrances.

(b) Duress system will be supplied by UPS.

(c) Activation of a panic duress button will call the nearest fixed or PTZ cameras to zoom in on the activation location and increase record rate of cameras for duration of 90 seconds from time of activation. These cameras will have ability to pop-up and prioritize live viewing on monitors determined in consultation with the Owner.

(d) Activation of a panic duress button will be registered by the security system and an alarm will be generated to the appropriate staff as determined in consultation with the Owner and to an off-site monitoring station.

(e) Blue beacon/strobe light will be above each station. The beacon light will be illuminated at all times. And the strobe light will flash only when panic duress station is in use.

(f) The panic duress assembly will be heavy-duty vandal proof construction and removal of the cover will be monitored with a tamper switch.

8.7.5 Intercommunication System

8.7.5.1 Basic Requirements

(a) The Design-Builder will provide a fully operational intercommunication system including all required components.

(b) Intercom system will provide fast ‘duplex’ (hands-free at both ends) voice communication as required to provide instant intercommunications for employees, emergency paging and signaling, alarm distribution and audio program distribution. System will assist with personnel safety, facility security, security systems integration, operational efficiency and maintenance functions. The IP based intercom will be fully integrated with the access control system and CCTV system.

(c) The intercom design will comply with the following codes and standards:

(i) Electronic Industry Association ANSI/EIA/TIA;

(ii) National Electrical Manufacturers Association (NEMA);

(iii) Underwriters Laboratories UL 294, UL 639, and UL 1037, UL 1076; and

(iv) National Fire Protection Association (NFPA).

(d) The Design-Builder will provide and install all wiring for the intercom system as required and as recommended by the intercom system manufacturer.

(e) The Design-Builder will provide and install all intercom control units, ad-on control units and all miscellaneous hardware for a complete turnkey intercom system.

(f) The Design-Builder will coordinate with the Owner, configure and program the intercom system as required to suit operations of the Facility as directed by the Owner.

8.7.5.2 Performance Requirements

(a) The Design-Builder will provide intercom system with built-in camera at the following locations as the minimum:

(i) School main entrance;

(ii) receiving; and

(iii) other locations required by the Owner.

(b) The Design-Builder will interconnect intercom system and access control system for remote door release.

(c) Desk mount master station will include the following controls: dialing buttons; manual button for speech control and other functions; cancel button; privacy slide switch and variable volume control, speaker mounted in an acoustic baffle, microphone. Frequency response of input and output will be 300 to 7 kHz. Master will be in a modern housing, suitable for desk mounting, and have a six foot cord and plug with addition of a lightweight handset.

(d) Wall mount standard master station will function exactly like a standard desk master but with all controls, speaker and microphone mounted on an extruded aluminum face plate, suitable for wall mounting.

8.7.5.3 Acceptable manufacturer: Aiphone IX (Valcom multi-zone), or acceptable equivalent.

Part 9 Sitework

9.1 Division 31 - Site Works

9.1.1 Civil Engineering

9.1.1.1 Site Infrastructure

(a) Information with regards to off-site services is provided on the record drawings included in the Disclosed Data.

(b) The Design-Builder will be responsible for all utility connections to off-site services at the locations shown in the Disclosed Data in coordination with the Municipality of North Cowichan and City of Duncan.

9.1.1.2 Upon request by the Owner, the Design-Builder will provide the following test and inspections results:

(a) pipe bedding and surrounding material gradations test;

(b) trench backfill compaction tests;

(c) structural fill gradation and compaction tests;

(d) sub-base aggregate gradation and compactions tests;

(e) base aggregate gradation and compaction tests;

(f) marwill asphalt marwill mix analysis;

(g) asphalt core tests;

(h) concrete tests;

(i) watermain pressure tests;

(j) watermain disinfection and flushing tests;

(k) sanitary sewer water exfiltration tests;

(l) sanitary sewer CCTV inspections;

(m) storm sewer CCTV inspections, including catch basin leads; and

(n) minimum field density test frequency will be in accordance with ASTM D6938 as follows:

(i) Pipe bedding – one density test per 50 lineal metres of trench.

(ii) Trench Backfill – one density test per 50 lineal metres of trench material placed in maximum 300 mm lifts.

(iii) Granular Sub Base and Granular Base – one density test per 50 lineal metres of travelled lane of road on the sub base and the base material.

(iv) General Fill – one density test per 100 m^2 per lift placed in maximum 300 mm lifts.

(v) Proof – Roll testing on each travelled lane of road on the subgrade.

(vi) The completed on-site Servicing Quality Management Plan will be signed by a Professional Engineer registered in British Columbia and submitted to the Owner.

9.1.1.3 Storm Sewer and Drainage

(a) Prepare and submit an Integrated Stormwater Management Plan for the Site.

(b) Design and construct a storm drainage system for the Facility and on-site temporary works, complying with:

(i) Municipality of North Cowichan Engineering Standards, 1993 Schedule “B” Bylaw No. 1851;

(ii) North Cowichan Zoning Bylaw 1997 No. 2950;

(iii) The University Village Local Area Bylaw 3582; and

(iv) Storm Water and Rain Water Design Guidelines Municipality of North Cowichan.

(c) Design Considerations.

(i) Existing storm conveyance system within the Trans-Canada Highway Right-of-Way will not be used for site stormwater management or conveyance.

(ii) Integrate the landscape design aspects where possible, including drainage for the playing field.

9.1.1.4 Watermain Appurtenances

(a) Design and construct a water service to the Facility and connect to existing off-site works in coordination with the City of Duncan, and in accordance with the City of Duncan Bylaw No. 3158, 2017 and the City of Duncan Waterworks Regulation Bylaw No. 3204, 2019. Service to be sized to supply potable water, fire protection and irrigation.

(b) Size and demand will be provided to the City of Duncan for integration into its water distribution system computer model.

(c) Provide written notice to the City of Duncan at least 72 hours prior to connection to the off-site water system.

(d) System to be tested and approved prior to any connection to the existing watermain.

9.1.1.5 Sanitary Sewer

(a) Design and construct a sanitary sewer service to the Facility, and connect to off-site works, using the Municipality of North Cowichan

Engineering Standards, 1993 Schedule “B” Bylaw No. 1851, and The University Village Local Area Bylaw 3582.

9.1.1.6 Road Works Minimum Standards

(a) Design and construct roadways and pathways, including the pavement, curbs and gutters, sidewalks, walkways, running path, signage and pavement markings in accordance to Municipality of North Cowichan Engineering Standards, 1993 Schedule “B” Bylaw No. 1851.

(b) Parking lots and driveways will be paved with hot-mix asphaltic concrete.

(c) Pavement structure will meet recommendations by a geotechnical engineer.

(d) Asphalt surface grades in parking lots and driveways will be a minimum of 1.0% slope and will not exceed 3.5% slope.

(e) Concrete gutter grades in parking lots will be a minimum of 0.7%.

(f) Curbs, gutters, and sidewalks will be concrete type, unless otherwise specified herein. The concrete curb and gutter will be non-mountable.

(g) Provide speed control and traffic calming design measures.

(h) Vehicular Routes

(i) Site Access:

1. 7.5m width;
2. 75mm asphalt;
3. 100mm base;
4. 300mm subbase; and
5. approved compacted subgrade.

(ii) Bus Only Site Exit / Alternate emergency vehicle access:

1. 6.0m width;
2. 75mm asphalt;
3. 150mm base;
4. 300mm subbase; and
5. approved compacted subgrade

(iii) Parking lot:

1. 75mm asphalt;
2. 100mm base;
3. 300mm subbase; and
4. approved compacted subgrade.

(iv) TED Compound:

1. 100mm asphalt;
2. 150mm thick, 3m reinforced concrete apron at doors;
3. 100mm base;
4. 300mm subbase; and
5. approved compacted subgrade.

(v) Off-street loading:

1. 6m concrete apron~~;~~
2. 150mm reinforced concrete;
3. 100mm base;
4. 300mm subbase; and
5. approved compacted subgrade.

(vi) Waste / Recycling:

1. concrete pad to suit waste / recycling bins;
   a. bins will be provided by the Owner;
2. 150mm reinforced concrete;
3. 100mm base;
4. 300mm subbase; and
5. approved compacted subgrade.

(i) Pedestrian Routes

(i) Primary Walkway:

1. 3.0m width;

2. 100mm concrete or 150mm concrete when combined with mountable curb or driveway crossing;

3. 50mm base;

4. 150mm subbase; and

5. approved compacted subgrade.

(ii) Secondary Walkway:

1. 2.0m width;

2. 100mm concrete or 150mm concrete when combined with mountable curb or driveway crossing;

3. 50mm base;

4. 150mm subbase; and

5. approved compacted subgrade.

(iii) Running Path and shared bike pathway:

1. 2.1m width minimum (Running Path);

2. 3.0m width minimum (Shared bike pathway);

3. 75mm of decomposed granite “pathway mix” with stabilizing binders;

4. 100mm crushed base course;

5. approved compacted subgrade; and

6. appropriate edging material.

9.1.1.7 Fences and Gates

(i) Fencing will be provided around the perimeter of the Site, from the service entry drive aisle, along the Trans-Canada Highway, and along the property line along the northwest edge of the Site to the bus lane.

(ii) Will be a minimum of 1830mm high, except along the perimeter of the Multi-Purpose Field, which will be 4500mm high.

(iii) Fence materials will be chain-link, designed and fabricated to guarantee a minimum 40-year lifetime.

(iv) Fencing will be black, vinyl-coated.

(v) Fences will be installed as per manufacturer’s directions.

(vi) Limit total settlement of fencing to 12mm maximum over the Design Life of the Building.

(vii) Provide lockable steel swinging gate at the service area entrance from University Way.

(viii) Provide securable chainlink vehicular access gate at the corner of Trans-Canada Highway and Beverly Street.

9.2 Division 32 – Earthworks

9.2.1 The civil design requirements apply to those aspects of the design that pertain to the Site, underground utilities, roads on-site and off-site, and storm drainage.

9.2.2 Buried utilities will be provided in accordance with the Municipality of North Cowichan Engineering Standards, 1993 Schedule “B” Bylaw No. 1851.

9.2.3 Refer to:

9.2.3.1 geotechnical and environmental information in the Disclosed Data;

9.2.3.2 bylaws around trucking and soil removal; and

9.2.3.3 erosion and sediment control as outlined in the Fisheries and Oceans Canada & Ministry of Water, Lands, and Air Protection handbook entitled “Land Development Guidelines for the Protection of the Aquatic Habitat, September 1993” and Environmental Best Management Practices for Urban and Rural Land Development.

9.3 Division 33 - Off-Site Improvements

9.3.1 The Design Builder will comply with and construct all off-site improvements in accordance to Municipality of North Cowichan Engineering Standards, 1993 Schedule “B” Bylaw No. 185 provided and City of Duncan Waterworks Regulation Bylaw No. 3204, 2019 in the Disclosed Data.

9.3.2 Civil Engineering

9.3.2.1 Road works

(a) Design and construct roadways and pathways, including the pavement, curbs and gutters, sidewalks, walkways, bike lanes, signage and pavement markings in accordance to Municipality of North Cowichan Engineering Standards, 1993 Schedule “B” Bylaw No. 1851.

(b) Curbs, gutters, and sidewalks will be concrete type, unless otherwise specified herein. The concrete curb and gutter will be non-mountable.

(c) Vehicular Routes

(i) Bus Only Site Exit / Alternate emergency vehicle access:

1. 6.0m width;
2. 75mm asphalt;
3. 100mm base;
4. 300mm subbase; and
5. approved compacted subgrade.

(d) Pedestrian Routes

(i) Sidewalk:

1. 1.5m width;
2. 100mm concrete or 150mm concrete when combined with mountable curb or driveway crossing;
3. 50mm base;
4. 150mm subbase; and
5. approved compacted subgrade.

9.4 Division 34 – Utilities

9.4.1 Sanitary Sewer

9.4.1.1 Provide sanitary sewer service for the Site in accordance with applicable bylaws of the Municipality of North Cowichan.

9.4.1.2 Service connection location to the North Cowichan infrastructure are shown on the record drawings located in the Disclosed Data.

9.4.1.3 Minimum service from the Building will be 150mm at a minimum grade of 1.0%.

9.4.1.4 Existing sanitary sewer system is shown on the record drawing located in the Disclosed Data.

9.4.2 Storm Sewer

9.4.2.1 Provide storm sewer service for the Site in accordance with applicable bylaws of the Municipality of North Cowichan and the following:

(a) post-development peak flow rate will be limited to pre-development peak flow rate for events up to and including the 200 year event; (Note: a copy of the “Cowichan Secondary School Replacement Project - Downstream Storm System Capacity Summary” dated August 6, 2021 has been provided to the Design-Builder for reference purposes.)

(b) temporary on site flooding in areas such as sports fields and parking areas is acceptable during extreme storm events (100 year return period or greater), with drawdown times not exceeding 72 hours. Access for emergency vehicles must be maintained at all times; and

(c) design stormwater detention areas suitable for the flood plain extents and elevations as outlined in the CVRD Floodplain map titled "COWICHAN-KOKSILAH FLOODPLAIN MAPPING PROJECT – 200 YEAR FLOOD WITH YEAR 2100 CLIMATE CHANGE SCENARIO FLOODPLAIN MAP, SHEET 2 OF 7" dated 17-FEB-2021 by Northwest Hydraulic Consultants.

9.4.2.2 Existing storm sewer system and service connection location to North Cowichan infrastructure are shown on the record drawings located in the Disclosed Data. Stormwater discharge directly to the Trans-Canada Highway right of way is also acceptable at pre-development rates, subject to compliance with Section 9.4.2.1.

9.4.3 Water Supply and Fire Protection

9.4.3.1 Provide water service for the Site in coordination with the City of Duncan, and in accordance with the City of Duncan Bylaw No. 3158, 2017 and the City of Duncan Waterworks Regulation Bylaw No. 3204, 2019.

9.4.3.2 Water supply to meet the demand outlined by the mechanical engineer for both domestic and fire protection. Service to be sized for a sprinkler system.

9.4.3.3 Existing and abandoned water service is shown on the record drawings in the Disclosed Data.

9.4.3.4 Verify existing hydrant spacing to ensure fire hydrants to be location within 45m of fire department Connection and to meet Fire Underwriters Survey (FUS) requirements.

9.4.3.5 The building supply to be designed such that the FUS calculated requirement is below what the City of Duncan water system can provide.

9.5 Temporary Works

9.5.1 Services and Systems

9.5.1.1 As stipulated throughout this Statement of Requirements, the Design-Builder is accountable for the implementation and metering of any required services or systems servicing the construction of the Facility, including water, sewer, drainage, power, gas, communication and accommodation.

9.5.2 Other Requirements

9.5.2.1 During the construction period, the Design-Builder will:

(a) have the sole responsibility for the design, erection, operation, maintenance and removal of temporary services, structures and other temporary facilities and the design and execution of construction methods required in their use; and

(b) provide its own services necessary for the Design-Builder's construction use including power, internet service, telephone, water and sewage; and provide on-Site temporary private workspace for the Owner. The temporary workspace provided will:

(i) include a conference room sufficient for a minimum of eight people to meet;

(ii) include at least two private offices with a minimum floor area of 9.0 m2 each;

(iii) be accessible to the Owner at all times;

(iv) be heated and cooled to a temperature of 20 to 22°c;

(v) be constructed and equipped to normal North American standards for construction site offices;

(vi) include all facilities, furniture, and fixtures required for a fully functional site office including lighting, power, potable water and all physical infrastructure required for telephone and internet connections;

(vii) include secure lockable doors on all offices and conference space;

(viii) include direct access to washrooms facilities; and

(ix) include a levelled parking area for five vehicles on Site, in close proximity.