SPECIFICATION

for

POWELL RIVER SAR STATION

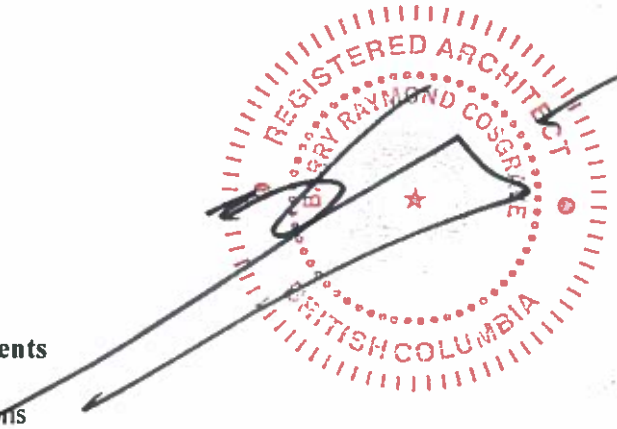
4315 marine Drive
Powell River, BC

Project No. 2016521

prepared for: Fisheries and Oceans, Real Property

September 27, 2017

SPECIFICATION



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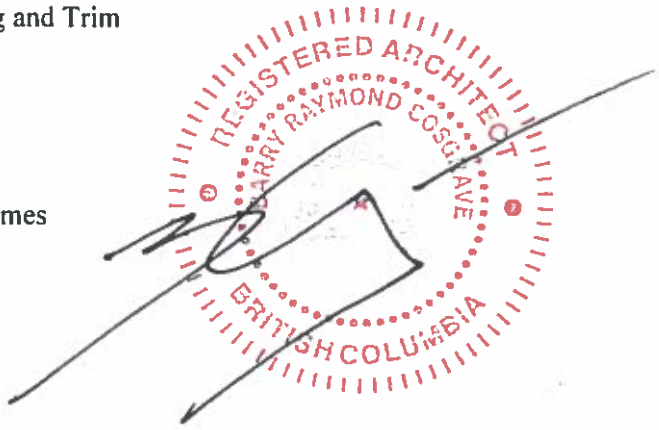

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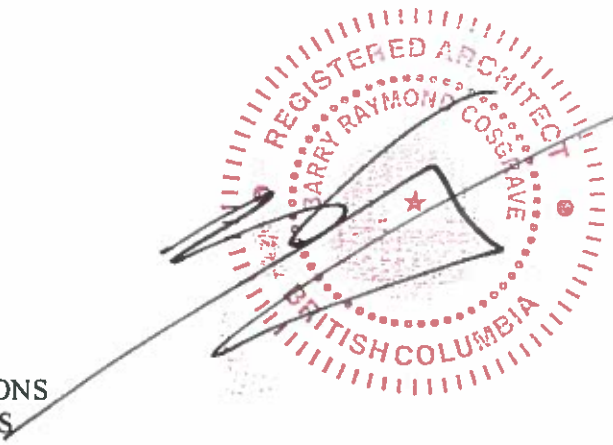

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Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

Work of this Contract comprises the general construction of the Powell River Search and Rescue station. The station is a combination of modular and wood frame construction. The station is to be constructed on a concrete foundation.

The Owner will supply the aluminum structural frame and all of the fasteners required for the assembly of this frame. Fasteners used to attach the frame to the foundation to be provided by the Contractor. Shop drawings and construction details will be provided for these components. The contractor will provide and install the steel floor decking.

The contractor will supply the insulated roof, floor and wall panels, associated flashings and all of the fasteners for the attachment of these panels. Shop drawings and construction details are to be provided for these components

The contractor will be responsible for erecting the pre fab structure, insulated panels wood trusses and conventional framing. The contractor will also supply and install all windows and doors, exterior rainscreen and cladding. All interior construction and electrical and mechanical components to be supplied and installed by the contractor under this contract. Interior finishes including but not limited to flooring, interior wall framing, finishes and painting, millwork and fixtures are to be supplied and installed by the contractor. Refer to individual specification sections and drawings.

1.2 CONTRACT METHOD

.1 Construct Work under a stipulated price contract.

1.3 CONTRACT DOCUMENTS

.1 The Contract documents, drawings and specifications are intended to complement each other, and to provide for and include everything necessary for the completion of the work.

.2 Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the work.

1.4 DIVISION OF SPECIFICATIONS

.1 The specifications are subdivided in accordance with the current 6-digit National Master Specifications System.

.2 A division may consist of the work of more than 1 subcontractor. Responsibility for determining which subcontractor provides the labour, material, equipment and services required to complete the work rests solely with the Contractor.

.3 In the event of discrepancies or conflicts when interpreting the drawings and specifications, the specifications govern.

1.5 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy of each document as follows:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed Shop Drawings.
.5 Change Orders.
.6 Other Modifications to Contract.
.7 Copy of Approved Work Schedule.
.8 Health and Safety Plan and Other Safety Related Documents.
.9 Other documents as specified.

1.6 WORK SCHEDULE

.1 Provide a schedule of work within 5 days of contract award and observe the following requirements

.1 Work must be completed by August 31, 2018
.2 Whenever variation from the schedule in excess of 3 working days occurs or is expected to occur, notify the Departmental Representative and provide a revised schedule
.3 Hours of work will be restricted to conform with municipal noise bylaws when work generates noise.

1.7 COST BREAKDOWN

.1 Before submitting the first progress claim, submit a breakdown of the Contract lump sum prices in detail as directed by the Departmental Representative and aggregating Contract price.

1.8 SITE CONDITIONS

.1 It will be the responsibility of the contractor to visit the site prior to the Submission of Tenders and make themselves thoroughly acquainted with the conditions at the site and to make whatever inquiries that are necessary to familiarize themselves with all conditions likely to affect the work.

1.9 CONTRACTOR USE OF PREMISES

.1 The contractor's use of site will be limited to the immediate area of the work and areas assigned by the Departmental Representative for site office placement, equipment, material stock piles, sanitary facilities, etc.

.2 Co-ordinate use of premises under direction of Departmental Representative.

.3 The contractor will provide sanitary facilities for the work force in accordance with governing regulations and ordinances.

.4 Departmental Representative will designate areas for parking, material storage, recycling storage and a site office. Maintain these areas clean and free of construction related

debris. Make good damages resulting from contractors use of these areas at no cost to the contract.

1.10 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

.3 All work is to be performed in accordance with Worksafe B.C. regulations, Labour Canada regulations, and all applicable municipal statutes and authorities having jurisdiction. In the event of conflict between any provisions the most stringent provision will apply.

.4 Ensure that all employees have received appropriate WHIMIS training and that all necessary MSDS information is available on site.

1.11 PERMITS, FEES AND NOTIFICATIONS

.1 Building permit fee to be paid for by owner.

.2 Obtain and pay for all additional permits and fees.

1.12 SUBMITTALS

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Where specified, submit drawings stamped and signed by professional engineer registered or licensed in British Columbia.

.3 Submit shop drawings in .PDF format.

.4 Allow 5 working days for Consultant review of shop drawings.

1.13 ADDITIONAL DRAWINGS

.1 The Departmental representative may furnish additional drawings for clarification. These additional drawings have the same meaning and intent as if they were included with plans referred to in the contract documents.

1.14 RECORD DRAWINGS

.1 As work progresses, maintain accurate records to show all deviations from the contract documents. Record these changes on a clean set of drawings used only for this purpose. Record changes in red ink. At completion, supply the Departmental Representative with one set of drawings and specifications with all changes clearly marked

1.15 ENVIRONMENTAL PROTECTION

.1 Comply with Federal, Provincial and Municipal laws orders and regulations concerning the protection of the environment and the control and abatement of soil, water, and air pollution.

.2 Place all waste, debris and lightweight materials in enclosed bins or under secure covers.

.3 Do not dispose of wastes or volatile materials into water courses, storm or sanitary sewers.

.4 All construction equipment to be in good working order, free of leaks that would contaminate the site

1.16 TEMPORARY FACILITIES

.1 The contractor is responsible for supplying potable water necessary for construction purposes to the site

.2 The Contractor is responsible for supplying temporary power for construction purposes to the site. Contractor to provide all temporary equipment and lines to bring the power supply to the work at no additional cost to the contract.

.3 Provide and maintain temporary fire protection required by the governing codes, bylaws and regulations during the performance of the work.

.4 Provide appropriate sanitary facilities for the workforce. Locate where directed by Departmental Representative.

.5 Contractor to provide temporary office of sufficient size to accommodate site meetings and store documents required on site. Furnish with a drawing laydown table.

.6 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.7 Provide and maintain scaffolding and ladders.

.8 Provide fencing, hoarding and barriers as required to prevent public access to the worksite and as required by the Departmental Representative.

.9 Remove any temporary services or facilities after completion of the work and make good any damage to conditions previously existing or to match new work as acceptable to the Departmental Representative.

1.17 EXECUTION

.1 Execute cutting, fitting, and patching to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.7 Fit Work to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.8 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.18 MATERIALS AND EQUIPMENT

.1 Use new materials unless otherwise specified

1.19 OWNER OCCUPANCY

.1 Owner will occupy dock and premises adjacent to the work site during entire construction period for execution of normal operations.

.2 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

.3 Maintain single lane access to the adjacent wharf during the duration of construction.

1.20 OWNER FURNISHED ITEMS

.1 Owner Responsibilities:

.1 Provide shop drawings and materials necessary to construct the aluminum structure.

.2 Aluminum Structure: Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to the Contractor.

.1 Arrange and pay for delivery to site in accordance with Progress Schedule.

.2 Inspect deliveries with contractor; record shortages, and damaged or defective items.

.2 Contractor Responsibilities:

.1 Designate submittals and delivery date for each product in progress schedule.

.2 Aluminum Structure:

.1 Review shop drawings, product data, samples, and other submittals. Submit to Consultant notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.

.2 Inspect deliveries with the Departmental Representative; Inform representative of missing or damaged items.

.3 Aluminum Panel system: Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to the Departmental Representative.

.1 Arrange and pay for delivery to site in accordance with Progress Schedule.

.2 Receive and unload products at site.

.3 Inspect deliveries; record shortages, and damaged or defective items.

.4 All construction materials including aluminum panel and aluminum structure.

.1 Arrange for replacement of damaged, defective or missing items.

.2 Submit claims for transportation damage.

.3 Handle products at site, including uncrating and storage.

.4 Protect products from damage, and from exposure to elements.

.5 Assemble, install, connect, adjust, and finish products.

.6 Provide installation inspections required by public authorities.

.7 Repair or replace items damaged by Contractor or subcontractor on site (under his control).

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.10 Keep one reviewed copy of each submission on site.

1.2 HEALTH AND SAFETY PLAN

.1 Submit site specific Health and Safety Plan, MSDS and WHMIS documents requested in Section 01 35 30 - Health and Safety

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.3 Allow 5 days for Departmental Representative's review of each submission.

.4 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.5 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.6 Accompany submissions with electronic transmittal, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Indicate the specification section and paragraph number that applies to the shop drawing that is being submitted.
  - .1 Ensure that each shop drawing clearly refers to the requirements of the stated specification section.
- .5 Identification and quantity of each shop drawing, product data and sample.
- .6 Other pertinent data.

.7 Submissions include:

- .1 Date and revision dates.
- .2 Project title, number and applicable specification section.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

.8 After Departmental Representative's review, distribute copies.

.9 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.10 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.11 Submit electronic copies of manufacturers instructions for requirements requested in Specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.12 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative

.13 Submit 2 hard copies and electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.14 Delete information not applicable to project.

.15 Supplement standard information to provide details applicable to project.

.16 If upon review by Departmental Representative no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.17 The review of shop drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of work of sub-trades.

1.4 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid, one of each sample to Departmental Representatives office and Prime Consultant’s office.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of digital photography in jpg format, standard resolution as directed by Departmental Representative.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints: 4 locations.

.1 Viewpoints and their location as determined by Departmental Representative.

.4 Frequency of photographic documentation: weekly and as follows

.1 Upon completion of: Framing and services before concealment.

1.6 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 Province of British Columbia

.1 Workers Compensation Act, RSBC 1996 - Updated 2006.

.2 Occupational Health and Safety Regulation.

.4 National Building Code of Canada (NBC)

.1 Part 8, Safety Measures at Construction and Demolition Sites.

1.2 WORKERS COMPENSATION BOARD COVERAGE

.1 Comply fully with Workers' Compensation Act, regulations, and orders made pursuant thereto and any amendments up to the completion of work

.2 Maintain Workers' Compensation Board coverage during term of Contract, until and including date that Certificate of Final Completion is issued.

1.3 COMPLIANCE WITH REGULATIONS

.1 The Departmental Representative may terminate Contract without liability to Canada where Contractor, in the opinion of the Departmental Representative, refuses to comply with a requirement of Workers' Compensation Act or Occupational Health and Safety Regulations.

.2 Contractor is responsible to ensure that all workers are qualified, competent and certified to perform work as required by Workers' Compensation Act or Occupational Health and Safety Regulations.

1.4 SUBMITTALS

.1 Submit to Department Representative submittals listed for review.

.2 Work effected by submittal will not proceed until review is completed.

.3 Submit the following:

.1 Health and Safety Plan.

.2 Copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.3 Copies of incident and accident reports.

.4 Copies of Material Safety Data Sheets and all other documents required by Workplace Hazardous Materials Information System (WHMIS) requirements.

.5 Emergency procedures

.4 Submission of Health and Safety Plan and any revised version to the Departmental Representative is for information and reference purpose only. It will not:

.1 Be construed to imply as approval by Department Representative

.2 Be interpreted as warranty of being complete, accurate, and compliant.

.3 Relieve the Contractor of his legal obligations for provision of health and safety for the project.

.5 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

1.5 WORK PERMITS

.1 Obtain speciality permit(s) related to the project before start of work

1.6 FILING OF NOTICE

.1 Complete and submit Notice of Project as required by Provincial authorities.

.2 Provide copies of all notices to Department Representative.

1.7 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.8 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.9 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.10 GENERAL CONDITIONS

.1 Provide safety barricades and lights at work site as required to provide safe working environment for workers

.2 Ensure that non-authorized persons are not allowed in designated construction areas and work site.

.1 Provide appropriate means by use of barricades, fences, and warning signs.

1.11 REGULATORY REQUIREMENTS

.1 Comply with specified codes, acts, bylaws, standards, and regulations to ensure safe operations at site.

.2 In the event of conflict between any provision of above authorities, the most stringent provision will apply.

1.12 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.13 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations having jurisdiction and advise Departmental Representative verbally and in writing.

1.14 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience specific to activities associated with the work outlined in the Contract.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.5 Be on site during execution of work.

1.15 HAZARDOUS PRODUCTS

.1 Comply with the requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Departmental Representative and in accordance with Canada Labour Code.

1.16 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations having jurisdiction, and in consultation with Departmental Representative.

1.17 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected. The Contractor will be responsible for costs arising from such "stop work order".

1.18 CONFINED SPACES

.1 Carry out work in confined spaces in compliance with Provincial regulations.

1.19 OVERLOADING

.1 Ensure no part of the work is subject to a load which will endanger its safety or will cause permanent deformation

1.20 SCAFFOLDING

.1 Design, construct, and maintain scaffolding in a rigid, secure, and safe manner, in accordance with CSA Z797 and BC Occupational Health and Safety Regulations.

1.21 FIRE SAFETY REQUIREMENTS

.1 Store oily/paint soaked rags, waste products, and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis

.2 Handle, store, use and dispose of inflammable and combustible materials in accordance with the National Fire Code of Canada.

1.22 FIRE PROTECTION

.1 Do not use fire hydrants, standpipes, and hose systems for purposes other than firefighting

.2 Be responsible/liable for cost incurred from fire department, building owner, and tenants, resulting from false alarms

1.23 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

END OF SECTION

Part 1 General

1.1 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

.3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.2 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.6 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.7 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.8 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.3 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

.2 Transportation cost of products supplied by Owner will be paid for by Departmental Representative. Unload, handle and store such products.

1.4 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions. Departmental Representative will establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.5 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed.

.2 Do not employ anyone unskilled in their required duties.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative whose decision is final.

1.6 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.7 CONCEALMENT

.1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

1.8 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.9 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Departmental Representative of conflicting installation. Install as directed.

.3 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.10 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.11 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.12 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Coast Guard personnel and by Other Contractors.

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide on-site containers for collection of waste materials and debris. Locate where directed by Departmental Representative.

.5 Provide and use clearly marked separate bins for recycling wherever facilities are available. Refer to Section 01 74 19 - Waste Management and Disposal for additional requirements.

.6 Remove waste material and debris from site and deposit in waste containers at end of each working day. Dispose of waste materials and debris off site.

.7 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.8 Store volatile waste in covered metal containers and remove from premises at end of each working day.

.9 Provide adequate ventilation during use of volatile or noxious substances. Do not use building ventilation system for this purpose.

.10 Use only cleaning materials recommended by manufacturer of surface to be cleaned and as recommended by cleaning material manufacturer.

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

2 FINAL CLEANING

.1 When Work is substantially completed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others and leave Work clean and suitable for occupancy.

.3 Prior to final review, remove surplus products, tools, construction machinery and equipment.

.4 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate and mechanical/electrical fixtures. Replace broken, scratched and disfigured glass.

.5 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls and floors.

.6 Clean lighting reflectors, lenses and other lighting surfaces.

.7 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.8 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.9 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.10 Remove dirt and other disfiguration from exterior surfaces.

.11 Clean and sweep roofs, gutters, areaways and sunken wells.

.12 Sweep and wash clean paved areas and all pavement parking/storage areas used by Contractor to remove all traces of construction spillage, stains and residue. Do not blast dirty water onto adjacent buildings and site features.

.13 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.14 Clean roofs, downspouts and drainage systems.

.15 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for re-use and for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Waste goals.

.2 Waste management plan.

.3 Waste management plan implementation.

.4 Disposal of waste.

1.2 DEFINITIONS

.1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.

.2 Construction and Demolition Waste: Solid wastes typically including but not limited to, building materials, packaging, trash, debris, and rubble resulting from construction, re-modelling, repair and demolition operations.

.3 Hazardous: Exhibiting the characteristics of hazardous substances including, but not limited to, ignitability, corrosiveness, toxicity or reactivity.

.4 Non-hazardous: Exhibiting none of the characteristics of hazardous substances, including, but not limited to, ignitability, corrosiveness, toxicity, or reactivity.

.5 Non-toxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

.6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and re-manufactured into a new product for reuse by others.

.7 Recycle: To remove a waste material from the Project site to another site for re-manufacture into a new product for reuse by others.

.8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.9 Return: To give back reusable items or unused products to vendors for credit.

.10 Reuse: To reuse a construction waste material in some manner on the Project site.

.11 Salvage: To remove a waste material from the Project site to another site for resale or reuse by others.

.12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

.13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

.14 Toxic: Poisonous to humans either immediately or after a long period of exposure.

.15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

.16 Volatile Organic Compounds (VOC): Chemical compounds common in and emitted by many building products over time through outgassing:

.1 Solvents in paints and other coatings,

.2 Wood preservatives; strippers and household cleaners,

.3 Adhesives in particle board, fibreboard, and some plywood; and foam insulation,

.4 When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.

.17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.3 WASTE MANAGEMENT GOALS

.1 Owner has established that this Project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors shall be employed. The owners goal is to divert 75% of waste materials from the landfill.

.2 Owner recognizes that waste in any project is inevitable, but indicates that as much of the waste materials as economically feasible shall be reused, salvaged, or recycled.

.3 Waste disposal in landfills shall be minimized.

1.4 MATERIAL SOURCE SEPARATION PLAN

.1 Before project start-up, prepare Materials Source Separation Program. Provide separate containers for re-usable and/or recyclable materials of following:

.1 Construction waste: including but not limited to following types.

.1 Uncontaminated packaging (wood, metal banding, cardboard, paper, plastic wrappings, polystyrene).

.2 Wood pallets (recycle or return to shipper).

.3 Batt insulation.

.4 Metals (pipe, conduit, ducting, wiring, miscellaneous cuttings)

.5 Wood (uncontaminated).

.6 Gypsum board (uncontaminated).

.7 Paint, solvent, oil.

.8 Other materials as indicated in technical sections.

.2 Administration/worker waste (uncontaminated): including but not limited to following types.

.1 Paper, cardboard.

.2 Plastic containers and lids marked types 1 through 6.

.3 Glass and aluminum drink containers (recycle or return to vendor).

.2 Implement MSSP for waste generated on project in compliance with approved methods and as approved by Departmental Representative.

.3 Locate containers in locations, to facilitate deposit of materials without hindering daily operations and as directed by Departmental Representative.

.4 Locate separated materials in areas which minimize material damage.

1.5 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.

.2 Unless specified otherwise, materials for removal becomes Contractor's property.

.3 All materials for recycling must be source separated into separate bins to be accepted by the local processing authority.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.5 Protect surface drainage, storm sewers, sanitary sewers, and utility services from damage and blockage.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 PREPARATION

.1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.

3.3 WASTE MANAGEMENT IMPLEMENTATION

.1 Manager: Contractor to designate an on-site party responsible for instructing workers and overseeing the results of the Waste Management Plan the Project.

.2 Instruction: Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the Project.

.3 Separation facilities: Contractor shall lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, and return. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.

.4 Hazardous wastes: Hazardous wastes shall be separated, stored, and disposed of according to local regulations.

.1 Dispose or recycle demolished asphalt paving in accordance with local bylaws.

3.4 DISPOSAL OF WASTE

.1 Burying of rubbish and waste materials is prohibited.

.2 Disposal of waste into waterways, storm, or sanitary sewers is prohibited.

3.5 COORDINATION

.1 Coordinate disposal of demolished concrete slab with Municipality. Contractor to load demolished material onto trucks provided by the Municipality. Municipality to haul debris to disposal site. Contractor responsible for arranging for disposal site and payment of tipping fees.

3.6 CLEANING

.1 Remove tools and waste materials on completion of work, and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

.3 Source separate materials to be reused/recycled into specified sort areas.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

.1 Contractor's Inspection: Contractor and all subcontractors to conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Departmental Representative in writing of satisfactory completion of inspection and submit verification that corrections have been made.

.2 Request Departmental Representative's inspection.

.2 Departmental Representative's Inspection:

.1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Certificates required by authorities having jurisdiction have been submitted.

.4 Operation of systems have been demonstrated to the owner’s personnel

.5 Work is complete and ready for final inspection.

.4 Declaration of Substantial Performance: When Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

.5 Commencement of warranty period: Date of Departmental Representatives acceptance of substantial performance to be the date for commencement for warranty period.

.6 Payment of Holdback: after issuance of Substantial Performance of work, submit application for payment of holdback amount in accordance with contractual agreement.

.7 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by Departmental Representative.

.2 If work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

.8 Final Payment

.1 When Departmental Representative considers final deficiencies and defects corrected and requirements of contract met, make application for final payment.

.2 When work deemed incomplete by Departmental Representative complete outstanding items and request re-inspection.

1.2 FINAL CLEANING

.1 Remove surplus materials, excess materials, rubbish tools and equipment.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Closeout submittals

.2 Operation and maintenance manual format.

.3 Contents each volume.

.4 Recording actual site conditions.

.5 Record (as-built) documents and samples.

.6 Record documents.

.7 Warranties and bonds.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.3 CLOSEOUT SUBMITTALS

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Submit preliminary copy for consultant review

.3 Copy will be returned with Consultant's comments.

.4 Revise content of documents as required prior to final submittal.

.5 Two weeks prior to Substantial Performance of the Work, submit to the Consultant, four final copies of operating and maintenance manuals in Canadian English.

.1 One copy of the manual to be provided in digital form on CD rom, in Canadian English.

.6 Ensure spare parts, maintenance materials and special tools required in individual specification sections are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.7 If requested, furnish evidence as to type, source and quality of products provided.

.8 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.9 Pay costs of transportation.

1.4 OPERATION AND MAINTENANCE MANUAL FORMAT

.1 Organize data in the form of an instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: Identify each binder with type or printed title “MAINTENANCE MANUAL”'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide both .PDF electronic copy and hard copy submissions

.10 Coordinate with commissioning specification to include all related close out documentation, warranty and test reports.

1.5 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;

.1 date of submission;

.2 names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties; and

.3 schedule of products and systems, indexed to content of volume.

.2 For each product or system, list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

.4 Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

1.6 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of black line opaque drawings, and within the Project Manual, provided by Owner.

.2 Annotate with coloured felt tip marking pens, maintaining separate colours for each major system, for recording changed information.

.3 Record information concurrently with construction progress. Do not conceal Work of the Project until required information is accurately recorded.

.4 Contract drawings and shop drawings: legibly mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 References to related shop drawings and modifications.

.5 Specifications: legibly mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain inspection certifications, field test records, required by individual specifications sections.

.7 Submit copy of record drawings and specifications to the Departmental Representative.

1.7 WARRANTIES AND BONDS

.1 Separate warranties and bonds with individual tab sheets keyed to the table of contents listing in the maintenance manual.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 20 00.

.2 Section 03 10 00.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.

.3 CSA O121-M1978(R2003), Douglas Fir Plywood.

.4 CSA S269.1-1975(R2003), Falsework for Construction Purposes.

.5 CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada

1.3 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Divert wood materials from landfill to a recycling facility as approved by Departmental Representative.

.4 Divert plastic materials from landfill to a recycling facility as approved by Departmental Representative.

.5 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Formwork materials:

.1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121, CAN/CSA-O86.

.2 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.

.2 Form ties:

.1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.

.2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.

.3 Form liner:

.1 Plywood: medium density overlay Douglas Fir to CSA O121, square edge, 19 mm thick.

.4 Form release agent: non-toxic, biodegradable, low VOC.

.5 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal 15 to 24 mm^2/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.

.6 Falsework materials: to CSA-S269.1.

Part 3 Execution

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.

.3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.4 Fabricate and erect falsework in accordance with CSA S269.1.

.5 Refer to architectural drawings for concrete members requiring architectural exposed finishes.

.6 Do not place shores and mud sills on frozen ground.

.7 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.8 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.

.9 Align form joints and make watertight.

.1 Keep form joints to minimum.

.10 Locate horizontal form joints for exposed columns 2400 mm above finished floor elevation.

.11 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.

.12 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.13 Construct forms for architectural concrete, and place ties [as indicated] [as directed].

.1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.

.14 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.15 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete.

.1 3 days for walls and sides of beams.

.2 3 days for columns.

.3 28 days for beam soffits, slabs, decks and other structural members, or 7 days when replaced immediately with adequate shoring to standard specified for falsework.

.4 1 days for footings and abutments.

.2 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.3 Space reshoring by design.

.4 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 10 00.

.2 Section 03 30 00.

1.2 REFERENCES

.1 American Concrete Institute (ACI)

.1 SP-66-04, ACI Detailing Manual 2004.

.2 ASTM International

.1 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

.2 ASTM A143/A143M-07, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

.3 ASTM A185/A185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.4 ASTM A775/A775M-07b, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

.3 CSA International

.1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A23.3-04(R2010), Design of Concrete Structures.

.3 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.

.4 CSA-G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.5 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.4 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.3 QUALITY ASSURANCE

.1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.

.1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.

.2 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground.

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section.

Part 2 Products

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by Departmental Representative.

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.

.3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.

.4 Cold-drawn annealed steel wire ties: to ASTM A82/A82M.

.5 Deformed steel wire for concrete reinforcement: to ASTM A82/A82M.

.6 Welded steel wire fabric: to ASTM A185/A185M.

.1 Provide in flat sheets only.

.7 Welded deformed steel wire fabric: to ASTM A82/A82M.

.1 Provide in flat sheets only.

.8 Epoxy Coating of non-prestressed reinforcement: to ASTM A775/A775M.

.9 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.

.10 Mechanical splices: subject to approval of Departmental Representative.

.11 Plain round bars: to CSA-G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

.1 Ship epoxy coated bars in accordance with ASTM A775A/A775M.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.

.2 Upon request inform Departmental Representative of proposed source of material to be supplied.

Part 3 Execution

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placing drawings in accordance with CSA-A23.1/A23.2.

.2 Use plain round bars as slip dowels in concrete.

.1 Paint portion of dowel intended to move within hardened concrete with [one coat of asphalt paint].

.2 When paint is dry, apply thick even film of mineral lubricating grease.

.3 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.4 Ensure cover to reinforcement is maintained during concrete pour.

.5 Protect epoxy paint coated portions of bars with covering during transportation and handling.

3.3 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated compatible finish to provide continuous coating.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse, recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 10 00.

.2 Section 03 20 00.

1.2 REFERENCES

.1 Abbreviations and Acronyms:

.1 Portland cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.

.1 Type GU, GUb and GUL - General use cement.

.2 Fly ash:

.1 Type F - with CaO content less than 15%.

.2 Type CI - with CaO content ranging from 15 to 20%.

.3 Type CH - with CaO greater than 20%.

.3 GGBFS - Ground, granulated blast-furnace slag.

.2 Reference Standards:

.1 ASTM International

.1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C309-07, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C494/C494M-10a, Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM C1017/C1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.2 CSA International

.1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA A283-06, Qualification Code for Concrete Testing Laboratories.

.3 CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.3 ACTION AND INFORMATION SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 When requested, provide Departmental Representative with samples of materials proposed for use as follows:

.1 3 kg of each type of supplementary cementing material.

.2 10 kg of each type of blended hydraulic cement.

.3 5 kg of each admixture.

.4 10 kg of each fine and coarse aggregate.

.3 Provide testing reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.

.4 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

.5 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

.6 Provide two copies of WHMIS MSDS in accordance with Section 01 35 30 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

1.4 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Provide Departmental Representative, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

.1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.

.3 Minimum 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:

.1 Falsework erection.

.2 Hot weather concrete.

.3 Cold weather concrete.

.4 Curing.

.5 Finishes.

.6 Formwork removal.

.7 Joints.

.4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

.5 Sustainability Standards Certification:

.1 Construction Waste Management: provide copy of plan.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.1 Concrete hauling time: deliver to site of Work and discharged within [120] minutes maximum after batching.

.1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative laboratory representative and concrete producer as described in CSA A23.1/A23.2.

.2 Deviations to be submitted for review by Departmental

.3 Representative.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

.2 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 DESIGN CRITERIA

.1 Alternative 1 – Performance : to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.2 PERFORMANCE CRITERIA

.1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

2.3 MATERIALS

.1 Portland cement: to CSA A3001, Type GU.

.1 Reduction in cement from Base Mix to Actual Supplementary Cementing Materials (SCMs) Mix, as percentage.

.2 Portland-limestone cement: Type GUL to CSA A23.1.

.3 Supplementary cementing materials: with minimum 20% N fly ash replacement, by mass of total cementitious materials to CSA A3001.

.4 Water: to CSA A23.1.

.5 Aggregates: to CSA A23.1/A23.2.

.6 Admixtures:

.1 Air entraining admixture: to ASTM C260.

.2 Chemical admixture: to ASTM C494 ASTM C1017. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.7 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.

.1 Compressive strength: 50 MPa at 28 days.

.8 Non-premixed dry pack grout: composition of non-metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 50 MPa at 28 days.

.9 Polyethylene film: .015 mm thickness to CAN/CGSB-51.34.

2.4 MIXES

.1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.

.1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.

.2 Provide concrete mix to meet following hard state requirements:

Mix type 1 Raft slab and foundation walls and columns

.1	Exposure Class	C-1 and S-3
.2	56 Day Compressive strength	35MPa
.3	Aggregate size	20 mm maximum
.4	Slump	80mm +/- 20mm

Mix type 2 Exterior slab on grade

.1	Exposure Class	C-2
.2	28 Day Compressive strength	32MPa
.3	Aggregate size	20 mm maximum
.4	Slump	80mm +/- 20mm

.3 Provide quality management plan to ensure verification of concrete quality to specified performance.

.4 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.

Part 3 Execution

3.1 PREPARATION

.1 Obtain Departmental Representative's written approval before placing concrete.

.1 Provide 24 hours minimum notice prior to placing of concrete.

.2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 During concreting operations:

.1 Development of cold joints not allowed.

.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.4 Pumping of concrete is permitted only after approval of equipment and mix.

.5 Ensure reinforcement and inserts are not disturbed during concrete placement.

.6 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.

.7 Protect previous Work from staining.

.8 Clean and remove stains prior to application for concrete finishes.

.9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.10 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.

.1 Place steel dowels [of deformed steel reinforcing bars] and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.

.11 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 INSTALLATION/APPLICATION

.1 Do cast-in-place concrete work to CSA A23.1/A23.2.

.2 Sleeves and inserts:

.1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by Departmental Representative.

.2 Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.

.3 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Departmental Representative.

.4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.

.5 Confirm locations and sizes of sleeves and openings shown on drawings.

.6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

.3 Anchor bolts:

.1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.

.2 Protect anchor bolt holes from water accumulations, snow and ice build-ups.

.3 Set bolts and fill holes with epoxy grout.

.4 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.

.4 Drainage holes and weep holes:

.1 Form weep holes and drainage holes in accordance with Section [03 10 00 - Concrete Forming and Accessories]. If wood forms are used, remove them after concrete has set.

.2 Install weep hole tubes and drains as indicated.

.5 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.

.6 Finishing and curing:

.1 Finish concrete to CSA A23.1/A23.2.

.1 Walk-smooth form finish.

.2 Use procedures as reviewed by Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.

.3 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.

.4 Finish concrete floor to CSA A23.1/A23.2. Class A.

.5 Provide steel-trowelled finish unless otherwise indicated.

.6 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

.1 Site tests: conduct tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.1 Concrete pours.

.2 Slump.

.3 Air content.

.4 Compressive strength at 7 and 28 days, including 56 days where applicable.

.5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Departmental Representative for review to CSA A23.1/A23.2.

.1 Ensure testing laboratory is certified to CSA A283.

.3 Contractor will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.4 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

.5 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Divert unused concrete materials from landfill to local facility after receipt of written approval from Departmental Representative.

.2 Provide appropriate area on job site where concrete trucks and be safely washed.

.3 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by Departmental Representative.

.4 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

.5 Prevent admixtures and additive materials from entering drinking water supplies or streams.

.6 Using appropriate safety precautions, collect liquid or solidify liquid with inert, non-combustible material and remove for disposal.

.7 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 09 90 00 - Painting.

.2 Section 07 41 16 Pre-Fabricated Wall and Roof Panels

1.2 REFERENCES

.1 Aluminum Association, Inc. (AA)

.1 Designation System for Aluminum Finishes [1997].

.2 American Welding Society (AWS)

.1 A5.10/A5.10M[1999], Specification for Bare Aluminum and Aluminum Alloy Welding Electrodes and Rods.

.3 Canadian Standards Association (CSA International)

.1 CAN3-S157-M83(R2000), Strength Design in Aluminum.

.2 CSA W47.2-M1987(R1998), Certification of Companies for Fusion Welding of Aluminum.

.3 CSA W59.2-M1991(R1998), Welded Aluminum Construction.

.4 Master Painters Institute (MPI)

.1 MPI - EXT 5.5D, Bituminous Paint.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 In accordance with Section 01 74 19 Construction Waste Management and Disposal.

.2 Divert unused metal from landfill to metal recycling facility.

.3 Dispose of unused paint material at official hazardous material collections site.

.4 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in other locations where it will pose health or environmental hazard.

Part 2 Products

N/A.

Part 3 Execution

3.1 GENERAL

.1 Structural aluminum work: in accordance with CAN3-S157.

.2 Welding: in accordance with CSA W59.2.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.2 for fusion welding of aluminum and/or CSA W55.3 for resistance welding of structural components.

3.2 CONNECTION TO EXISTING WORK

.1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Department Representative for direction before commencing fabrication.

3.3 ERECTION

.1 Erect structural aluminum as indicated and in accordance with CAN3-S157 and approved erection drawings.

.2 Field cutting or altering structural members: to approval of Departmental Representative.

3.4 JOINT SEALING AND PAINTING

.1 Surface preparation of aluminum in contact with or embedded in dissimilar materials: to CAN3-S157. All locations to be treated as if they are in presence of moisture.

.2 Paint in accordance with CAN3-S157.

3.5 FIELD PAINTING

.1 Paint in accordance with Section 09 90 00 - Painting.

.1 Touch up damaged surfaces with one coat of zinc chromate primer followed by one coat of compatible paint.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 05 41 11 - Structural Aluminum Assembly

.2 Section 07 13 26 - Self Adhered Sheet Membrane

.3 Section 07 41 16 – Pre –Fabricated Wall and Roof Panels

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM A653/A653M-01a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A792/A792M-01a, Specification for Steel Sheet, 55%Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-S16.1-94(R2000), Limit States Design of Steel Structures.

.2 CSA-S136-94(R2001), Cold Formed Steel Structural Members.

.4 Canadian Sheet Steel Building Institute (CSSBI)

.1 CSSBI 10M-96, Standard for Steel Roof Deck.

.2 CSSBI 12M-96, Standard for Composite Steel Deck.

1.3 DESIGN REQUIREMENTS

.1 Design steel deck using limit states design in accordance with CSA S136 and CSSBI 10M.

.2 Steel deck and connections to steel framing to carry dead, live and other loads including lateral loads, diaphragm action, composite deck action, and uplift as indicated.

.3 Deflection under specified live load not to exceed 1/360 of span.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 Submittal procedures.

.2 Indicate deck plan, profile, dimensions, base steel thickness, metallic coating designation, connections to supports and spacings, projections, openings, reinforcement details and accessories.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 Construction Waste Management and Disposal.

.2 Divert unused metal from landfill to metal recycling facility.

Part 2 Products

2.1 MATERIALS

.1 Steel deck units shall be formed of zinc-coated sheet steel minimum CSSBI 10M Grade A with a base nominal thickness of 0.91mm or greater. Unless noted otherwise, zinc coatings shall be:

.1 Interior Exposure: Floors ZF75 - wipe coat

.2 Exterior Exposure: Z275.

.2 Touch-up paint shall conform to CGSB - 1.181 Ready-Mixed Organic Zinc Rich Coating.

.3 Cover plates, cell closures and flashings: shall be the same material as the deck with a minimum nominal thickness of 0.76 mm.

.4 Deck shall conform to the depths and dimensions shown on the drawings

.5 Attachment screws: Hex head self tapping 12-14 x 19mm steel screws.

Part 3 Execution

3.1 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S136 and CSSBI 10M.

3.2 ERECTION

.1 Erect steel deck as indicated and in accordance with CSA S136 and CSSBI 10M and in accordance with approved erection drawings.

.2 Isolate steel deck from aluminum structure with strips of self adhesive membrane

.3 Fasten steel decking to aluminum frame using self tapping screws

.4 Immediately after deck is permanently secured in place, touch up metallic coated top surface with compatible primer where necessary.

3.3 OPENINGS AND AREAS OF CONCENTRATED LOADS

.1 No reinforcement required for openings cut in deck which are smaller than 150 mm square.

.2 Frame deck openings with any one dimension between 150 to 300 mm as recommended by manufacturer, except as otherwise indicated.

.3 For deck openings with any one dimension greater than 300 mm and for areas of concentrated load, reinforce in accordance with structural framing details, except as otherwise indicated.

END OF SECTION

PART 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 20 00 Finish Carpentry

1.2 REFERENCES

.1 ASTM International

- .1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A153/A153M-16 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .3 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .4 ASTM D1761-12, Standard Test Methods for Mechanical Fasteners in Wood.
- .5 ASTM D5055-13e1, Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.
- .6 ASTM D5456-14b, Standard Specification for Evaluation of Structural Composite Lumber Products.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-11.3-[M87], Hardboard.
- .2 CAN/CGSB-71.26-[M88], Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.

.3 CSA International

- .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .2 CSA O86 Consolidation-14, Engineering Design in Wood.
- .3 CSA O112.9-10(R2014), Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).
- .4 CSA O121-08(R2013), Douglas Fir Plywood.
- .5 CSA O141-05(R2014), Softwood Lumber.
- .6 CSA O151-09(R2014), Canadian Softwood Plywood.
- .7 CSA O325-07(R2012), Construction Sheathing.
- .8 CSA O437 Series-93(R2011), Standards on OSB and Waferboard.

.4 Forest Stewardship Council (FSC)

- .1 FSC-STD-01-001-(version 4-0), FSC Principle and Criteria for Forest Stewardship.

.5 National Lumber Grades Authority (NLGA)

- .1 Standard Grading Rules for Canadian Lumber 2014.

.6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

.1 SCAQMD Rule 1113-A2011, Architectural Coatings.

.2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wood products and accessories and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 QUALITY ASSURANCE

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.

.3 Sustainable Standards Certification:

.1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wood and panel materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan and Waste Reduction Workplan in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

1.6 COORDINATION AND COOPERATION

.1 Cut, trim, drill, frame and make good rough carpentry work for passage of work of other sections except where otherwise specified.

.1 Provide location, centering and bracketing for all trades and wood framing for plumbing, heating, electrical and other trades. Make good all defects and fully complete the rough carpentry.

.2 Provide solid backing where required for mounting accessories, including grab bars.

PART 2 Products

2.1 FRAMING, STRUCTURAL AND PANEL MATERIALS

.1 Lumber: softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Glued end-jointed (finger-jointed) lumber SPS, are not acceptable for exterior wall and shear wall framing.

.3 Framing and board lumber: in accordance with National Building Code of Canada (NBCC) and CSA O86.

.4 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:

.1 Board sizes: "Standard" or better grade.

.2 Dimension sizes: "Standard" light framing or better grade.

.5 Plywood, OSB and wood based composite panels: to CSA O325.

.6 Canadian softwood plywood (CSP): to CSA O121, standard construction and in accordance with structural drawings.

2.2 ACCESSORIES

.1 Air seal: closed cell polyurethane or polyethylene.

.2 Sealants: in accordance with Section 07 92 00 - Joint Sealants.

.1 Sealants: VOC limit 250 g/L maximum to SCAQMD Rule 1168.

.3 Subflooring adhesive: to CAN/CGSB-71.26, cartridge loaded.

.4 General purpose adhesive: to CSA O112.9.

.5 Nails, spikes and staples: to CSA B111.

.6 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.7 Self tapping screws: Stainless steel, countersink head, of appropriate length.

.8 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

.9 Fastener Finishes:

.1 Galvanizing: to ASTM A153/A153M, use galvanized fasteners for exterior work, and interior highly humid areas

PART 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 MATERIAL USAGE

.1 Roof Decking:

- .1 As specified in Structural drawings.

.2 Floor sheathing:

- .1 Plywood, DFP, select sheathing grade, square edge, 19 mm thick.

.3 Subfloor:

- .1 Plywood, DFP, G1S square edge, 8mm thick

.4 Rain screen strapping:

- .1 38x64mm SPF lumber

.5 Electrical equipment mounting boards:

- .1 Plywood, DFP G1S grade, or, square edge 19 mm thick.

3.3 INSTALLATION

.1 Install wood truss system and sheathing as indicated in Structural and Architectural details .Provide blocking and gussets as indicated.

.2 Install rain screen strapping to aluminum plate attached to the upper portion of the exterior wall and aluminum structural channel at the lower portion of the exterior wall. Use stainless steel self tapping screws. Provide steel angle clips to attach rain screen strapping to exterior of insulated panels at 1/3 and 2/3rd the length of the strap. Use self tapping screws to attach to the panel, coated screws to attach to the strap.

.3 Install floor sheathing as indicated, at right angles to insulated floor panels. Attach into top skin of floor panels with #8 x38mm PHF TEK screws set flush with top of plywood. Screws to be spaced approximately

.4 Attach subfloor to floor sheathing using adhesive and staples as indicated.

.5 Install rough bucks, nailers and linings to rough openings as required to provide backing for windows, door frames and other work.

.6 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

.7 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.8 Countersink bolts where necessary to provide clearance for other work.

3.4 FURRING AND BLOCKING

.1 Co-ordinate and Install proper furring and solid blocking as shown on the drawings and as specified to space-out and/or support

- .1 Truss system.
- .2 Anchoring and mounting cabinets.
- .3 Hardware.
- .4 Electrical equipment.
- .5 Fittings and fixtures not supplied with backing attachments.
- .6 Washroom accessories.
- .7 Wall mounted benches.
- .8 All grab bars as per layout specified in Architect's detail drawings.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal

- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by rough carpentry installation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Custom shop fabricated locker units.

.2 Storage cabinets

.3 Kitchen cabinets and countertops.

.4 Cabinet hardware.

.5 Free standing and wall hung benches

.6 Interior window trim

1.2 RELATED SECTIONS

.1 Section 06 20 00 - Finish Carpentry

.2 Section 09 91 23 - Interior Painting.

1.3 REFERENCES

.1 BHMA A156.9-2010 - Cabinet Hardware.

.2 NPA A208.2-2009 - Medium Density Fibreboard (MDF) for Interior Applications.

.3 AWMAC - Architectural Woodwork Standards (AWS) – 1st Edition, 2009.

.4 CAN/CSA O141-91(R1999), Softwood Lumber.

.5 NEMA LD3-2005 - High Pressure Decorative Laminates (HPDL).

.6 Green Seal Environmental Standards

- .1 Standard GC-03-97, Anti-Corrosive Paints.
- .2 Standard GS-11-93, Architectural Paints.
- .3 Standard GS-36-00, Commercial Adhesives

.7 South Coast Air Quality Management District (SCAQMD), California State

- .1 SCAQMD Rule 1113-04, Architectural Coatings.
- .2 SCAQMD Rule 1168-05, Adhesives and Sealants Applications

1.4 SUBMITTALS

.1 Section 01 33 00: Submission procedures.

.2 Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.

.3 Product Data: Provide data for hardware accessories.

.4 Provide samples of solid surface and plastic laminate materials for selection by Departmental Representative.

- .1 Provide samples from manufacturers standard colour range.

1.5 QUALITY ASSURANCE

.1 Perform cabinet construction to AWMAC Custom quality.

1.6 DELIVERY, STORAGE, AND PROTECTION

.1 Deliver, store and handle materials in accordance with manufacturers recommendations.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 During and after installation of work of this section, maintain the same temperature and humidity conditions in building spaces as will occur after occupancy.

Part 2 Products

2.1 LUMBER MATERIALS

.1 Lumber: To the requirements of AWMAC, Custom grade.

.2 Hardwood Lumber: plain sawn, maximum moisture content of 6%; with plain sawn grain, of quality suitable for transparent finish.

2.2 SHEET MATERIALS

.1 Sheet Materials: To the requirements of AWMAC custom grade.

.2 Softwood Plywood: Veneer core; Douglas fir of grade to suit application; sanded faces.

.1 Plywood resin to include no added urea formaldehyde

.3 Maple plywood: 7-ply all hardwood veneer core plywood with no voids, to AWMAC/AWI Custom Grade requirements, no added urea-formaldehyde.

.1 Top veneers (facers): White Maple, plain-sliced/flat-cut, 'A Grade' to AWS Manual 4.2a.16.2 requirements and selected for uniform consistent colour across face.

2.3 STANDING AND RUNNING TRIM MATERIALS

.1 19mm x 89mm kiln dried finger joint pine, pre primed. To CAN/CSA O141-91.

2.4 LAMINATE MATERIALS

.1 High Pressure Laminate: NEMA LD3, high pressure laminate, solid chosen from manufacturers standard colour range, satin finish.

2.5 SOLID SURFACE COUNTERTOP MATERIALS

.1 Synthetic stone countertop material comprised of powdered natural quartz set in a proprietary resin binder. 1cm thickness. Mounted to plywood substrate.

.1 Edges: built up to 25mm thick with square edges.

.2 Outside corners: Square

.3 Submittals:

.1 Show field-verified dimensions, quartz surfacing dimensions, locations and dimensions of cutouts, required locations of support and blocking

members, edge profiles, and installation details and methods. Identify colour(s) and finish(es).

.2 Samples for Colour and edge treatment approval: Submit two (2) samples 10 x 10 inches (250 x 250 mm) of colour and finish selected.

.3 Stone Adhesive: Submit two (2) samples of an adhesive joint for colour quartz surfacing selected. Show colour match of adhesive.

2.6 ACCESSORIES

.1 Adhesive: Type recommended by laminate and solid surface material manufacturer to suit application.

.1 Adhesives to SCAQMD Rule 1168-05

.2 Plastic Edge Trim (PVC): Extruded flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness; colour as selected. Minimum 3 mm thickness.

2.7 HARDWARE

.1 Hardware: BHMA A156.9

.2 Shelf Standards and Rests: Formed steel channels and rests, cut for fitted rests spaced at 25 mm centres; satin finish.

.3 Shelf Brackets: Formed steel brackets, formed for attachment with lugs; satin finish.

.4 Drawer and Door Pulls: Extruded aluminum pull, U-shaped satin finish; 100 mm centres.

.5 Cabinet and Locker Locks: Keyed cylinder, two keys per lock, master keyed.

.6 Cabinet Catches: Magnetic.

.7 Drawer Slides: Galvanized steel construction, ball bearings separating tracks, full extension type.

.8 Hinges: European type, satin finish.

.9 Piano hinges: 19mm butt, stainless steel construction. Satin finish, lengths as detailed

.10 Slide bolts: Stainless steel door bolt. 78mm long, minimum 26 mm throw. Complete with strike.

.11 Rare earth magnet catches:

.1 Flush mount magnetic catch system comprised of rare earth magnet, mounting cup with counter-bored mounting holes, and steel washers with counter-bored screw holes.

.2 19 mm diameter

.3 3 per door as detailed

.12 Hanging rods:

.1 Rods: chrome plated 25 mm o.d x minimum 1.9 mm wall thickness seamless steel tubing.

.2 Flanges: chrome plated steel round "captured" flanges to prevent unauthorized rod removal, complete with chromed plated mounting screws.

.3 Intermediate supports required when rod exceeds 1m length

.13 Wire shelving:

.1 Ventilated wire shelving 304mm wide, lengths as indicated

.2 Plastic coated

.3 Provide supports at 609mm intervals

.14 Custom fabricated locker room and shower bench supports

.1 Material- Stainless steel sections

.2 To be fabricated according to detail drawings.

2.8 PLASTIC LAMINATE CASEWORK

.1 Cabinet Construction: Flush overlay, adjustable shelving plywood core.

.2 Exposed Surfaces:

.1 Drawers and Drawer Fronts: High pressure laminate.

.2 Edges: PVC.

.3 Semi-exposed Surfaces:

.1 Surfaces (other than drawer bodies) Thermofused melamine.

.2 Shelves: High pressure laminate.

.3 Edges: PVC.

.4 Drawer Sides and Backs: Edgebanded.

.5 Drawer Bottoms: Melamine.

2.9 VENEER PLYWOOD CASWORK

.1 Plywood materials as detailed

.2 Solid wood edging to AWMAC - Architectural Woodwork Standards (AWS) – 1st Edition, 2009, Custom grade.

2.10 SOLID SURFACE COUNTERTOPS

.1 Comply with AWMAC Quality Standards, Custom grade requirements for counter construction supplemented as follows:

.2 Synthetic stone material tops and edges

.3 Core Material: Plywood.

.4 Adhesives: To manufacturers specification.

2.11 FABRICATION

.1 Shop prepare and identify components for matching during site assembly.

.2 Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

.3 When necessary to cut and fit on site, provide materials with ample allowance for site cutting and scribing.

.4 Apply plastic laminate finish in full, uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises.

.5 Fabricate solid surface countertops with integral backsplash and front and side edging as detailed. Pre-cut for sink openings.

2.12 WOOD FINISHES

.1 Factory Finishing:

.1 Finishing System: AWMAC, Custom grade, acrylic lacquer finish system.

.2 Sheen: Satin.

Part 3 Execution

3.1 INSTALLATION

.1 Install Work to AWMAC Custom Grade.

.2 Set and secure casework in place; rigid, plumb, and level.

.3 Use fixture attachments in concealed locations for wall mounted components.

.4 Use concealed joint fasteners to align and secure adjoining counter tops.

.5 Secure cabinet to floor using appropriate angles and anchorages.

3.2 INTERIOR STANDING / RUNNING TRIM

.1 Install in accordance with details and to AWMAC/AWI Custom Grade requirements unless more stringent requirements are specified in this Section.

.2 Job site conditions for installation to be in accordance with AWS Manual requirements at time of installation.

.3 Install items in accordance with details using finishing nails throughout.

.4 Countersink all fixings and fill flush with wood filler.

.5 Site measure, cut and install items using longest practical length pieces to avoid splice joints.

.6 Use one length per location to avoid splice joints.

.7 Caulk junctions between standing/running trim and adjacent walls with sealant make junctions filled and smooth for "painting out".

.8 Co-ordinate application of 1st coat of finishes prior to installation.

3.3 BENCHES

.1 Fabricate metal components per detail drawings

.2 Fasten maple slats to top portion of bench with carriage bolts as detailed.

.3 Fasten shower benches to wall at previously installed blocking.

3.4 ADJUSTING

.1 Test installed work for rigidity and ability to support loads.

.2 Adjust moving or operating parts to function smoothly and correctly.

3.5 CLEANING

.1 Do cleaning in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

PART 1- GENERAL

1.1 Submittals

.1 Submittals in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.

.2 Product data:
- .1 Submit manufacturer's printed product literature, specifications and data sheets.
- .2 Submit 2 copies of WHMIS - Material Safety Data Sheets.

.3 Samples:
- .1 Submit duplicate 300 mm long sample of plastic decking material.
- .2 Submit full range plastic decking colour samples for Departmental Representative's selection use.
- .3 Submit duplicate 300 mm long sample of hidden deck fasteners.

.4 Manufacturer's instructions:
- .1 Submit manufacturer's installation instructions.

1.2 Quality Assurance

.1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.

1.3 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 Materials

.1 Plastic deck boards: proprietary solid synthetic lumber made from 100% recycled plastic and containing no filler, ultraviolet light stabilised for outdoor use, integral colouring, dimensions detailed/indicated on drawings, in colours selected by Departmental Representative.

.2 Hidden deck fasteners: purpose-made rails designed to fix to topsides of deck joists and pre-punched to received fixings for securing of deck boards from underside of deck assemblies, galvanized for exterior use.

.3 Nails (for fixing of hidden deck fasteners to deck joists): stainless steel alloy, lengths recommended by hidden deck fastener manufacturer.

.4 Screws (for fixing of deck boards to hidden deck fasteners): stainless steel alloy, head design to suit hidden deck fastener pre-drilled holes, length required to secure deck boards without breaking through topsides of deck boards.

PART 3 - EXECUTION

3.1 Manufacturer's Instructions

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions and data sheets.

3.2 Installation

.1 Hidden deck fasteners:
- .1 Install continuous lengths to joist framing.
- .2 Fix to joists using number of nails recommended by hidden deck fastener manufacturer.

.2 Plastic deck boards:
- .1 Install using longest practical lengths to minimize end joints.
- .2 Stagger end joints where deck dimensions exceed deck board lengths.
- .3 Fix deck boards in place using number of screws per plank required to produce permanent and stable deck installations.
- .4 Replace deck boards whenever topside is broken through by underside fixing screws.

3.3 Cleaning

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 06 10 00 - Rough Carpentry

.2 07 28 00 - Air and Vapour Barriers

.3 07 44 56 - Mineral Fiber Reinforced Cementitious Siding

1.2 REFERENCES

.1 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM C665-12 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit copy of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's insulation products and adhesives.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

Part 2 Products

2.1 INSULATION

.1 Mineral fibre board: to CAN/ULC-S702

.1 Type: 1

.2 Density: 128 kg/m^3.

.3 Surfaces: unsurfaced

.4 Thickness: 38mm

.5 Size: as detailed.

.2 Mineral fiber Batt Insulation:

.1 Pre formed semi rigid Mineral Wool insulation in batt form, unfaced, friction fit, to ASTM C665.

2.2 BATT INSULATION SUPPORT

.1 Flexible carbon steel spring wire rods sized slightly larger than floor joist spacing.

.1 Designed to hold horizontally installed insulation in place.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 EXAMINATION

.1 Prior to commencement of work ensure:

.1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

3.3 BATT INSULATION INSTALLATION

.1 Install insulation after building substrate materials are dry.

.2 Install insulation to maintain continuity of thermal protection to building elements and spaces and for sound attenuation.

.3 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints.

.4 Offset both vertical and horizontal joints in multiple layer applications.

.5 Install in floor joist cavity where indicated. Install in cavities at joist ends.

.1 Hold in place with wire rod insulation support system, or approved alternative.

.6 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.4 EXTERIOR SEMI RIGID INSULATON INSTALLATION

.1 Install over sheathing. Fasten with screws driven through building paper and rain screen strapping. Fasten through wall sheathing into studs where possible.

3.5 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Sheet and sealant materials for controlling vapour diffusion.

.2 Film vapour barriers.

.3 Sheet air barriers.

.4 Building paper

1.2 RELATED SECTIONS

.1 Section 05 31 00 Steel Decking.

.2 Section 06 10 00 Rough Carpentry.

.3 Section 07 21 13 Insulation

.4 Section 07 92 00 Joint Sealant.

.5 Section 08 11 00 Metal Doors and Frames

.6 Section 08 53 13 Vinyl Windows

.7 Section 07 21 13 Insulation

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):

.1 ASTM E 96-05 Standard Test Methods for Water Vapor Transmission of Materials.

.2 ASTM E154 Standard test methods for water vapour retarders in contact with earth under concrete slabs.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.

.2 CAN/CGSB 37-GP-56M, Standard for Modified Bituminous Sheet Membranes.

.3 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

.3 ASTM C1193 - Standard Guide for Use of Joint Sealants.

.4 ASTM E96 - Test Methods for Water Vapour Transmission of Materials.

1.4 DEFINITION

.1 Vapour barrier: A material or assembly of materials that resists water vapour diffusion through it.

1.5 SUBMITTALS

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide data indicating material characteristics, performance criteria and limitations.

.3 Manufacturer's Installation Instructions: Indicate preparation and installation requirements, techniques.

1.6 WHMIS

.1 Comply with WHMIS requirements when handing and using sealant materials.

1.7 INSPECTION TESTING

.1 Coordinate inspection of vapour barrier elements prior to vapour barrier system being covered up by other trades.

Part 2 Products

2.1 VAPOUR BARRIER

.1 Underslab vapour barrier: Purpose made composite sheet membrane comprised of a non-woven fabric, elastomeric membrane with a proprietary plasmatic core designed for strength and to be impervious to water vapour. Designed to be installed on the inside face of concrete forms and under concrete slab prior to concrete placement. Forms a mechanical bond with concrete as it cures.

.1 Moisture vapour transmission tested to ASTM E 96 B

.2 Puncture resistance to ASTM E 154.

.3 Thickness: 73 mil (1.85mm) minimum.

.2 Film Type: CAN2-51.33M, Translucent polyethylene film, 0.15 mm (6mils) thick for vapour barrier in framed walls.

2.2 SELF ADHESIVE MEMBRANE

.1 Modified Bituminous Membrane: Asphalt and polymer modifiers of styrene-butadiene-styrene (SBS) type, reinforced with non-woven cross laminated polyethylene; smooth surfaced; .8 mm thick. To CAN/CGSB 37-GP-56M

2.3 SHEATHING PAPER

.1 Building/sheathing paper: To CAN/CGSB-51.32 asphalt saturated kraft paper permitting passage of water vapour; conforming to U.S. Standard UUB-790A for 30 minute water resistance.

2.4 SEALANTS

.1 Underslab membrane: Membrane lap primer/sealant to membrane manufacturer’s recommendations.

2.5 ACCESSORIES

.1 Under slab barrier: proprietary fabric reinforced tape as recommended by manufacturer.

.2 Primer: Water based surface conditioner as recommended by self adhesive membrane manufacturer.

.3 Seam tape- proprietary moisture resistant pressure sensitive adhesive tape.

.4 Staples: corrosion-resistant alloy or plated, lengths required to penetrate sheathing for secure attachment of building/sheathing paper.

.5 Sealants: Refer to Section 07 92 00 - Joint Sealing

Part 3 Execution

3.1 EXAMINATION

.1 Verify condition of substrate and adjacent materials.

3.2 PREPARATION

.1 Remove loose or foreign matter which might impair adhesion.

.2 Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials or substances that may impede installation.

3.3 VAPOUR BARRIER UNDER-SLAB

.1 Install the barrier in accordance with this section and Manufacturer's instructions.

.2 Install membrane as a continuous, airtight floor and wall moisture barrier membrane system under the entire concrete slab and continuous up foundation walls prior to concrete placement.. The barrier shall be sealed with manufacturers flexible sealant at all edges, seams and penetrations to provide a water and air tight seal.

.3 Lap seams a minimum of 152.4 mm sealed in the overlapping areas with manufacturers proprietary liquid applied membrane.

.4 Continue the barrier vertically up all exterior foundation walls.

.5 Seal all interior membrane penetrations according to manufacturer's directions.

.6 Seal the floor barrier around columns and pipes

.7 Repair any puncture in membrane prior to pouring concrete.

3.4 VAPOUR BARRIER

.1 Install vapour barrier on warm side of insulation in framed wall assembly. Seal to framing and penetrations with acoustic sealant

3.5 SELF ADHESIVE MEMBRANE

.1 Apply membrane at intersection of dissimilar materials as detailed.

.1 Apply where steel decking meets aluminum floor beams

.2 Apply membrane at window and door openings as detailed.

.3 Apply primer as recommended by membrane manufacturer.

.4 Install membrane waterproofing in accordance with manufacturer's instructions.

.5 Roll out membrane. Minimize wrinkles and bubbles.

.6 Remove release paper layer. Roll out on substrate with a mechanical roller to encourage full contact bond.

3.6 SHEATHING PAPER

.1 Install two layers of sheathing paper to the exterior of rigid insulation prior to strapping installation where indicated.

.2 Install sheathing paper to produce both continuous water shedding barrier over rigid insulation, down onto metal wall flashings.

.3 Install sheathing paper horizontally, starting from bottom of wall with each subsequent course shingle lapped over previous course to shed moisture down building/sheathing paper surface.

.4 Overlap subsequent courses minimum 200 mm over previous courses and provide minimum 100 mm overlaps at course ends laps.

.5 Attach building/sheathing paper to sheathing using sufficient quantities of staples to hold paper in place until covered by subsequent construction.

.6 Seal vertical lap joints of each layer using continuous applications of tape.

.7 Repair rips and tears in building/sheathing paper using continuous strips of tape. Repair large holes using patches of building/sheathing paper stapled in place with all edges tape sealed.

.8 Install sheathing paper material between trusses and skin of prefab metal roof as indicated.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 05 14 11 - Structural Aluminum Assembly.

.2 Section 07 92 00 – Joint Sealing.

.3 Section 08 11 00 - Metal Doors and Frames.

.4 Section 08 53 13 - Vinyl Windows

.5 Section 09 90 00 - Painting.

1.2 REFERENCES

.1 ASTM A653/A653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A775: Standard specification for Sheet Steel, Metallic Coated by the Hot Dip Process and Prepainted by the Coil Coating Process for Exterior Exposed Building Products.

.3 ASTM D1621: DStandard Test Method for Compressive Properties of Rigid Cellular Plastics.

.4 ASTM E72; Standard Test Methods of Conducting Strength Tests of Panels for Building Construction

.5 ASTM E84; Standard Test Method for Surface Burning Characteristics of Building Materials

.6 ASTM E283; Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

.7 ASTM E331; Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

.8 ASTM E1646; Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference

.9 ASTM E1680; Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems

.10 UL 580; Tests for Uplift Resistance of Roof Assemblies

.11 FM 4471; Approval Standard for Class 1 Panel Roofs

1.3 SUBMITTALS

.1 Product Data: Submit manufacturer current technical literature for each type of product.

.2 Provide detailed assembly instructions for the wall panel system.

.1 Indicate methods for fitting panels together and mounting doors and windows into panel assembly.

.3 Shop Drawings: Submit detailed drawings and panel analysis showing:

.1 Profile

.2 Gauge of both exterior and interior sheet

.3 Location, layout and dimensions of panels on structure

.4 Location and type of fasteners

.5 Shape and method of attachment of all trim

.6 Locations and type of sealants

.7 Coordination Drawings: Provide elevation drawings and building sections which show panels in relationship to required locations for structural support. Include panel details and details showing attachment to structural support.

.8 Snow and Wind Design loads

.1 Engineered per NBC for building location.

.2 Provide drawings and calculations under the seal of a Structural Engineer registered in the Province of British Columbia.

.9 Other details as may be required for a weathertight installation

.4 Roof Panel Analysis: Provide panel calculations to indicate compliance with max deflection of L/240 for the indicated design loads. Include effects of thermal differential between the exterior and interior panel facings

. 5 Wall Panel Analysis: Provide panel calculations to verify panels will withstand the design wind loads indicated without detrimental effects or deflection exceeding L/180. Include effects of thermal differential between the exterior and interior panel facings and resistance to fastener pullout.

.6 Samples: Each colour indicated. 6 inches by 6 inches minimum.

.7 Miscellaneous Certifications:

.1 Submit documentation that products have been certified.

.8 Quality Assurance Submittals

.1 Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.

.2 Manufacturer Erection Instructions: Provide manufacturer's written installation instructions including proper material storage, material handling, installation sequence, panel location(s), and attachment methods, details and required trim and accessories.

1.4 WHMIS

.1 Submit copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOCs during application

1.5 QUALITY ASSURANCE

.1 Manufacturer Qualifications:

.1 Manufacturer shall have a minimum of five (5) years experience in the production of insulated metal standing seam roof panels. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure.

.2 Installer Qualifications:

.1 Installer shall be authorized by the panel manufacturer and the work shall be supervised by a person having a minimum of five (5) years experience installing insulated metal standing seam roof panels on similar type and size projects.

.2 Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

.3 Fire Classifications:

.1 Factory Mutual Class 1A Approval when installed at a maximum roof slope of 5:12.

1.6 DELIVERY STORAGE AND HANDLING

.1 Deliver panel materials and components in manufacturer's original, unopened, undamaged packaging with identification labels intact.

.2 Store roofing, wall and flooring panel materials on dry, level, firm, and clean surface using the three inch factory provide foam supports under the panels. Use of wood substitute is not acceptable. Stack no more than two bundles high. Elevate and ventilate to allow air to circulate and moisture to escape.

1.7 WARRANTY

.1 Limited Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. The items covered by the warranty include structural performance and finish performance.

.1 Warranty Period: Ten (10) years from date of Substantial Completion

.2 Finish Warranty: Standard form in which manufacturer agrees to repair or replace metal panels that evidence deterioration of fluoropolymer finish, including flaking or peeling from approved primed metal substrate, chalk in excess, and /or colour fading.

.1 Warranty Period: Ten (10) years from date of Substantial Completion.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 In accordance with Section 01 74 19 Waste Management and disposal.

.2 Divert unused metal from landfill to metal recycling facility.

.3 Dispose of unused paint material at official hazardous material collections site.

.4 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in other locations where it will pose health or environmental hazard.

Part 2 Products

2.1 ROOF AND FLOOR PANELS

.1 Standard of Acceptance:

.1 Korolite Engineered Panel Structures, 19402 56th Av, Surrey B.C.

.2 Roof and Floor Panel Description

.1 Minimum R Value: R34

.2 Panel width: 42 inch wide

.3 Panel length: full length no seams

.4 The side joint shall consist of a 2 inch vertical sidelap, mechanically seamed, with fasteners and thermally broken attachment clip completely concealed within the side joint.

.5 Exterior Face of Panel

.1 Material: AZ150 Galvalume.

.2 Metal thickness: 24 gauge.

.3 Texture: smooth, embossed

.4 Yield: 33 ksi minimum

.5 Exterior Finish: 1.0 mil Silicone Modified Polyester (SMP)

.1 Colour: TBD

.6 Interior Face of Panel

.1 Material: AZ150 Galvalume. per ASTM A792

.2 Metal thickness: 24 gauge.

.3 Profile: stucco, embossed

.4 Yield: 33 ksi minimum

.5 Interior Finish: 1.0 mil Silicone Modified Polyester (SMP)

.1 Colour: Imperial White

.7 Insulating Core:

.1 Panel shall provide a nominal R-value of 4 per inch thickness.

.2 Compressive Strength: 10psi

.3 Flexural Strength: 25 psi

.4 Water Vapour: Permeability: 3.50 perm-in

.5 Water Absorption % by volume: 6.0

.6 Dimensional Stability % linear change: 1.5%(max)

2.2 WALL PANELS

.1 Standard of Acceptance:

.1 Korolite Engineered Panel Structures, 19402 56th Av, Surrey B.C.

.2 Wall Panel Description

.1 Minimum R Value: R-24

.2 Metal thickness: 24 gauge.

.3 Panel Attachment: Shall consist of fasteners and stainless steel attachment clip completely concealed within the panel side joint.

.4 Exterior Face of Panel

.1 Material:

.1 Steel coil material shall be in accordance with ASTM A755: AZ150 Galvalume in accordance with ASTM A792.

.2 Profile : embossed

.3 Texture: Non Directional stucco

.4 Exterior paint Finish Colour:

.1 Regal White

.2 Finish System

.1 1.0 mil Silicone modified Polyester (SMP)

.5 Interior Face of Panel

.1 Material

.1 Steel coil material shall be in accordance with ASTM A755: AZ150 Galvalume in accordance with ASTM A792. .

.2 Metal thickness: 24 gauge.

.3 Profile: embossed

.4 Texture: non-directional stucco

.5 Interior Finish: 1.0 mil Silicone Modified Polyester (SMP)

.1 Colour: Imperial White.

2.3 PANEL CHARACTERISTICS (ROOF, WALL AND FLOOR PANELS)

.1 Physical Characteristics

.1 Structural Test: Design shall be verified by representative structural test for wind loads in accordance with ASTM E72. The deflection criteria shall be L/240 for roof panels and l/180 for wall panels.

.2 Thermal Properties: The panel shall provide a nominal R-value of 4 per inch thickness when tested in accordance with ASTM C518 at a mean temperature of 75 deg. F.

.3 Fatigue Test: There shall be no evidence of metal/insulation interface delamination when the panel is tested by simulated wind loads of 20 psf (positive and negative loads), when applied for two million alternate cycles.

.4 Bond Strength: No metal primer interface corrosion and/or delamination shall occur after 1000 hours at 140 deg. F and 100 percent relative humidity. No delamination shall occur after 2-1/2 hours in a 2 psi 212 deg. F autoclave.

.5 Water Penetration: There shall be no uncontrolled water leakage at pressures of up to 20 psf when tested in accordance with ASTM E331 and ASTM E1646. Tested assembly must include endlap and sidelap conditions.

.6 Air Infiltration: Air infiltration through the roof shall not exceed 0.003 cfm/sf at 6.24 psf air pressure differential when tested in accordance with ASTM E283 and ASTM E1680. Tested assembly must include endlap and sidelap conditions.

.7 Hailstorm Rating: Factory Mutual 1 SH hailstorm rating.

.2 Finish Characteristics

.1 Film Thickness: The exposed surface shall have a dry film thickness of 0.1 mils. Test Method: ASTM D5796

.2 Film Cure: The baked film shall withstand one hundred and fifty (150) MEK double rubs. Test Method: ASTM D5402

.3 Film Hardness (Pencil Method): The hardness of the paint film may be measured by means of Eagle/Berol turquoise T-2375 or equivalent pencils using a flat cylindrical head applied at a 45deg. angle to the paint film. A minimum hardness of F shall be obtained. Pencil Hardness is specified as the hardest pencil number that will not rupture the paint film when tested as described above. Test Method: ASTM D3363

.4 Formability/Adhesion Test: When testing a representative sample at 20oC } 1oC and using #610 Scotch cellophane tape, the paint system will show no loss of adhesion when subjected to a 3T 180deg. bend and tape pull test. Test Method: ASTM D4145.

.5 Gloss: The specular gloss shall be 30 ± 5 gloss units when measured with a Gardner 60o Glossmeter.

.6 Humidity Resistance: The humidity resistance test shall be conducted at 100% relative humidity at a temperature of 38oC. After 1000 hours of exposure, the surface shall show no field blisters. Test Method: ASTM D2247

.7 Film Integrity: During the first forty (40) years of exposure, the paint film shall have no evidence of cracking, flaking, or checking to an extent that is apparent on ordinary outdoor visual observations.

.8 Chalking: For the first thirty (30) years, vertical installations will not chalk more than a #8 rating and non-vertical installations will not chalk more than #6 when measured per ASTM D4214, Method A.

.9 Colour Change: For the first thirty (30) years, vertical installations will not change colour more than five (5) and non-vertical installations will not change more than eight (8) delta E colour units.

2.4 ACCESSORIES

.1 Fasteners

.1 Self-drilling fasteners shall be cadmium plated steel, designed to resist maximum negative pulloff loads and hold the face sheet mechanically to the structural support.

.2 Panel attachment clip shall be two pieces and fully concealed within the panel side joint. Base clip shall be a minimum 14 gauge galvanized, and top clip shall be a minimum 20 gauge stainless steel with an integral thermal break.

.3 Vibration resistant type (anti-backout threads) fasteners. Self-drilling flathead screws with sealing washers and square drives, designed to resist back out by increasing thread friction as screw loosens.

.2 Perimeter Trim and Penetration Treatments

.1 As provided by the panel manufacturers as a complete package with the panel system.

.2 All required trim and metal flashing with same coating, colour, and gauge as the exterior face of the insulated metal roof panel.

.3 Butyl Tape: Per panel manufacturer's recommendations for panel to panel and panel to trim seal.

.4 Butyl Sealants: Non-skinning type per panels manufacturer's recommendations.

Part 3 Execution

3.1 EXAMINATION

.1 Examine alignment of the structure and supports prior to installing the insulated metal roof panels.

.1 Structure Tolerance: In the plane of the roof 0 inches inward, plus 1/2 inch outward

.2 All deviations from structural tolerances shall be corrected by the responsible party prior to installation of the panels.

.2 Examine individual panels upon removing from the bundle; both edges should be visually examined and any slight overfill of insulation should be carefully removed.

3.2 PANEL INSTALLATION

.1 Assembly instructions for panel system to be provided by the panel manufacturer with the shop drawings.

.2 Cut panels, where indicated on shop drawings, using a power circular saw with fine tooth carbide tip blades or a band saw prior to installation. Ventilate area where polyurethane dust is generated. Personnel should wear respiratory and eye protection devices.

.3 Apply butyl sealant vapour seal around interior perimeter of roof assembly per panel manufacturer's instructions.

.4 Apply butyl tape on panel sidelaps and clip assemblies per panel manufacturer's instructions.

.5 Secure units to the steel supports with manufacturer's recommended fastener.

.6 Place panel fasteners through predrilled top clip and base clip, concealed within the side joint of the panel.

.1 Heads of concealed fasteners shall be insulated from the exterior environment to prevent condensation and "ice balling" from occurring on the fastener shaft.

.7 Apply endlap sealing tape and butyl to panel surface to be lapped per manufacturer's instructions.

.8 Endlap panel stitch fasteners to be vibration resistant type.

.9 As each panel is installed, crimp hidden clip assembly prior to placement of next panel.

.10 Repair or replace metal panels and trim that have been damaged.

3.3 TRIM INSTALLATION

.1 Place trim to determine the location of the closure strips, sealant and ridge closure trims.

.2 Apply butyl tape above and below the foam closure strip and seat the closure strip firmly in the tape to ensure a continuous seal. If any voids exist add butyl caulking and reseat the closure.

.3 Place a continuous layer of butyl tape on top of the metal ridge closure trims for the length of the building.

.4 Fasten the exterior ridge trim to the metal ridge closure trims, per manufacturer's recommendations, on center with 1/4 inch by 7/8 inch low profile vibration resistant stitch fasteners.

3.4 CLEANING

.1 Do cleaning in accordance with Section 01 74 11 - Cleaning.

.2 Progress Cleaning:

.1 Remove dirt and marks caused by installation.

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.4 Waste Management: Separate waste materials for recycling.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 06 10 00 - Rough Carpentry: wood strapping

.2 Section 07 62 00 – Sheet Metal Flashings and Trims: wall flashings.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).

.1 ASTM C1186-08, Standard Specification for Flat Fiber-Cement Sheets.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.

.2 CAN/CGSB-19.17-M90, One-component, Acrylic Emulsion Base Sealing Compound.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

.4 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer installation instruction sheets indicating nailing and cutting requirements.

.2 Submit manufacturer MSDS for siding and panels.

.1 Indicate precautions for workers when cutting siding and panels.

.3 Samples:

.1 Submit 300 long samples of siding proposed for use in Work, if requested by Departmental Representative.

.2 Submit 300 x 300 mm size samples of panels proposed for use in Work, if requested by Departmental Representative.

.3 Submit full range pre-finish colour charts for Departmental Representative colour selection use.

.4 Manufacturer’s instructions:

.1 Submit manufacturers installation instructions

1.4 QUALITY ASSURANCE

.1 Mock ups

.1 Install at least 10 m^2 area of siding in location directed by Departmental Representative to indicate installation techniques and workmanship. Include application of sealant in mock-ups.

.2 Notify Departmental Representative at least 2 working days in advance to review mock-ups.

.3 Allow 2 working days for Departmental Representative to inspect mock-ups.

.4 Approved mock-ups will establish minimum acceptable standard for remaining work.

.5 Approved mock-ups may form part of Work.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets (MSDS) acceptable to Labour Canada.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 Construction Waste Management and Disposal.

1.8 WARRANTY

.1 For Work of this Section, 12 months warranty period is extended as follows:

.1 360 months that siding and panels will be free from defects in materials and workmanship.

.2 180 months that pre-finish applied to siding and to panels will be free from paint peeling, cracking and chipping.

.3 Warranties to be in form acceptable to Departmental Representative.

1.9 CLOSEOUT SUBMITTALS

.1 Provide warranty certificates for inclusion in O&M manual

Part 2 Products

2.1 MATERIALS

.1 Siding: to ASTM C1186, asbestos-free composite product intended for exterior use, insect resistant, fire resistant and non-combustible.

.1 Dimensions: 3657 mm long planks, 210 mm wide for 178 mm exposure.

.2 Thickness: 8 mm.

.3 Exposed face: wood texture embossed.

.4 Finish: pre-finished factory-applied 3 coat baked on paint system in colour “Cobble Stone” or as approved by Departmental Representative. Each board factory protected with plastic film prior to shipping.

.2 Panels: to ASTM C1186, asbestos-free composite product intended for exterior use, insect resistant, fire resistant and non-combustible.

.1 Dimensions: Length and width to suit.

.2 Thickness: 6 mm.

.3 Exposed face: wood texture embossed.

.4 Finish: pre-finished factory-applied 3 coat baked on paint system in colour "Countrylane Red" or as approved by Departmental Representative. Each panel factory protected with plastic film prior to shipping.

.3 Trim: Kiln dried S4S spruce, pre primed.

.1 Dimensions as indicated.

.2 Exposed Face: Comb Face.

.3 Finish: P aint finish as indicated

.4 Nails:

.1 Stainless steel alloy or hot dip galvanized steel; style, type, head and lengths recommended by siding/panel manufacturer for permanent attachment of siding/panels to substrates applicable.

.2 Style and head of nails acceptable to Departmental Representative to minimize nail appearance where nails cannot be concealed.

.3 Fasteners are to be sized so as not to protrude through the inside of the strapping materials. The exterior skin of the pre-fabricated wall panels shall not be penetrated by these fasteners.

.5 Screws:

.1 Ceramic coated steel alloy socket drive (Robertson) flat head deck screws of lengths recommended by panel manufacturer for permanent attachment of panels to substrates applicable.

.2 “Trim Head” reduced screw head size, specifically designed for attachment of exterior trim. Stainless steel construction.

.3 Fasteners are to be sized so as not to protrude through the inside of the strapping materials. The exterior skin of the pre fabricated wall panels shall not be penetrated by these fasteners

.6 Sealants:

.1 Paintable: acrylic latex to CAN/CGSB-19.17, colours capable of being concealed by paint.

.2 Non-paintable: polyurethane to CAN/CGSB-19.13, colours to match siding/panel paint colours.

.7 Touch-up paint: siding/panel manufacturer formulation for exact touch-up/repair of pre-finished siding/panels.

.8 Accessories: Aluminum bug screen closure custom fabricated for bottom of rain screen assembly

Part 3 Execution

3.1 MANUFACTURERS INSTRUCTIONS

.1 Compliance: comply with manufacturer written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions and data sheets.

3.2 INSTALLATION

.1 Use maximum size material at each location to prevent or minimize joints.

.2 Cut material using sharp shears, saws and tools recommended by siding/panel manufacturer. Make cuts that will produce true even joints free of chips and splinters.

.3 Remove factory protective film immediately after installation of each board to ensure full protection of pre-finish coating during siding/panel handling and installation.

.4 Siding:

- .1 Install to match approved site mock-ups.
- .2 Blind nail in place.
- .3 Stagger end joints in adjacent coursing so as not to be apparent in finished installation.
- .4 Provide and install siding starter strips required for start of siding installations.
- .5 Install horizontal and true to line of building with even aligned coursing across all wall planes.

.5 Corner Trim

- .1 Install corner and window trims as detailed. Use stainless steel trim head screws of appropriate length for attachment.

.6 Caulking:

- .1 Install to match accepted mock-ups.
- .2 Install sealants to produce weathertight and fine-finished installations.
- .3 Apply sealant in continuous beads, using caulking gun and proper size nozzle.
- .4 Use sufficient pressure to fill voids and joints solid.
- .5 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .6 Tool exposed surfaces before skinning begins.
  - .1 Siding/panel butt joints: finish sealant flush and smooth to minimize joint appearance.
  - .2 All other joints: finish sealant to give slightly concave shape.
- .7 Wipe off excess sealant without damaging siding/panel pre-finish paint coating.

3.3 CLEANING

.1 Do cleaning in accordance with Section 01 74 11 - Cleaning.

.2 Progress Cleaning:

- .1 Remove dirt and marks caused by installation.

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.4 Waste Management: separate waste materials for recycling.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by mineral fibre reinforced panel installation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Precoated Galvanized steel roofing, associated integral flashings, and underlayment.

.2 Roofing underlay membranes.

1.2 RELATED SECTIONS

.1 Section 06 11 00-_Wood Framing: roof framing, roof sheathing.

1.3 REFERENCES

.1 American Society for Testing Materials International

.1 ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A792/A792M-9a, Standard Specifications for Steel Sheet,55% Aluminum-Zinc Alloy-Coated by the Hot Dip process.

.3 ASTM D523-08,Standard Test Method for Specular Gloss.

.4 ASTM D822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.2 Roofing Contractors Association of British Columbia(RCABC)

.1 RGC manual, RGC Roofing Practices Manual, Published by RCABC.

.3 TBCBC- The British Columbia Building Code (TBCBC) 2012.

1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00: Shop drawings, Product Data and samples.

.2 Product Data

.1 Submit manufacturer printed product literature, specifications and datasheets for sheet membranes and for insulation. Include:

.1 Product characteristics

.2 Performance Criteria

.3 Limitations

.3 Provide mill certificates for sheet metal materials indicating country of origin.

.4 Submit Workplace Hazardous Materials Information System (WHMIS)Material Safety Data Sheets (MSDS).

.1 Indicate precautions for workers during handling of primers, mastics and sealant products.

.5 Shop Drawings: Indicate arrangements of sheets and joints, types and locations of fasteners and special shapes and relationship of panels to building roof framing.

.6 Samples

.1 Submit full colour range of metal roofing for use in colour selection.

.2 Submit samples of metal roofing for final finish/colour verification prior to ordering project material. Samples to be cured finish applied to metal.

.3 Submit 300 mm length full width metal roof panel of each type proposed for use prior to commencement of work.

.7 Manufacturers instructions.

.1 Submit manufacturer installation instructions.

1.5 QUALITY ASSURANCE

.1 Comply with RCABC published manuals, detail and specifications and with metal roof manufacturer recommendations, unless detailed/indicated or stated otherwise. Comply with more stringent requirements of these two provisions. Do work in accordance with RCABC 10 Year Guarantee Standards, unless stated otherwise.

.2 Engage crew(s) of competent, qualified trade workers, using adequate plant and equipment to perform work of this Section.

1.6 PERFORMANCE REQUIREMENTS

.1 Provide metal roofing that will:

.1 Withstand wind loads, snow loads and rain loads and seismic conditions listed in TBCBC for building location, unless more stringent values are identified on drawings,

.2 Accommodate local temperature extremes,

.3 Accommodate building movement,

.4 Produce watertight installations.

.2 Provide for drainage of any trapped moisture to exterior, discharging moisture in a manner avoiding staining of architectural finishes, collecting in puddles, formation of icicles and dripping onto pedestrians.

1.7 DESIGN REQUIREMENTS

.1 Provide metal roofing system that is:

.1 Continuous from ridge to eaves without horizontal lap or horizontal seam,

.2 Free of through fasteners, except at ridges where all such fasteners must be covered by cap flashings and

.3 Not dependant on sealants for primary exclusion of water.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Section 01 61 00: Deliver, store, protect and handle products to site.

.2 Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

.3 Prevent contact with materials which may cause discolouration or staining.

.4 Store materials requiring protection from weather in weatherproof shelters. Avoid exposing light or heat sensitive materials to sunlight for prolonged periods of time.

.5 Do not store materials on roof in concentrations which exceed design live loads.

.6 Protect installed work and materials from damage. Replace damaged materials and damaged roofing panels, at no cost to Contract.

1.9 SITE CONDITIONS

.1 Do not install during periods of precipitation to prevent moisture from becoming trapped in assemblies.

.2 Do not apply roofing to wet, frozen or unsuitable deck surfaces.

.3 Do not expose material vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

.4 Limit access across installed metal roofing to:

.1 Roofing Trade
.2 Departmental Representative
.3 Roofing Manufacturing Representative

Part 2 Products

2.1 SHEET METAL MATERIALS

.1 Zinc coated steel sheet: to ASTM A653/A653M, commercial quality, Grade 33 with Z275 designation galvanized zinc coating.

.2 Aluminum-zinc alloy coated steel sheet: to ASTM A792/A792M, commercial quality, Grade 33 with AZM180 designation coating, pre-finished.

.3 Sheet metal materials to be produced by North American mills.

2.2 COMPONENTS

.1 Underlay membrane: glass fibre based breathable dry sheathing material acceptable to RCABC and metal roofing manufacturer.

.2 Clips: zinc coated sheet steel purpose-made formed shapes, designed specifically to engage and friction retain metal roofing panels allowing for panel movement.

.3 Standing-seam style metal roof panels:

.1 Description: factory fabricated or site rolled metal roof panels suitable for concealed clip metal roofing installation.

.2 Profile: approx. 300 mm width coverage, minimum 25 mm high interlocking friction locking edge seams not requiring site cinching in order to achieve weatherseal, with formed with intermediate minor ribs to lessen oil-canning between edge seams.

.1 Color to match Cascadia Metals color: Red PVDF

.3 Material: minimum 0.61 mm (24 ga.) design thickness aluminum-zinc coated sheet steel.

.4 Fasteners

.1 Concealed locations: stainless steel alloy or galvanized steel, type of sizes/strengths required for adequate anchorage of components.

.2 Exposed locations: stainless steel, type of sizes and strengths required to provide adequate anchorage of components, socket head design, complete with self-sealing soft neoprene washers.

.5 Filler strips: closed cell PVC or neoprene foam, over-sized 30-50% to ensure tight fitting installation.

.6 Sealants: types recommended by metal roofing manufacturer and installer to suit applications, compatible with substrates and adequate to provide permanent seal at temperature ranges anticipated, colours selected by Consultant to match adjacent metal roofing/flashing colours where exposed to view.

.7 Touch-up coating: paintable type recommended by panel manufacturer for use in repairing minor surface damage.

.8 Roof jacks: pre-fabricated purpose-made assemblies, integral nailing flange, suitable for Project roof pitches, with companion lead settle caps.

2.3 SHOP FABRICATION

.1 Fabricate items in accordance with reviewed shop drawings.

.2 Form sections and pieces square, true and accurate to size, free from distortion and other defects detrimental to appearance and performance.

.3 Fabricate all components in sizes required to produce least number of joints.

.4 Fabricate metal roof panels using commercial production quality progressive die forming equipment capable of producing repeated identical straight, accurate, crisp formed panels free of distortion, buckles and damage to pre-finished surfaces.

.5 Trim, edging, flashings, fascia:

.1 Fabricate using minimum 0.61 mm(24 ga.) design thickness aluminum-zinc coated sheet steel to match roof panels, unless noted otherwise on the drawings

.2 Fabricate flashings required for metal roof areas. Produce in accordance with RCABC standards and details or metal roofing system standards whichever is more stringent. Use standing seam construction throughout.

.3 Hem exposed edges. Fold under minimum 10mm.

2.4 FINISH

.1 Pre-finish aluminum-zinc alloy coated sheet steel with coil stock applied polyvinylidene fluoride gloss paint on epoxy primer prior to profile fabrication with colour coat containing not less than 70% pvdf resin. Include permanent-type treatment to reverse side of coil stock to prevent corrosion of backside surfaces.

.1 Class F2S.

.2 Color: selected by the consultant

.3 Specular Gloss: 30 units 1/-5 to ASTM D523

.4 Coating thickness: not less thatn 22 micrometers

.5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20% to ASTM D822 as follows:

.6 Outdoor exposure period 2500 hours.

.7 Humidity resistance exposure period 5000 hours.

.8 Solar reflectance (albedo): as part of 'Energy Star' Roof Product Program, the U.S. EPA has established criteria for solar reflectance of coatings applied to low-sloped and high-sloped roofs. Following target figures apply to this project.

.9 Initial albedo level: no less than 0.3 average.

.10 3-year albedo level: no less than 0.2 average.

Part 3 Execution

3.1 EXAMINATION

.1 Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to eaves.

.2 Verify deck is dry and free of snow or ice. Verify joints in wood deck are solidly supported and fastened.

3.2 INSTALLATION

.1 General: install metal roof system in accordance with reviewed shop drawings.

.2 Underlayment membrane

.1 Apply over completed roof sheathing installation.

.2 Arrange joints to shed moisture down roof slopes.

.3 Roof panels and flashings:

.1 Install roof panels to comply with RCABC requirements and roofing manufacturer recommendations complete with associated flashings and assembly components.

.2 Use metal roofing manufacturer proprietary fastener clips to anchor roof panels to sheathing.

.3 Form and tailor panels to ensure weathertight installation. Fabricate and install system rain excluders.

.4 Install metal panels, associated flashings and assembly components rigidly secured in place, with laps as required to allow for expansion/contraction, weathertight and to meet performance requirements specified.

.5 Install components progressively, in a manner to prevent damage to finished surfaces.

.6 Install related metal flashings.

.7 ncorporate roof jacks of correct sizes to suit plumbing vents. Finish each installation with correct size of settle cap.

3.3 PROTECTION OF FINISHED WORK

.1 Do not permit traffic over unprotected roof surface.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 08 11 00 - Metal Doors and Frames

.2 Section 08 53 13 – Vinyl Windows

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM A240/A240M-07e1, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

.2 ASTM A653/A653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM B32-04, Standard Specification for Solder Metal.

.4 ASTM D523-89(1999), Standard Test Method for Specular Gloss.

.5 ASTM D822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.6 ASTM C920-08, Standard Specification for Elastomeric Joint Sealants.

.2 Aluminum Association (AA)

.1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.3 American Architectural Manufacturers Association (AAMA)

.1 AAMA 611-98, Voluntary Specifications for Anodized Finishes Architectural Aluminum.

.4 NBC, National Building Code of Canada (issue date listed in Section 01 41 00 Regulatory Requirements)

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit duplicate samples of each type of sheet metal material, finishes and colours for Departmental Representative color selection.

1.4 PERFORMANCE REQUIREMENTS

.1 Provide metal flashings that will withstand wind uplift conditions listed in NBC for building location, unless more stringent values are identified on drawings.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturers recommendations.

.2 Protect pre finished materials from scratching

.3 Stack pre-formed materials in manner to prevent twisting, bending and rubbing.

1.6 WASTE MANAGEMENT AND DISPOSAL:

.1 Separate waste materials for recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

.1 Zinc coated sheet steel: to ASTM A653/A653M, commercial quality, Grade 33, with not less than Z275 designation zinc coating, pre-finished.

.1 Pre-finish: coil stock finished with polyvinylidene fluoride gloss paint on epoxy primer prior to profile fabrication, with colour coat containing not less than 70% pvdf resin. Include permanent-type treatment to reverse side of coil stock to prevent corrosion of backside surfaces.

.1 Specular gloss: 30 units +/- in accordance with ASTM D523.

.2 Coating thickness: not less than 22 micrometres

.3 Resistance to accelerated weathering for chalk rating of 8, colour fade 5units or less and erosion rate less than 20% to ASTM D822 as follows:

.1 Outdoor exposure period 2500 hours

.2 Humidity resistance exposure period 5000 hours

.4 Colours: As selected by Departmental Representative.

.2 Sheet steel to be produced by North American mills to ensure compliance with above-referenced standards. Submit evidence of North American mill source upon Departmental Representative request.

.2 Touch-up paint: type compatible with and matching pre-finish paint/colour.

.3 Flashing fasteners: #8-18x19mm, self-tapping screws

.4 Sealants: non-sag polyurethane, one part formulation, to ASTM C 920 Type S, Grade NS, Class 35, Use NT, M, A and O; colours selected by DCC Representative where exposed to view.

.5 Self-adhesive SBS membrane: minimum 1 mm thick self-adhering composite sheet membrane comprised of 0.8 mm thick rubberized asphalt integrally bonded to 0.1 mm thick film of polyethylene, bottom surface protected with silicone release sheet.

2.2 FABRICATION OF FLASHING

.1 Fabricate in accordance with detail drawings.

.2 Fabricate typical flashings using not less than 0.61 mm thick pre-finished zinc coated sheet steel, unless detailed/indicated otherwise. Use greater metal thickness at locations of wider span to prevent "oil-canning" and deformation of flashings.

.3 Fabricate flashings accurately with true crisp lines and quality metalwork joinery suitable for exposed installation.

.4 Pre-fabricate corners with mitred joints. Form watertight lock-seams set in sealant for all mitred corner joints.

.5 Maintain 1:6 minimum slope on horizontal surfaces.

.6 Hem exposed edges. Fold under minimum 10 mm.

.7 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.8 Refer to drawings for self-adhesive SBS membrane locations under metal flashings.

.9 Fabricate specialized flashings including but not limited to hot pipe flashings, storm collars, pressure rings and flue caps using not less than 0.38 mm (AISI 28 gauge) metal thickness stainless steel sheet. Use greater metal thickness at locations of wider span to prevent "oil-canning" and deformation of flashings.

.1 Colour match welding material to parent metal in stainless steel fabrications.

.2 Use welding material with same corrosion resistance properties as parent metal.

.3 Grind and polish welds to match parent metal.

2.3 FABRICATION OF WINDOW FLASHINGS

.1 Fabricate in straight sections as indicated.

2.4 GUTTERS

.1 .1 Material: ASTM B209M utility sheet aluminum, shop pre-coated with high molecular weight polyester (hmp) gloss paint on epoxy primer prior to profile fabrication, colours selected by Departmental Representative.

.2 Components:

.1 Gutters: 125 mm size rectangular profile, not less than 0.80 mm metal thickness.

.2 Downspouts: 75 mm o.d. round profile, not less than 0.48 mm metal thickness.

.3 End caps, downspout outlets, straps, support brackets, downspout strainers: profiled to suit gutters and downspouts.

.3 Accessories:

.1 Anchorage devices: stainless steel alloy screws and washers.

.2 Gutter supports: designed to fit into, engage and support gutters; non-corroding plated finish stamped metal or aluminum alloy casting fabrications.

.3 Downspout supports: straps.

.4 Downspout adapters: ABS plastic units sized to downspouts and to drain pipes, offset and straight designs, colours selected by Departmental Representative.

.4 Fabrication:

.1 Form gutters and downspouts of profiles and sizes detailed/indicated.

.2 Form sections square, true and accurate in size, in maximum possible lengths and free of distortion or defects detrimental to appearance or performance.

Part 3 Execution

3.1 INSTALLATION

.1 Metal Flashings

.1 Install in accordance with detail drawings.

.2 Fit flashings together so that one end of each section is free to move in joint.

.3 Fit flashings secure in place. Make corners square, surfaces true and straight in all planes, and all lines accurate to profiles.

.2 Gutters and downspouts

.1 Install in accordance with detail drawings.

3.2 CLEANING

.1 Do cleaning in accordance with Section 01 74 11 - Cleaning.

.2 Clean flashings to remove handling marks and smudges.

.3 Progress cleaning: leave Work area clean at end of each day.

.4 Final cleaning: on completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools, equipment and barriers.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 41 16 - Pre-Fabricated Wall and Roof Panels

.2 Section 07 44 56 - Mineral Fiber Reinforced Cementitious Panels

.3 Section 07 62 00 Sheet Metal Flashing and Trim

.4 Section 09 91 00 Painting

1.2 REFERENCES

.1 ASTM International

.1 ASTM C919-08, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).

.2 CAN/CGSB-19.13- M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.

.3 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.

.4 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

.3 General Services Administration (GSA) - Federal Specifications (FS)

.1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

.4 AAMA 809 Voluntary Specifications and Test Methods for Sealants.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.6 Green Seal Environmental Standards

.1 Standard GS-36-00, Commercial Adhesives

.7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

.1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.3 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Manufacturer's product to describe:

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Samples:

.1 Submit samples of each type of material and colour.

.2 Cured samples of exposed sealants for each colour where required to match adjacent material.

.4 Manufacturer's Instructions:

.1 Submit instructions to include installation instructions for each product used.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturers recommendations.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

1.5 WHMIS

.1 Submit copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOCs during application.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

1.7 SITE CONDITIONS

.1 Environmental Conditions:

.1 Proceed with installation of joint sealants only when:

.1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.

.2 Joint substrates are dry.

.3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.2 Joint-Width Conditions:

.1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Proceed with installation of joint sealants only after contaminants capable of

.4 Where sealants are qualified with primers use only these primers.

Part 2 Products

2.1 SEALANT MATERIALS

.1 Sealant materials to conform to the requirements of :

.1 Green Seal Environmental Standards

.1 Standard GS-36-00, Commercial Adhesives

.2 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

.2 VOC limit maximum 250 g/L for sealers used within the building envelope.

.3 Where sealants are qualified with primers, use only these primers

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Polyurethanes: colours selected by Departmental Representative.

.1 Non-sag formulation: 1-part, to CAN/CGSB-19.13, Type 2, MCG-2-25, MCG-2-40.

.2 Self-levelling formulation:

.3 1-part: to CAN/CGSB-19.13, Type 1.

.4 2-part: to CAN/CGSB-19.24, Type 1, Class B.

.2 Non-drying butyl sealant to AAMA 809

.3 Silicones one part: to CAN/CGSB-19.13.

.4 Structural silicones to CAN/CSGB 19.13 M87

.5 Acrylics one part: to CGSB 19-GP-5M.

.6 Acrylic latex: one part, non sag siliconized acrylic polymer to CAN/CGSB-19.17.

.7 Preformed compressible and non-compressible back-up materials:

.1 Polyethylene, urethane, neoprene or vinyl foam:

.1 Extruded closed cell foam backer rod.

.2 Sized as required.

.2 Neoprene or butyl rubber:

.1 Round solid rod, Shore A hardness 70.

.3 High density foam:

.1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa,

extruded polyolefin foam, 32 kg/m^3 density, or neoprene foam backer, size as recommended by manufacturer.

.4 Bond breaker tape:

.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

.1 Roof and wall panel connections

.1 Non -drying, self-healing, butyl rubber sealant.

.2 Flashings applied at wall and roof junctions.

.1 High performance single component neutral cure structural silicone to CAN/CSGB 19.13 M87, Clear colour

.3 Junctions between subfloor floor edges and exterior wall panels to produce permanent sealed vapour-resistant joints.

.1 Polyurethane, self-levelling.

.4 Penetrations in exterior walls to fill joints watertight including but not limited to exterior perimeters of door frames, window frames, curtain wall frames; exterior perimeters of wall vents; exterior perimeters of all other wall penetrations.

.1 Polyurethane, non-sag.

.5 Interior perimeters of door frames and trims, window and curtain wall frames to make junctions filled, smooth and invisible suitable for subsequent "painting out" with interior wall finishes.

.1 Acrylic latex.

.6 Gypsum board control joints: to make joints suitable for subsequent "painting out" with interior wall finishes.

.1 Acrylic latex.

.7 Junctions between counter tops and walls to produce permanent sanitary and watertight seal; junctions between plumbing fixtures and walls, floors and counter tops/vanities to produce permanent sanitary and watertight seal. Co-ordinate with plumbing trade to avoid omission/duplication.

.1 Mildew-resistant silicone.

.8 Interior vapour barrier

.1 Non-drying butyl sealant to AAMA 809

2.4 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.

.2 Primer: in accordance with sealant manufacturer's written recommendations.

Part 3 Execution

3.1 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.2 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.3 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.4 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.5 APPLICATION

.1 Sealant:

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing:

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

3.6 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Non-rated and thermally insulated steel frames.

.2 Non rated metal window and sidelight frames

.3 Non-rated and thermally insulated steel doors.

1.2 RELATED SECTIONS

.1 Section 08 71 00 - Door Hardware: Hardware, silencers, and weather-stripping.

.2 Section 09 91 23 - Painting: Field painting of frames.

1.3 REFERENCES

.1 ASTM A653/A653M - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 CSDFMA (Canadian Steel Door and Frame Manufacturers Association).

.3 DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

.4 SDI-100 - Standard Steel Doors and Frames.

.5 ASHRAE 90.1 2013- Energy Standard for Buildings Except Low Rise Residential Buildings

1.4 SUBMITTALS

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Indicate frame configuration and finishes. Indicate door configurations, location of cut-outs for hardware reinforcement.

.3 Shop Drawings: Indicate frame elevations, reinforcement, anchor types and spacings, location of cut-outs for hardware, and finish. Indicate door elevations, internal reinforcement, closure method, and cut-outs for glazing, louvers, and finishes.

1.5 QUALITY ASSURANCE

.1 Conform to requirements of CSDFMA SDI-100.

1.6 PROJECT CONDITIONS

.1 Coordinate the work with frame opening construction, door, and hardware installation.

PART 2 PRODUCTS

2.1 DOORS

.1 Exterior doors: Air infiltration to comply with ASHRAE Standard 90.1 2010 & 2013 requirements of less than .4 CFM/FT^2

.2 Insulated Core Doors:

.1 Door faces, top and bottom end channels: minimum 1.2 mm.

.2 Cores: Polyurethane to CAN/ULC-S701 Rigid, modified polyisocyanurate, closed cell board. Density 32kg/m3.

.3 Interior honeycomb core doors: minimum ,1.2 mm surface sheets and top and bottom end channels; cores filled with honeycomb material laminated under pressure to surface sheets.

.4 Reinforcement for hardware:

.1 Locks: minimum 1.52 mm steel.

.2 Butts: minimum 3.42 mm steel.

.3 Flush Bolts: minimum 3.42 mm steel.

.4 Door Closures: minimum 1.9 mm steel.

.5 Glazing Stops: 0.9 mm rolled steel channel shape, butted corners; 16 mm high profile; prepared for countersink screws.

2.2 FABRICATION DOOR FRAMES

.1 Frame material not less than 1.6 mm metal thickness for openings to 1220 mm in unsupported width; not less than 2.0 mm metal thickness for openings exceeding 1220 mm in unsupported width.

.2 Fabricate frames in accordance with CSDMA specifications and following requirements

.3 Fabricate frames with hardware reinforcement plates welded in place.

.4 Reinforce frames wider than 1 200 mm with roll formed steel channels fitted tightly into frame head, flush with top.

.5 Prepare frames for silencers. Provide three single silencers for single doors and mullions of double doors on strike side. Provide two single silencers on frame head at double doors without mullions.

.6 Glazing Stops: 0.9 mm rolled steel channel shape, butted corners; 16 mm high profile; prepared for countersink screws.

.7 Provide drywall returns on all frames.

.8 Attach channel spreaders at bottom of frames for shipping.

2.3 FRAME ANCHORAGE

.1 Provide appropriate anchorage to floor and wall construction.

.2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.

.3 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof

2.4 FRAMES: KNOCKED-DOWN TYPE

.1 Ship knocked-down type frames unassembled.

.2 Provide frames with mechanical joints which inter-lock securely and provide functionally satisfactory performance when assembled and installed in accordance with CSDMA Recommended Installation Guide for Steel Doors and Frames.

.3 Securely attach floor anchors to inside of each jamb profile.

2.5 FABRICATION - DOORS

.1 Fabricate hollow metal doors and panels in accordance with requirements of "Canadian Manufacturing Standards for Steel Doors and Frames" produced by the Canadian Steel Door and Frame Manufacturer's Association and as indicated on Drawings. Fabricate doors with hardware reinforcement welded in place.

.2 Fabricate fire rated hollow metal doors in accordance with requirements of Underwriters Laboratories of Canada (ULC). Place ULC labels where visible when in installed position.

.3 Longitudinal seams: Mechanically interlocked, continuously welded, filled and sanded with no visible edge seams. Top and bottom of doors closed with end channels recessed and spot welded in place.

.4 Reinforce and prepare doors to receive hardware. Refer to Section 08 71 00 for hardware requirements.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify that opening sizes and tolerances are acceptable.

3.2 INSTALLATION

.1 Install frames in accordance with CSDFMA.

.2 Coordinate with gypsum board wall construction for anchor placement.

.3 Coordinate installation of glass and glazing.

.4 Coordinate installation of doors and frames with installation of hardware specified in Section 08 71 00

.5 Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

.6 After installation, touch up all scratched or damaged surface and prime.

.7 Insulate all frames exposed to the exterior.

.8 Install door louvers, plumb and level.

3.3 ERECTION TOLERANCES

.1 Maximum Diagonal Distortion: 1.5 mm measured with straight edges, crossed corner to corner.

.2 Clearance on steel doors at head and jambs shall be: 3 mm maximum, maximum between pairs of doors

3.4 ADJUSTING

.1 Adjust door for smooth and balanced door movement.

3.5 CLEANING

.1 Do cleaning in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

1.0 GENERAL

1.1 WORK INCLUDED

.1 Window frames and sashes consisting of extrusions of polyvinyl chloride (PVC).

.2 Windows as pre-assembled units, including factory installation of glass and glazing.

.3 Furnish all labour, materials, equipment and services required for the design, fabrication, supply and installation of windows as shown on the drawings and as specified. Furnishment to include, but not be limited to the following:

- .1 Fully glazed vinyl window assemblies including vinyl shapes and glass.
- .2 All glazing accessories for window assemblies including gaskets, setting blocks, and sealants as required to meet the air and water tightness requirements of the section.
- .3 All necessary reinforcing members, brackets, anchors, fasteners and other accessories as required to meet the structural requirements of the installation and specifications in this section.
- .4 Shop applied galvanizing and electrolytic barrier painting of all steel parts.
- .5 All perimeter closures, membranes, sealants, flashings, and trim required to integrate the window assemblies with other cladding and finishing materials.
- .6 Assessment of the alignment of the existing façade elements as required to allow design and layout of the work in this section.
- .7 All fastening of the window assemblies to the rough openings

.4 Include also the following:

- .1 Checking of building lines and levels as required for the proper layout and installation of all work included in this section.
- .2 Shop painting of all steel shapes and ferrous metal used in attachment or reinforcing of window and field painting after steel shapes are installed.

.5 Window systems of the following types:

- .1 Single fixed lites.
- .2 Composite, with fixed lites and operable casement lites.

1.2 REFERENCE STANDARDS (Most recent version unless noted otherwise.)

.1 AAMA/WDMA/CSA101/I.S.2/A440-08-NAFS- North American Fenestration Standard/ Specification for windows, doors, and skylights

.2 CSA A440S1 – 09 “Canadian Supplement to AAMA/WDMA/CSA101/I.S.2/A440-08 – NAFS – North American Fenestration Standard/Specification for windows, doors, and skylights”

.3 British Columbia Energy Efficiency Act – Energy Efficiency Standards Regulation (BCEEA)

.4 CAN/CSA-A440-Windows; A440.1 User Selection Guide to A440; A440.2 Energy Performance Evaluation; A440.3 User Guide to A440.2; A440.4 Window and Door

Installation.

.5 CAN/CSA-G164-Hot-Dip Galvanizing of Irregularly Shaped Articles

.6 CAN/CGSB-1.40-Primer, Structural Steel, Oil Alkyd Type.

.7 ASTM D4216, Standard Specification for Rigid Polyvinyl Chloride (PVC) and Related PVC and Chlorinated Polyvinyl Chloride (CPVC) Building Products Compounds.

.8 ASTM D4726, Standard Specification for Rigid Polyvinyl Chloride (PVC) Exterior-Profile Extrusions Used for Assembled Windows and Doors

.9 Glazing Contractor's Association of B.C. (GCABC) publication: Glazing Systems Specifications Manual

.10 IGMA Glazing Recommendations for Sealed Insulating Glass Units.

1.3 DEFINITIONS

.1 Single Unit Window: a window consisting of one fixed or one operable lite.

.2 Composite Window: a window consisting of a maximum of three lites in one main frame. Composite windows may consist of fixed or operable windows, or a combination of both.

1.4 DESIGN CRITERIA

.1 Materials, fabrications, attachments, accessories, assembly and performance, other that thermal performance, shall meet or exceed applicable requirements of CSA-A440, Windows, including appendices. The more stringent of CSA-A440 or this specification shall apply.

.2 Thermal performance shall be determined in conformance with CSA-A440.2, Thermal Performance Evaluation of Windows and Sliding Glass Doors, and Appendix A – Overview of the Procedure for Determining the U-Value by Computer Simulation.

.3 Design windows to be glazed from the interior.

.4 Design windows to equalize both positive and negative pressure between outside air and:
.1 cavities surrounding insulating glass units, and
.2 cavities surrounding operable sash.

.5 Design windows to provide drainage from spaces around operable sash and around insulating glass units to exterior.

.6 Design windows to provide for the continuity of the air seal from the inside face of the sealed unit to the surrounding frame.

.7 Design window anchorage to withstand wind load equal to or greater than calculated loads as per CSA A440S1-09 in accordance to the Performance Class specified herein or

to Part 4 of the BC Building Code.

.8 Design vinyl components to accommodate thermally induced movement and to prevent creep deflection. Limit of creep deflection 3mm per meter in any member or assembly.

.9 Design assembly to accommodate structure movements due to wind, seismic, creep and live loads where applicable and/or as noted.

1.5 PERFORMANCE REQUIREMENTS

.1 This is a performance specification issued in conjunction with the drawings for the work. The drawings show the general arrangement of the finished work and these specifications described the minimum requirements of the finished system. The Contractor is responsible for designing and furnishing a window system that will fulfill the requirements of the specifications and drawings including items which may not be shown or specified but are required for performance of the system.

.2 The window shall be designed, fabricated and installed to meet or exceed the criteria in this subsection.

.3 Structural

- .1 Wind Load Resistance to NAFS in conjunction with CSA A440.09.
- .2 The window assembly and fasteners shall be designed to withstand negative and positive wind loads in accordance to BCBC using an annual probability factor of **1/50 years** for the reference wind velocity, and 8 per 1000 glass failure rate under this load.
- .3 The glass and window frames shall be designed to withstand guard loads at locations required by the BCBC.
- .4 The glass shall be designed to withstand thermal stresses imposed in service. In calculation, assume the use of blinds located not less than 50 mm from the inside surface of the glass.
- .5 The window system shall be designed to limit deflection orthogonal to the plane of the glass under wind or guard loads to **L/175** in all clear span dimensions of glass and framing members.
- .6 Anchors and fasteners shown on the drawings do not represent the required location or types required for installation of the new widow. Any attachment points must be shown on shop drawings for review by the Consultant.
- .7 All fastenings and attachments shall be concealed.
- .8 Movement and Tolerances
  - .1 The window installation shall accommodate a building structure live load deflection of 9 mm at midspan of longest project window header/lintel without transferring load to the window.
  - .2 The window shall accommodate expansion and contraction of component materials over an exterior air temperature range of -18ºC to 35ºC and a possible solar heating range to 70ºC, and an interior temperature range of 0ºC to 30ºC without causing:
    - .1 failure of joint seals necessary for air and water tightness of the system,
    - .2 failure of perimeter seals at interfaces to adjacent wall systems,
    - .3 overstressing of fasteners,
    - .4 pinching or distortion or breakage of glass,

.5 distortion of aluminum members,
.6 or other harmful effects.

.4 The window shall be fabricated and installed square, level and plumb as follows:
.1 Plumb to within 3 mm of vertical over the height of each unit.
.2 Within 3.0 mm of level relative to a datum established for frames at the same floor.
.3 Within 1.5 mm of level relative to an adjacent frame.
.4 Each frame shall be within 3.0 mm of square when measured across the diagonals.
.5 Clearances required for installation should be considered and indicated on the shop drawings.
.6 All movements of the window system shall be noiseless.

.5 Weather Tightness
.1 Water Tightness to NAFS in conjunction with CSA A440.09 .
.2 The glazing system shall be installed so that it forms a continuous unbroken air seal on the room side of the assembly. The air seal shall extend from the glazing assembly to adjoining wall components at all interfaces. Airtightness of the window and interfaces shall restrict infiltration and exfiltration of air through the system in accordance to NAFS.
.3 The window system shall be designed in accordance with rainscreen principles, incorporating venting and drainage mechanisms and separate air and water barriers, effective so that any water entering the system past exterior seals drains harmlessly to the exterior via pressure equalized drainage cavities.
.4 Vent and drain holes shall be present in inconspicuously locations and shall not contribute to staining or marking of glass, mullions, or spandrels.

.6 Durability
.1 The window frames and integral seals shall be designed to have an expected service life of 30 years. All seals, gaskets, corrosion protection, coatings and attachments are expected to be serviceable at the end of this service period.

.2 The glazing shall have a guaranteed service life of five years. Any glazing failing to meet this service life shall be removed and replaced at no cost to the Owner under guarantee by the Contractor. Failure of any glazing shall be deemed to occur if any of the following are noted:
.1 Chipping, cracking, or breakage of glass panes occurring due to manufacturing defects or under specified service conditions.

.3 Seals between unitized components of the glazing system shall be formed with clamped rubber gaskets. Seals between frame units made with field applied sealants alone will not be accepted.

1.6 RESPONSIBILITY FOR MEETING PERFORMANCE REQUIREMENTS

.1 Meeting the performance requirements of this section during the design fabrications and installation of the work shall be the complete responsibility of the Contractor.

.2 The details shown on associated drawings show dimensions and profiles similar to those expected to be required to meet the specifications of this section. The Contractor may submit design proposals with minor changes to the details shown on the drawings in order to meet or exceed the performance requirements of this section by using proprietary technology. Every effort has been made to show on the drawings and in the specification items of the design that may not be altered or altered only to limited extents.

.3 The structural and energy use requirements of this section shall be certified by an Engineer employed by the Contractor using standards recognized by the local authority having jurisdiction, the product manufacturer and current trade associations.

.4 The design of the product and the responsibility of the Contractor's Engineer shall extend to accommodate all temporary conditions associated with fabrication, transport, storage, lifting, installation and temporary closure of the building without detrimental effect on the performance requirements of these contract documents.

.5 The Consultant's review of the Contractor's submittals and the work is of the benefit only of the Owner. The Contractor shall remain responsible for the design, fabrication, installation and performance of the product.

1.7 SUBMITTALS

.1 Submittals to be made in accordance with Section 01 33 00 - Submittals.

.2 Product Data: Submit catalogue details for each type of window and framing system illustrating profiles, dimensions and methods of assembly, installation procedures, recommendations and data that products have been tested and comply with performance requirements.

.3 Submit test reports form an independent testing agency acceptable to the Consultant, indicating windows to be supplied for the project meet specified requirements, including compliance with AAMA/WDMA/CSA101/I.S.2/A440-08- NAFS. Testing conducted by manufacturer to follow all required product test and sequence tests as described under Clause 5 in AAMA/WDMA/CSA101/I.S.2/A440-08- NAFS in conjunction with CSA A440S1-09.

.4 Energy Conformance: Supply documentation sufficient to confirm conformance of project window sizes and configurations with the British Columbia Energy Efficiency Act, using one of the following testing agencies or persons.
- .1 A person or organization accredited by the Standards Council of Canada
- .2 National Fenestration Rating Council accredited Inspection Agency
- .3 Architect or Professional Engineer, authorized to practice in British Columbia.

.5 Shop Drawings:
- .1 Submit shop drawings of windows prepared under the supervision and bearing the seal of a Professional Engineer of the Province of BC. Submit completed BC Building Code Letters of Assurance (Schedules B1 and B2) together with the initial shop drawing submission. Upon request, provide structural calculations per conformance to Building Codes, By-Laws and CAN/CGSB 12.20.
- .2 Clearly indicate each type of window, hardware and locations, framing system,

extrusion profiles, methods of assembly, section and hardware reinforcement, anchorages and location of exposed fasteners, isolation coatings, finishes, glazing components, insect screens, and location of manufacturer's name plates (if applicable).

.3 Provide scaled elevations, sections, plans, dimensions and quantity of units. Indicate rough opening requirements and tolerances of adjacent construction.

.4 Provide full size details for head, sill and jamb conditions, junctions between combination units (coupling mullions), and interior and exterior trim. Clearly indicate method and location of connection and continuity of the envelope air, vapour and water seals. Clearly indicate drainage and ventilation paths within the window assembly and at the interface to the building envelope. Confirm compatibility of materials that form the air/vapour/water barrier of the integrated system.

.5 Provide manufacturer's assembly instructions for operable units if they will be supplied demounted from main frame.

.6 Shop drawings are submitted to allow the Departmental Representative to review conformance of the proposed system. Review of the shop drawings by the Departmental Representative shall not relieve the Contractor of any responsibilities to perform under the terms of this specification. Notify the Departmental Representative of any sequencing of submittals and reviews that will expedite the Contractor's delivery of the project

.7 No materials shall be purchased or units fabricated until final review of shop drawings is completed by the Departmental Representative.

.6 Samples: If requested, make the following samples available for Departmental Representative review at least one week prior to shop drawing preparation:

.1 150 mm long corner sections of head, jamb, sill, mullions, and coupling mullions to indicate profile.

.2 One (1), 4'x 4' with 2' operable section, representative model of each type of window.

.7 Letters of Assurance: The Registered Professional Engineer who signed and sealed the shop drawings shall perform sufficient field reviews in order to provide a letter of professional assurance after completion of the Work, giving assurance that the Work has been fabricated and installed in general conformance with the sealed shop drawings. Approved forms are BC Building Code Letters of Assurance (Schedule C). Written inspection reports of field reviews shall be submitted to the Architect promptly as the field reviews are made.

.8 Maintenance Data: Provide in accordance with Section 01 78 10 – Maintenance and Renewal Manual, the following data for incorporation into specified maintenance manual:

.1 A recommended inspection procedure and schedule and component replacement schedule.

.2 Data for cleaning and maintenance of framing finishes, glazing and hardware.

.9 Warranties:

.1 Provide a written warranty signed and issued in the name of the Owner stating:

.1 All windows will be free from defects in material and workmanship for a period of two (2) years from the date of substantial Performance of the Work.

.2 All windows will continue to provide satisfactory resistance to water penetration for a period of five (5) years from the date of Substantial Performance of the Work.

.3 All insulating sealed double glazing units shall be covered for a period of ten (10) years from the date of Substantial Performance of the Work, against material obstruction of vision as a result of hermetic seal failure and dust or film formation on inner glass surfaces.

.2 If a 3rd party warranty is provided then the warranty requirements are to be the most stringent of the 3rd party warranty or the requirements listed above or the requirements in Section 01 78 36 Warranties and Bonds.

.3 Satisfactory performance means compliance with the performance criteria and the testing and construction standards of this specification, and with the reviewed shop drawings. This includes the performance of finishes, hardware glass and glazing materials, structural attachment, sealants and flashings.

.4 Correct all deficiencies that appear during the warranty period at no cost to the Owner.

1.8 QUALITY ASSURANCE

.1 Sealed insulation unit manufacturer to be a member in good standing of the Insulating Glass Manufacturers Alliance (IGMA).

.2 Glass and glazing work under this section to conform to IGMA standards.

.3 Window manufacturer and installation contractor to be a member in good standing of the Glazing Contractors Association of BC (GCABC) and have a minimum of 5 years uninterrupted experience in successfully carrying out projects of similar size. Contractor to document past experience on request.

2.0 PRODUCTS

2.1 WINDOWS

.1 Description: sash comprised of purpose-made vinyl extrusions, thermally broken, rain screen design with pvc sub sill, exterior flange mount, fitted with insulated glass unit glazing and rigid extruded vinyl snap-in glazing stop, in sizes and arrangements detailed/indicated.

2.3 SINGLE UNIT WINDOWS

.1 Meet or exceed requirements of selected Performance Class and Performance Grade as

per AAMA/WDMA/CSA101/I.S.2/A440-08- NAFS- North American Fenestration Standard/Specification for windows, doors, and skylights and CSA A440S1- 09 – Canadian Supplement to NAFS and the secondary performance requirements:

.1 All windows shall conform to:
  .1 Class **CW – PG30 (metric)** - Fixed
  .2 Class **CW – PG30 (metric)** – Casement and Awning
.2 Water Penetration: Water penetration test pressures shall be **400 Pa.**
.3 Air Tightness Rating, Fixed Windows: Fixed Level.
.4 Air Tightness Rating, Operable Windows: A3 Level
.5 Operation Force for: Casement window - Normal Use (Clause 5.3.1.1, Table 6)
.6 Energy Performance: Overall Window U-Value averaged over all fenestration products within the scope of work to be no more than **1.8 W/m2•K**.
.7 All windows are to be labeled with the AAMA, CSA or WDMA label and have sash, leaf and size shown on the drawings.

2.4 COMBINATION WINDOWS

.1 Meet or exceed requirements of selected Performance Class and Performance Grade as per AAMA/WDMA/CSA101/I.S.2/A440-08- NAFS- North American Fenestration Standard/Specification for windows, doors, and skylights and CSA A440S1- 09 - Canadian Supplement to NAFS, and the secondary performance requirements. Refer to Clause 2.1.1 for Window Performance Grades and Energy Performance.

.2 Air and water tightness of joints along frames mulled together, and at mullions where lites within one main frame join, shall meet or exceed performance ratings specified for the higher rated adjacent single unit windows.

.3 Lateral deflection of mulled frames shall not exceed **L/175** of span when subjected to loading equivalent to wind load resistance of the adjacent single unit windows.

2.5 WINDOW TYPES

.1 Fixed: with removable double-glazed insulated sealed units. Minimum performance standard to meet AAMA/WDMA/CSA 101/I.S.2/A440-08 – NAFS Class CW-PG30.
.2 Casement (Outswing sash): with removable double-glazed insulated sealed units. Minimum performance standard to meet AAMA/WDMA/CSA 101/I.S.2/A440-08 – NAFS Class CW-PG30.
.3 Screens: provide on ventilating portions of windows.

2.6 FRAME AND SASH REQUIREMENTS

.1 Frame and sash profiles and glazing detailed on drawings are not intended to restrict product types conforming to these specifications.
.2 Provide PVC frame and sash conforming to the following standards:
  .1 ASTM D4726, Standard Specification for Rigid Poly Vinyl Chloride (PVC) Exterior-Profile Extrusions Used for Assembled Windows and Doors.

.2 ASTM D4216, class 1 32021 42 4040 or equivalent standard for weathering and mechanical properties.

.3 Can/CGSB 41-GP-19MA, Rigid Vinyl Extrusions for Windows and Doors. The material shall show no reduction in surface gloss or colour after 10,000 hours in a UV arc weather-o-meter.

.4 Minimum external wall thickness of extrusions: 2.5 mm nominal, exceeding requirements of CSA-A440 for vinyl (PVC) window wall types A, B, and C.

.3 Seal sash perimeter continuously at three locations minimum, with primary seal located between operator and interior seal.

.4 Secure hardware and attachments using screws into H-ports or penetrating minimum of two walls of framing or internal steel reinforcement.

.5 Join single units to form combination units with joints at combination unit frame perimeter finished with sealant and steel plate, 75 mm x 75% of depth of framing. Plate shall be screw fastened with a minimum of four screws through plastic into steel reinforcing.

.6 Anchor using metal retaining clips at head, nailing flanges at jambs and continuous back angle at sill.

2.7 GLASS AND GLAZING MATERIAL

.1 Insulating Glass Units: meet or exceed requirements as described in AAMA/WDMA/CSA101/I.S.2/A440-08- NAFS and CSA A440S1- 09 - Canadian Supplement to NAFS . Units shall be certified by the Insulating Glass Manufacturers Alliance (IGMA). Overall unit thickness shall be a minimum of 24 mm using a minimum of 4 mm glass thickness. In combination and composite units use the greater glass thickness throughout. Use two-stage seal method of manufacture, as follows:

.1 Primary Seal: polyisobutylene or hot-melt butyl.

.2 Secondary Seal: polyisobutylene, silicone or polysulphide based sealant, filling gap between the two lites of glass at the edge up to the spacer/separator and primary seal.

.3 Spacer/separator: non-conductive, as required to suit performance requirements.

.3 Insulated glass unit assembly to provide following minimum performance requirements. Following is based on 6 mm thick Low E glass in 25 mm thick insulating unit with 13 mm thick Argon gas filled space and 6 mm thick clear inner glass.

.1 Transmittance:

Ultra-violet (UV) light: 19%
Visible daylight: 70%
Total solar energy: 33%

.2 Reflectance:

Visible light: 11%
Total solar energy: 30%

.3 U-values (Imperial):

Winter night time: 0.29
Summer day time: 0.28

.4 Shading coefficient factor: 0.44

.5 Solar heat gain coefficient: 0.38
.6 Light-to-solar gain (LSG): 1.84

.2 Clear Float Glass: to CAN/CGSB-12.3, glazing quality, for inner and outer lite.

.4 Glazing Gaskets for PVC Sections: neoprene, thermoplastic rubber or EPDM, flexible at minimum design temperature, and as follows:
- .1 Profiles with a minimum of two (2) fins to contact glazing at interior and exterior of glass units
- .2 Designed to maintain pressure contact against glass units through design temperature range.
- .3 Co-extruded gaskets are not acceptable on the main frame or sash.
- .4 Foam or butyl glazing tapes are not acceptable.

.5 Other Glazing Accessories: setting blocks to AAMA/WDMA/CSA101/I.S.2/A440-08-NAFS.

2.8 HARDWARE

.1 Exposed Hardware Components: cast metal, in finish selected by Consultant from hardware manufacturer's standard range.

.2 Hardware exposed to exterior environment with sash in closed and open positions shall be corrosion-resistant stainless steel or bi-chromated steel composites.

.3 Secure hardware and attachments using screws into H-ports or penetrating a minimum of two walls of framing. Wherever possible provide metal reinforcement embedded in vinyl frames at screw attachment locations.

.4 Equip operable windows with hardware as follows:
- .1 Casement: concealed dual arm operator and stainless steel tracks, with under screen roto operator assembly. Provide multi-point locking with single handle operation.
- .2 Hardware to be adjustable to accommodate compression set of weather and air seals.

.5 Provide ADA approved handles for roto operators.

.6 Force to operate locking devices shall not exceed 20 N.

.7 Provide pole operated hardware where window latching devices are located in excess of 1900 mm above floor level:

2.9 ACCESSORIES

.1 Weatherstripping for operable sash: neoprene, thermoplastic rubber or EPDM, flexible at minimum design temperature, and as follows:
- .1 Profiled to mechanically key into window and sash framing members, at interior and exterior of sash.
- .2 Removable without special tools and without dismantling of frames.
- .3 Designed to maintain pressure contact against frame through design temperature range.
- .4 Provide a minimum of one weather seal gasket to the exterior and one air seal gasket to the interior of drained and vented cavities.

.2 Steel Reinforcement: sheet steel to ASTM A653M, hot dip galvanized, minimum Z275 coating designation.

.3 Transition membrane: minimum1.6 mm thick SBS membrane sheet reinforced with non-woven polyester or glass fleece. Stripping to be a minimum 150mm wide. Approved products are:
- .1 Soprema – Sopraseal 60 F/F or Sopralene Flam Stick
- .2 Protectowrap Jiffyseal 140/60.
- .3 Bakor Blueskin TG.

.4 Joint Sealants: as specified in Section 07 92 10, as recommended for substrates.

.5 Foam Backer Rod: extruded closed cell backer rod, oversize 30 to 50%.

.6 Screens: To CAN/CGSB-79.1.
- .1 Insect screening mesh: count 18 x 16.
- .2 Fasteners: tamper proof.
- .3 Screen frames: vinyl or aluminum, colour to match window frames.

2.10 FRAME AND SASH FINISHES

.1 Vinyl: as selected by the Consultant from the manufacturer's colour range.

2.10 AIR/VAPOUR RETARDER

.1 Ensure continuity of air/vapour retarder and seal from walls to window frame.

3.0 EXECUTION

3.1 FABRICATION

.1 Fabricate window units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement over 1800 mm.

.2 Mitre and heat weld full length of vinyl frame and sash joints at corners. All welding flash to be neatly removed.

.3 Fasten steel reinforcement to extruded vinyl mullions with concealed stainless steel

fasteners at maximum 300 mm o/c.

.4 Continuously and uniformly compress length of gaskets during installation, to compensate for linear shrinkage.

3.2 GLAZING

.1 Clean sealing surfaces at perimeter of glass and sealing surfaces of rabbets and stop beads before applying tape, splines or gaskets. Use solvents and cleaning agents recommended by manufacturer of sealing materials.

.2 Install glazing gaskets uniformly with accurately formed corners and bevels. Ensure that proper contact is made with glass and rabbet interfaces.

.3 Support both lites of glass thermal units on levelled setting blocks, 4 or 6 mm minimum, spaced as recommended by glass manufacturer. Provide at least one setting block at quarter points from each corner. For casement windows, locate setting blocks closer to corners as recommended by manufacturer.

.4 Centre glass thermal units in glazing rabbet to maintain 6 mm minimum clearance between edges of glazing and plastic framing at sill or 4 mm minimum clearance between edges of glazing and plastic framing at sill if glazing bite incorporates a drainage channel with depth of 3 mm minimum.

.5 Size glass thermal units to ensure exposed face of spacer is in line with glazing stops.

.6 Use spacers and shims in accordance with glass manufacturer’s recommendations.

.6 Immediately replace damaged or broken glass.

3.3 WINDOW INSTALLATION

.1 Install in accordance with CAN/CSA-A440 and reviewed shop drawings.

.2 Arrange components to prevent abrupt variation in colour.

.3 Erect and secure window units in prepared openings, plumb and square, free from warp, twist or superimposed loads.

.4 Secure work accurately to structure and in a manner not restricting thermal movement of materials.

.5 Transfer window dead load to wall construction by anchors alone or in combination with plastic shims. Wood shims are not acceptable.

.6 Place shims under sill frame at exact setting block locations, and as marked on frames by window frame manufacturer.

.7 Conceal all anchors and fitments. Exposed heads of fasteners are not permitted.

.8 Maintain dimensional tolerances after installation. Maintain alignment with adjacent work.

.9 Provide seal around interior perimeter of window frame using foam joint sealant or foam backer rod, size as required to lightly compress between frame and rough opening, and sealant. Ensure continuity of air/vapour retarder and seal to window frame.

.10 Provide seal at head and jamb of exterior perimeter of window frame using foam joint sealant or foam backer rod, size as required to lightly compress between frame and rough opening, and sealant. Do not seal sill at exterior.

.11 Install jamb extensions, casings, brick moulds and trim as indicated on drawings.

.12 Install sealant, in accordance with Section 07 92 10, and related materials as indicated on drawings.

.13 Adjust operable sash and hardware to operate smoothly.

.14 Temporary installations of windows if needed are to meet all requirements for occupant and public safety, such as but not limited to, operable unit restrictors, fastening, sharp edges etc.

3.5 CAULKING

.1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates in bedding compound. Caulk butt joints in continuous sills.

.2 Apply sealant in accordance with Section 07 92 00 - Sealants. Conceal sealant within window units except where exposed use is permitted by the Consultant.

3.6 PROTECTION AND CLEANING

.1 Do cleaning in accordance with Section 01 74 11 - Cleaning.

.2 Protect windows/doors from damage/staining during and after installation.

.3 Clean interior and exterior surfaces as soon as adjacent contaminating activities are completed, to recommendations of window manufacturer.

3.7 ENERGY CERTIFICATE

.1 Site certificates to be supplied in accordance with the British Columbia Energy Efficiency Act.

.2 Certificates to include the following information:

.1 The whole-product U-value for each fenestration product provided on site (in W/m2K).

.2 The overall average U-value for the whole project, averaged over every fenestration product in the scope of work (in W/m2K).

.3 The name of the person or agency acting as verifier for the fenestration products.

.3 Certificates are to be posted in plain view at the project site for a period of at least 120 days after the last manufactured fenestration product is installed in the building.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Hardware for hollow and insulated steel doors.

.2 Thresholds

.3 Weatherstripping, seals, and door gaskets.

1.2 RELATED SECTIONS

.1 Section 08 11 00 - Metal Doors and Frames.

1.3 REFERENCES

.1 American National Standards Institute (ANSI).

.1 ANSI/BHMA A156.1-2006, American National Standard for Butts and Hinges.
.2 ANSI/BHMA A156.2-2003, Bored and Preassembled Locks and Latches.
.3 ANSI/BHMA A156.4-2000, Door Controls - Closers.
.4 ANSI/BHMA A156.13-2002, Mortise Locks and Latches Series 1000.
.5 ANSI/BHMA A156.18-2006, Materials and Finishes.
.6 ANSI/BHMA A156.31- 2013, Electric Strikes and Frame Mounted Actuators

.2 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).

.1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.

.3 NBC, National Building Code of Canada (issue date listed in Section 01 41 00 - Regulatory Requirements).

1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00: Submission procedures.

.2 Samples:

.1 Provide hardware samples requested by Departmental Representative.
.2 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.

.3 Shop Drawings:

.1 Provide product data sheets to describe fully to Departmental Representative all products of this Section.
.2 Include descriptions of materials, composition, cautions, installation requirements.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

.1 Submittals in accordance with Section 01 78 10: Submission procedures.

.2 Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

.3 Special tools:

.1 Provide 2 sets of wrenches for each type of door closer and lock set installed, for project maintenance use.

.2 At completion of installations and adjustments turn over to Departmental Representative all tools supplied by hardware manufacturers with hardware items installed for later use in hardware maintenance. Seal tools together with respective hardware data/installation sheets supplied with hardware in clear plastic bags.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum 10 years documented experience.

.2 Regulatory Requirements:

.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification organization accredited by Standards Council of Canada.

1.7 DELIVERY, STORAGE, AND PROTECTION

.1 Deliver, store and handle materials in accordance with respective material manufacturer's requirements.

.2 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.3 Store door hardware in locked, clean and dry area.

.4 Include hardware templates and full installation/adjustment information.

.5 Supply hardware complete with all factory supplied mounting fasteners required for installation.

.6 Replace defective or damaged materials with new.

1.8 WASTE DISPOSAL AND MANAGEMENT

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction Waste Management and Disposal.

1.9 WARRANTY

.1 For Work of this Section 08 71 00 - Door Hardware, 12 months warranty period is extended to:

.1 60 months for door closers of this Section will be free from manufacturing defects.

.2 Manufacturing defects will be deemed to occur if any of following conditions are noted.

.1 Defects of material and factory workmanship.

.2 Fluids leaks.

.2 Defective products to be corrected, replaced or maintained without cost to Canada as necessary to enable such products to perform as warranted.

.3 Start warranties at date of Final Certificate of Completion.

Part 2 Products

2.1 MANUFACTURERS

.1 Hardware items to be of the best grade, free from defect and of first line quality production suitable for this level of project.

.2 Use one hardware manufacturer product only for each similar hardware item.

.3 Acceptable manufacturers:

.1 Hinges: McKinney, Stanley, Ives.

.2 Locks: Schlage, Sargent, Corbin/Russwin.

.3 Closers: LCN, Sargent, Corbin/Russwin.

.4 Exit Device: Von Duprin, Sargent, Corbin/Russwin

.5 Door stops, Overhead: Glynn Johnson, Sargent, Corbin/Russwin.

.6 Other wall and floor stops: CBH, Gallery, Ives

.7 Thresholds and weatherstrip: Draft Seal, Pemko, National

.8 Pocket track: Kris Track, de Jong, K N Crowder

.9 Pocket Lock: KN Krowder, Baldwin, Emtek

.10 Electric strikes/power supply: Von Duprin, Sargent, RCI.

2.2 HARDWARE - GENERAL

.1 General: Refer to paragraph. **3.6 Hardware Schedule** for further description and finishes of following items.

.2 Locks and latches:

.1 Mortise locks and latches: to ANSI/BHMA A156.13, series 1000 mortise lock, grade 1, designed for functions scheduled and keyed as stated in Hardware Schedule.

.2 Lever handles, Plain design

.3 Escutcheons: round.

.4 Normal strikes: box type, lip projection not beyond jamb.

.5 Electric strikes to ANSI/BHMA A156.31- 2013 suitable for installation in hollow metal door frames. Fail secure. c/w power supply. Refer to Electrical

.6 Cylinders: keyed into keying system directed by Departmental Representative.

.7 Finishes: finished to 626

.3 Card reader, controller and fobs

.1 All devices from the same manufacturer, compatible with electric strike.

.4 Butts and hinges:

.1 Butts: to ANSI/BHMA A156.1, 5-knuckle, sizes x finishes scheduled, concealed bearing for scheduled doors, NRP for scheduled doors.

.5 Exit devices: to ANSI/BHMA A156.3 and as scheduled.

.6 Door closers and accessories:

.1 Door controls (closers): to ANSI/BHMA A156.4, designated by letter C, sizes as required by NBC and to provide following requirements.

.2 Maximum degree of opening required.

.3 Size to door.

.7 Architectural door trim: to ANSI/BHMA A156.6, designated by letter J and as scheduled.

.1 Door protection plates: Kick plate type1.27 mm thick stainless steel finish to 630

.2 Push plates: 1.27 mm thick finished to 630

.3 Pull units: stainless steel finished to 630

.8 Thresholds: 127 mm wide x full width of door opening, extruded aluminum mill finish, serrated surface.

.9 Weatherstripping:

.1 Head and Jamb seal:

.1 Extruded aluminum frame and solid closed cell nepoprene insert, clear anodized finish.

.2 Adhesive backed neoprene material

.2 Door bottom seal:

.1 Extruded aluminum frame with closed cell neoprene, vinyl sweep, clear anodized finish.

2.3 KEYING

.1 Obtain final keying from Departmental Representative before ordering.

.2 Prepare keying schedule in co-operation with Departmental Representative.

.3 Supply keys in duplicate for every lock in this contract.

.4 Supply 3 master keys for each master key or grand master key group.

.5 Stamp Keying code numbers on keys and cylinders.

.6 Supply construction cores

.7 Supply 30 fobs for card reader

.8 Use a bonded locksmith for all keying work. Stamp all keys "Do Not Copy".

2.4 FINISHES

.1 Finishes: Stainless steel 630.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

3.2 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.3 Exposed fastening devices to match finish of hardware.

.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.5 Use fasteners compatible with material through which they pass.

3.3 INSTALLATION

.1 Install hardware in accordance with manufacturer's instructions.

.2 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.

.3 Use templates provided by hardware item manufacturer.

.4 Use only manufacturer supplied fasteners. Failure to comply may void manufacturer warranties and applicable licensed labels. Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

.5 Provide metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.6 Remove construction locks when directed by the Departmental Representative.

.1 Install permanent cores and ensure locks operate correctly

3.4 ADJUSTING

.1 Adjust hardware for smooth operation.

3.5 PROTECTION OF FINISHED WORK

.1 Do not permit adjacent work to damage hardware or finish.

3.6 CLEANING

.1 Do cleaning in accordance with Section 01 74 11 - Cleaning.

.2 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer instructions.

3.7 HARDWARE SCHEDULE

.1 Hinges

.1 A1–Hinge5Knuckle-.180gauge-114mmx101mmx NonRemovablePinx630

.2 A2 – Hinge 5 Knuckle-.134 gauge- 114mm x 101mm x Non Removable Pin x 652

.2 Locks, Deadbolts and Privacy

.1	B1 – Cylinder	Type x length x cam to suit	626
.2	B2 - Privacy set	ANSI F22 with indicator	626
.3	B3 - Lock set	ANSI F09	626
.4	B4- Lock set	ANSI F07	626
.5	B5- Passage set	ANSI F75	626
.6	B6-Classroom lock	ANSI F05	626
.7	B7- Electric strike	BHMA Grade 1	626
.8	B8- Deadbolt	cylinder only	626

.3 Closers

.1 C1 Institutional, non sized, compression spring buffer arm x delayed action 689.

.2 Include through bolts and grommet nut fasteners

.4 Auxilliary hardware

.1 D1-Kick Plate 1.27 mm thickness x 254mm height x width less 38mm X 630

.2 D2 - Wall stop Cast concealed mount, concave bumper with back plate x 626

.3 D3-Over Head stop Surface mount, single acting, non handed with slide track for medium traffic and weight doors

.4 D4- Push plates, push/pull units.

.5 Threshold , seals door bottoms, astragal:

.1 E1- Thresholds: as scheduled, one length per door opening without joins or splices.

.2 E2- Weatherstripping/Seals: Adjustable jamb type with silicone insert.

.3 E3-Astragal: overlapping, extruded aluminum, neoprene weather seal, finished to match doors.

.4 E4 –Flush bolts

Hardware Set 01 for Exterior single door 102

3 Hinges	A1
1 Ea. Lock set	B3
1 Ea. cylinder	B1
1 Ea. Closer	C1
1 Ea. Kick Plate	D1
1 Ea. Threshold	E1
1 Ea. Weatherstripping	E2
1 Ea. Electric Strike	B7
1 Ea. Power supply	
1 Ea. Deadbolt	B8

Access control hardware refer to Electrical

Hardware Set 02 Passage doors 105, 106, 107, 108.

3 Hinges	A2
1 Ea. Closer	C1
2 Ea. Kick plate	D1
1 Ea. push plates, push/pull units.	D4

Hardware Set 03 Washroom/Shower doors 113, 117, 119, 120

3 Hinges	A2
1 Ea. Lock set	B2
1 Ea. Door stop	D2
1 Ea. Kick plate	D1

Hardware Set 04 Storage rooms 111, 112

3 Hinges	A2
1 Ea. Passage set	B5
1 Ea. Door stop	D2
1 Ea. Door stop	D3- Overhead stop-Door 111 only
1 Ea Kick plate	D1
1 Ea. Deadbolt	B8

Hardware set 05 Meeting room, Copy Room, Mechanical room. Doors 110, 114, 118

3 Hinges	A2
1 Ea. Kick plate	D1
1 Ea. Door stop	D2
1 Ea. Passage set	B5

Hardware Set 6 Office 115, 116

3 Hinges	A2
1 Ea. Kick plate	D1

1 Ea. Door stop D2
1 Ea. Lock set B6

Hardware Set 07 for Exterior double doors 100

6 Hinges A1
1 Ea. Passage set B5
1 Deadbolt B8
Cylinder on inside of active door, blank plate outside
1 Ea. Closer C1
1 Ea. Kick Plate D1
1 Threshold E1
1 Ea. Weatherstripping E2
1 Astrigal E3
2 Flush bolts E4

Hardware set 08 Workshop. Doors 103

3 Hinges A2
1 Ea. Kick plate D1
1 Ea. Passage set B5
1 Ea. Closer C1

Hardware set 09 Laundry. Door 109

3 Hinges A2
1 Ea. Kick plate D1
1 Ea. Passage set B5 – blank on inside
1 Ea. Door stop D3- Overhead stop-Door 112 only

Hardware Set 10 for Exterior storage door 101

3 Hinges A1
1 Ea. Passage set B5
1 Deadbolt B8
1 Ea. Door stop D2
1 Ea. Kick Plate D1
1 Threshold E1
1 Ea. Weatherstripping E2

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Gypsum board and joint treatment.

.2 Metal stud wall framing.

.3 Rubber Base

1.2 RELATED SECTIONS

.1 Section 09 90 00 - Painting and Coating.

1.3 REFERENCES

.1 ASTM C475/C475M-12 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.2 ASTM C645-11a - Standard Specification for Nonstructural Steel Framing Members.

.3 ASTM C754-11 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.4 ASTM C1002-07 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.5 ASTM C1396/C1396M-09a, Standard Specification for Gypsum Wallboard.

.6 Gypsum Association GA-214-10 - Recommended Levels of Gypsum Board Finish.

.7 ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

1.4 REGULATORY REQUIREMENTS

.1 Conform to applicable code for fire rated assemblies.

.1 Fire Rated Partitions: Listed assembly by ULC .

1.5

PART 2 PRODUCTS

2.1 FRAMING MATERIALS

.1 Studs and Tracks: ASTM C645; galvanized sheet steel, 0.91 mm thick, C shape, with knurled faces.

.2 Slip joint head track: 0.91 thick, galvanized sheet steel, 50 mm deep.

.3 Fasteners: ASTM C1002.

.4 Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

2.2 GYPSUM BOARD MATERIALS

.1 Standard Gypsum Board: ASTM C1396; 12 mm thick, maximum available length in place; ends square cut, tapered edges.

.1 Use 16mm Type X where noted on drawings.

.2 Fire rated gypsum board: to ASTM C1396/C1396M Type X, thicknesses detailed/indicated on drawings x widths to suit framing centres x maximum practical lengths, wrapped tapered edges, square cut ends, bearing ULC fire rating labels.

.1 Paper facing: no less than 75% recycled.

.2 Gypsum core: no less than 10% recycled content.

2.3 ACCESSORIES

.1 Corner Beads: 0.45 mm thick, galvanized sheet steel, paper faced; tapable

.2 Edge Trim: GA-201 and GA-216; Galvanized steel or rigid vinyl with 'J' type bead, tapable.

.3 Joint Materials: ASTM C475; reinforcing tape, joint compound, adhesive, and water.

.4 Fasteners: ASTM C1002

2.4 ACCESS PANELS

.1 Proprietary access panels consisting of a GWB face housed in an aluminum framework.

.1 Mounting frame bedded into GWB joint material.

.2 Concealed hardware (frame, latch and hinge).

.3 Removable door panel with safety cable.

.4 Sized as indicated in mechanical specification and drawings.

PART 3 EXECUTION

3.1 METAL STUD INSTALLATION

.1 Install studs in accordance with ASTM C754 Metal Stud Spacing: 400mm on center.

.2 Install slip joint head track where stud walls meet structure. Allow for 40 mm deflection.

.3 Coordinate installation of bucks, anchors, blocking, electrical and mechanical work placed in or behind partition framing.

3.2 GYPSUM BOARD INSTALLATION

.1 Install gypsum board in accordance with manufacturer's instructions.

.2 Erect single layer standard gypsum board horizontally with ends and edges occurring over firm bearing.

.3 Use screws when fastening gypsum board to metal furring or framing.

.4 Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

.1 Install edge trim in all areas where the GWB abuts the exterior wall and ceiling panels.

.2 Metal trims are supplied in areas where the interior walls abut structural posts.

.5 Install gypsum board to underside of the interior of the structure.

3.3 JOINT TREATMENT

.1 Tape, fill, and sand exposed joints, edges, and corners three coats minimum to produce smooth surface ready to receive finishes.

.2 Feather coats on to adjoining surfaces so that camber is maximum 0.8 mm.

3.4 ACCESS PANELS

.1 Install access panels where indicated

3.5 TOLERANCES

.1 Maximum Variation of Finished Gypsum Board Surface from True Flatness: 3 mm in 3 m in any direction.

3.6 CLEANING

.1 Do cleaning in accordance with Section 01 74 11 - Cleaning.

.2 Dispose of waste materials in accordance with Section 01 74 19 - Const. Waste Management And Disposal.

.3 Dispose of excess GWB at the appropriate waste management facility

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM E84-12c - Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 ASTM F1861-08(2012)e1 - Standard Specification for Resilient Wall Base.

.3 ASTM F1860-14e1 - Standard Specification for Rubber Sheet Floor Covering With Backing.

.4 CAN/ULC-S102.2-10 - Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.

.5 Green Guard Environmental Institute

.1 Greenguard Certification

.6 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.2 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Submit Workplace hazardous materials information system (WHIMS) Material Safety Data Sheets (MSDS)

.1 Indicate precautions for workers when handling flooring preparation and installation products.

.2 Indicate VOC content of flooring preparation and installation products.

.3 Product Data: Provide data on specified products, describing performance, physical characteristics, sizes, patterns and colours available.

.4 Shop Drawings: Indicate seaming plan.

.5 Samples:

.1 Submit two (2) samples of manufacturer's standard colour range, one (1) to Departmental Representative and one (1) to Consultant, for colour selection.

CLOSEOUT SUBMITTALS

.6 Section 01 78 00: Submission procedures.

.7 Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.3 MAINTENANCE MATERIAL SUBMITTALS

.1 Section 01 78 00: Maintenance and extra material requirements.

.2 Extra Stock Materials: Provide 5 sq.m of flooring, 15 lin m of base material specified.

1.4 QUALITY ASSURANCE

.1 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented.

1.5 DELIVERY, STORAGE, AND PROTECTION

.1 Transport, handle, store, and protect products. In accordance with manufacturers specifications

.2 Protect roll materials from damage by storing on end.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Store materials for three (3) days prior to installation in area of installation to achieve temperature stability.

.2 Maintain ambient temperature required by adhesive manufacturer three (3) days prior to, during, and twenty-four (24) hours after installation of materials.

1.7 WARRANTY

.1 Provide flooring manufacturers 5 year written material warranty against excessive wear under normal usage.

.2 Warranties to start at date of substantial completion.

Part 2 Products

2.1 MATERIALS - SHEET FLOORING

.1 Rubber Flooring to ASTM F1860:

.1 Description: pre-fabricated rubber flooring; calendered and vulcanized with natural and synthetic rubber base, stabilizing agents and pigmentation, manufactured in 2 layers vulcanized together, shore hardness of top layer greater than that of bottom layer.

.2 Surface: smooth, permanent no-wax finish.

.3 Appearance: solid background colours with random marbleized pattern throughout wear layer.

.4 Thickness; Not less than 3 mm

.5 Colour: to be selected from manufacturers standard colour range.

.6 Flooring systems installed in the building interior shall meet the requirements of the following standards

.1 Green Guard Certification

.2 SCAQMD 1168

2.2 MATERIALS - BASE

.1 Base: ASTM F1861, Type TV thermoplastic rubber; coved profile; top set; premoulded end stops and external corners:

.1 Thickness: minimum 3 mm.

.2 Heights: 102 mm, unless noted otherwise.

.3 Lengths: roll.

.4 Colours: selected by Departmental Representative from standard colour range.

2.3 ACCESSORIES

.1 Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

.2 Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

.1 Adhesives to SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

.3 Edge Strips: Metal.

.4 Adhesives: solvent-free waterproof types recommended by respective flooring manufacturer to suit each flooring material and each application condition, with low emission and odour levels.

.5 Joint sealing/welding material: purpose-made welding thread (rod) of type recommended by respective flooring manufacturers to suit application, colours to match flooring.

Part 3 Execution

3.1 EXAMINATION

.1 Verify floor and lower wall surfaces are free of substances that may impair adhesion of new adhesive and finish materials.

3.2 PREPARATION

.1 Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

.2 Prohibit traffic until filler is cured.

.3 Ensure wall to receive base is smooth, level, free from waves and other defects, and ready for base installation, refer to section 09 21 16 – Gypsum Board Assemblies.

.4 Vacuum clean substrate.

3.3 INSTALLATION - SHEET FLOORING

.1 Install sheet flooring to manufacturers written instructions.

.2 Spread only enough adhesive to permit installation of materials before initial set.

.3 Set flooring in place, press with heavy roller to attain full adhesion.

.4 Lay flooring with joints and seams to produce minimum number of seams.

.5 Install sheet flooring parallel to length of room. Provide minimum of one third (1/3) full roll width. Double cut sheet; provide butt joint.

.6 Seal joints of sheet flooring, including self-coved bases, using welding thread (rod). Form joints uniform in width, appearance and as inconspicuous as possible. Form joints flush, well adhered in place, watertight and free of peaking or projections.

.7 Terminate flooring at centreline of door openings where floor finish is dissimilar.

.8 Install edge strips at unprotected or exposed edges, and where flooring terminates.

.1 Secure metal strips after installation of flooring with stainless steel screws.

.9 Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.4 INSTALLATION - BASE

.1 Fit joints tight and vertical. Maintain minimum measurement of 450 mm between joints.

.2 Mitre internal corners. At external corners and exposed ends, use premoulded units.

.3 Install base in full bed of adhesive using full spread notched trowel. Cut and fit base neatly at corners, to tight fitting tolerances.

.4 Install base straight and level to maximum variation of 1:1000.

.5 Install base on toe kick of cabinets which occur in rooms and areas where resilient flooring is scheduled.

.6 Scribe and fit to door frames and other interruptions.

.7 Keep joints tight and well fitted.

3.5 CLEANING

.1 Do cleaning in accordance with Section 01 74 11 - Cleaning.

.2 Clean installed work.

.3 Remove access adhesive from floor, base, and wall surfaces without damage.

.4 Clean and seal floor in accordance with manufacturers written instructions.

3.6 PROTECTION OF FINISHED WORK

.1 Prohibit traffic on floor finish for forty-eight (48) hours after installation.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 08 11 00- Metal Doors and Frames

.2 Section 09 21 18 – Gypsum Board Assemblies

1.2 REFERENCES

.1 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

- .1 Material Safety Data Sheets (MSDS).

.2 Master Painters Institute (MPI)

- .1 MPI Architectural Painting Specifications Manual, 2004.

.3 National Fire Code of Canada – 1995

.4 Green Seal Environmental Standards

- .1 Standard GC-03-97, Anti-Corrosive Paints.
- .2 Standard GS-11-93, Architectural Paints.
- .3 Standard GS-36-00, Commercial Adhesives

.5 South Coast Air Quality Management District (SCAQMD), California State

- .1 SCAQMD Rule 1113-04, Architectural Coatings.
- .2 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

.6

1.3 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

- .1 Submit product data and instructions for each paint and coating product to be used.
- .2 Submit product data for the use and application of paint thinner.
- .3 Submit copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOCs during application.

.3 Samples:

- .1 Submit duplicate 200 x 300 mm draw down samples of each scheduled paint colour with specified paint colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards.
- .2 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
- .3 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation application instructions.

.4 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour numbers and information necessary for re ordering paint.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

.1 Pack, ship, handle and unload materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.

.2 Acceptance at Site:

.1 Identify products and materials with labels indicating:

.1 Manufacturer's name and address.

.2 Type of paint or coating.

.3 Compliance with applicable standard.

.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Storage and Protection:

.1 Provide and maintain dry, temperature controlled, secure storage.

.2 Store materials and supplies away from heat generating devices.

.3 Store materials and equipment in well ventilated area.

.5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.

.7 Remove paint materials from storage only in quantities required for same day use.

.8 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.5 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Unused coating materials must be disposed of at official hazardous material collections site as approved by Departmental Representative.

1.6 SITE CONDITIONS

.1 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.2 Additional interior application requirements:

.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

Part 2 Products

2.1 MATERIALS

.1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Provide paint materials for paint systems from single manufacturer.

.3 Conform to latest MPI requirements for interior and exterior painting work including preparation and priming.

.4 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.

.5 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required

.6 Paint materials to conform to the requirements of :

.1 Green Seal Environmental Standards

.1 Standard GS-11-93, Architectural Paints.

.2 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1113-04, Architectural Coatings.

2.2 COLOURS

.1 Departmental Representative to provide interior colour schedule after Contract award

.2 Selection of colours from manufacturers full range of colours.

.3 Where specific products are available in restricted range of colours, selection based on limited range.

2.3 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10

Gloss Level 2 - Velvet-Like Finish	Max.10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	min. 35
Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

2.4 PAINTING SYSTEMS

.1 Galvanized metal: Interior doors and frames

.1 INT 5.3M - High performance architectural latex G3 gloss level finish.

.2 Galvanized metal: Exterior doors and frames.

.1 EXT 5.3J- W.B.Light industrial coating: G5 gloss level finish.

.3 Metal knife plates and brackets

.1 Powder coat - Black

.4 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:

.1 INT 9.2M – Institutional low odor/low VOC; G3 gloss level finish (over latex sealer).

.5 Wood posts and beams:

.1 EXT 6.2D- Solid colour wood stain over Alkyd/oil primer.

.6 Exterior wood trims:

.1 EXT 6.2C – Alkyd over alkyd primer

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

3.4 PREPARATION

.1 Protection:

- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.
- .4 Protect building occupants and general public in and about the building.

.2 Surface preparation: clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements

.3 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.4 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Touch up of shop primers with primer as specified.

3.5 APPLICATION

.1 Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:

- .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
- .2 Work paint into cracks, crevices and corners.
- .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
- .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
- .5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray application:

- .1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
- .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.

.4 Brush out immediately all runs and sags.

.5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

3.6 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.7 CLEANING

.1 Do cleaning in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM A167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 ASTM B456-03, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

.3 ASTM A653/A653M-09, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.4 ASTM A924/A924M-09, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.2 Canada Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).

.2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.

.2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.

.3 CGSB 31-GP-107MA-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.

.4 CSA International

.1 CAN/CSA-B651-04, Accessible Design for the Built Environment.

.2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop drawings

.1 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame requirements.

.4 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.3 MAINTENANCE MATERIAL SUBMITTALS

.1 Tools:

.1 Provide special tools required for assembly, disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.

.2 Deliver special tools to Departmental Representative.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's recommendations.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

1.6 WARRANTY

.1 For framed mirrors of this section, 12 month warranty period is extended to 120 months against failure of the silver mirror finish.

Part 2 Products

2.1 MATERIALS

.1 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 COMPONENTS

.1 Toilet tissue dispenser: Single roll type, surface mount, chrome plated steel frame, capacity of 500 double ply roll, roll under spring tension for controlled delivery.

.2 Paper towel dispenser: Flush mount. Satin finish stainless steel. Seamless beveled flange. Dispenses single fold or 475 multifold towels. Hinged at bottom of towel storage portion. Rough opening of 285 x 385 x100mm. All units keyed alike.

.3 Soap Dispenser: Surface mount with concealed fixing. Horizontal tank with refill window. Stainless steel construction, satin finish. Corrosion resistant valve for dispensing lotions or soaps. Capacity 1.2L. Filler top requires special key.

.4 Mirror: One piece stainless steel channel frame. Bright polished finish. Mirror: 6mm silvered float glass. Galvanized steel back. Concealed wall hanger with theft resistant screws. Size: 762 x1070.

.5 Shower curtain rod: 304 Stainless steel construction, satin finish, 26mm diameter. Mounted with wall brackets concealed by snap fitted stainless steel escutions.

.6 Shower curtain: Opaque, matte white vinyl, 0.2mm thick, contains antibacterial and flame retardant agents. Nickel-plated brass grommets along top, one every 150mm. Hemmed bottom and sides. Sized to suit shower stall. Complete with stainless steel shower curtain hooks.

.7 Robe hooks: surface mount with concealed fixing, No. 4 satin stainless steel construction, maximum 50 mm projection with blunted end.

2.3 FABRICATION

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1.5 mm radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back paint components where contact is made with building finishes to prevent electrolysis.

.6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CAN/CSA-G164.

.7 Shop assemble components and package complete with anchors and fittings.

.8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.

.9 Provide steel anchor plates and components for installation on studding and building framing.

Part 3 Execution

3.1 MANUFACTURERS INSTRUCTIONS

.1 Compliance: comply with manufacturer written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions and data sheets.

3.2 INSTALLATION

.1 Do not install accessories until wall have been painted, inspected and accepted.

.2 Install and secure accessories rigidly in place as follows:

.1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.

.2 Hollow masonry units, existing plaster or drywall: use toggle bolts drilled into cell or wall cavity.

.3 Use tamper proof screws/bolts for fasteners.

.4 Fill units with necessary supplies shortly before final acceptance of building.

3.3 ADJUSTING

.1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by toilet and bathroom accessories installation.

3.5 SCHEDULE

.1 Refer to drawings for approximate locations.

- .1 Toilet paper roll holders: one adjacent each toilet.
- .2 Paper towel dispensers: one per washroom.
- .3 Soap dispensers: one per washroom basin.
- .4 Mirrors: one per washroom basin.
- .5 Shower Curtain and Rod: Shower rooms 106 and 105

.2 Final locations directed by Departmental Representative.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Refrigerator.

.2 Range.

.3 Range hood

.4 Microwave oven.

.5 Dishwasher.

1.2 RELATED SECTIONS

.1 Division 26 – Electrical Power.

1.3 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide data on equipment and accessories.

1.4 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Installation Data: Manufacturer's special installation requirements.

1.5 CLOSEOUT SUBMITTALS

.1 Section 01 78 10: Submission procedures.

.2 Warranty and Maintenance Documentation: Include warranty and maintenance information on regular servicing.

1.6 QUALITY ASSURANCE

.1 All electric appliances to be energy efficient models bearing Energy Star designations.

Part 2 Products

2.1 APPLIANCES

.1 Refrigerator:

- .1 Style: Free Standing, top mount freezer, frost free
- .2 Capacity .58 cu. meter.
  - .1 Fresh food section .43 cu meter
  - .2 Freezer section .14 cu meter
- .3 Overall dimensions 750mm wide x 825mm deep x 1750mm high
- .4 Doors: 2, reversible hinging one each for refrigerator and freezer sections. Hinge to be on side away from the counter.

.5 Shelves: Cantilevered, adjustable, spill proof glass.

.6 Vegetable Crispers: 2, pull-out design drawers, humidity controlled

.7 Meat keepers: 1, Pull out design drawer.

.8 Door Bins: 3 adjustable, covered butter keeper.

.9 Controls: Refrigerator section temperature and moisture, Freezer section temperature.

.10 Accessories: 2 ice cube trays.

.11 Finish /Colour: Textured sheet steel, White.

.2 Range:

.1 Electric, free standing type, single oven, width 762 mm.

.1 Self-clean oven, with concealed bottom element and interior oven light.

.2 Ceramic range top.

.3 Four top burners.

.4 Vision panel.

.5 Timed convenience outlet.

.6 Colour: White

.3 Range hood

.1 762 mm wide

.2 Outdoor venting with all venting adapters included

.3 2 speed fan

.4 Filter element

.5 Integral light fixtures-2

.6 White finish

.4 Dishwasher:

.1 Under countertype, nominal width 600 mmdepth to suit counter depth.

.1 Two level wash cycle.

.2 Two rubber coated pull out dish racks with adjustable top rack.

.3 One loose utensil bin.

.4 Colour: White

.5 Microwave Oven:

.1 Countertop type, interior space .22 cu m, electronic timed cooking and interior light.

.1 Rotating glass platform.

.2 Removable shelf.

.3 Motorized rotisserie.

.4 Colour: White.

.6 Washer:

.1 Free standing, stacking , high efficiency front loading type, nominal width 762 mm.

.1 Variable water level control.

.2 Loose small wash bin.

.3 Dispenser for liquid softener, liquid soap, bleach, powder soap.

.4 Colour: White.

.7 Dryer:

.1 Electric, Stacking type, nominal width 762 mm with interior light and removable lint screen.

.1 Of same manufacture, size and capable of stacking with washing machine.

.2 Colour: White.

.8

2.2 ACCESSORIES

.1 Appliances: Pipe and fittings to connect to utilities.

.2 Power cord to connect to utilities].

.3 Fasteners and Anchors: Galvanized or stainless steel type, anchors, screws, bolts, expansion shields, set screws; required by the type of construction to which they are attached.

Part 3 Execution

3.1 PREPARATION

.1 Verify that prepared openings are ready to receive work and opening dimensions are as indicated on shop drawings and instructed by the manufacturer.

.2 Verify that proper power supply is available.

3.2 INSTALLATION

.1 Prior to installation, ensure that finished flooring is protected from indentationof doly wheels, crates

.2 Install appliances to manufacturer's written instructions requirements.

.3 Set and adjust units level and plumb.

.4 Activate units to confirm correct operation.

.5 Turn refrigerators on to moderate temperature setting

.6 Connect to utilities and make units operational.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 06 10 00 - Rough Carpentry: wood blocking.

1.2 DESIGN REQUIREMENTS

.1 Design blinds to following requirements:
- .1 Be designed in manner that allows wear susceptible parts to be replaceable by either user or manufacturer.
- .2 Guarantee of at least 5 years of available replacement parts following discontinuation of product manufacture.
- .3 Be accompanied by instructions for replacing or repairing worn parts, including inventory numbers for parts and procedures for ordering replacement parts.
- .4 Program that allows for the refurbishing or return of used blinds.
- .5 Designed in manner that permits effective disassembly of components in order to permit recycling of materials for which recycling markets exist.

1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.

.2 Product data:
- .1 Submit manufacturer printed product literature, specifications and data sheets.

.3 Shop drawings:
- .1 Indicate dimensions in relation to window jambs, operator details, head anchorage details, hardware and accessories details.

.4 Samples:
- .1 Submit one representative working sample of horizontal louvre blind, if requested by Departmental Representative.
- .2 Submit duplicate samples of manufacturer standard colours for selection by Departmental Representative.
- .3 Samples will be returned after approval.

.5 Manufacturer instructions:
- .1 Submit manufacturer installation instructions.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.

1.7 CLOSEOUT SUBMITTALS

.1 Make submissions in accordance with Section 01 78 10 - Closeout Submittals.

.2 Provide following for inclusion in Project operating and maintenance manuals:
- .1 Full identification of each type of window blind installed (i.e., model and model/series number) for later use in obtaining service and replacement parts.
- .2 Name, address and telephone numbers of installer and of local service/repair agent.

PART 2 - PRODUCTS

2.1 MATERIALS AND FABRICATION

.1 Slats: 25 mm wide, with rounded corners and rough edges removed.
- .1 Aluminum alloy, corrosion resistant spring-tempered.
- .2 Colour and finish: selected by Departmental Representative.

.2 Ladders: braided polyester yarn designed for full tilting action while retaining the same level and position of each slat. Ladders spaced not more than 150 mm from end of slats and 550 mm o.c.

.3 Headrails: one piece aluminum/steel channel with rolled edges, formed to provide sufficient strength to support blind without sagging, twisting or distorting. Metal minimum 0.50 mm thick.

.4 Bottom rails: lock seam tubular steel section, 0.36 mm thick.

.5 Bottom rail end caps: soft moulded plastic fitted snugly over ends of rails, colour to match slats.

.6 Tilt rods: steel construction.

.7 Tassels: soft moulded plastic, colour to match slats.

.8 Pulleys: designed to permit ease of operation with minimum wear to cord.

.9 Tilters: fully enclosed and lubricated, with positively locked to drum to prevent

slippage and ensure accurate timing. Use anti-friction materials for worm and gear.

.10 Cord locks: designed to provide smooth operation with feature to prevent accidental dropping of blinds.

.11 Ladder caps: designed to provide sufficient retention when snapped onto bottom rail to hold ladders in proper position.

.12 Installation brackets: end and centre type complete with safety locking caps to secure headrail and valance.

.13 Lift cords: minimum 1.98 mm dia., minimum tensile strength 689 kPa, fitted with tassels.

.14 Tilter controls: transparent wand, minimum 8 mm dia.

PART 3 - EXECUTION

3.1 MANUFACTURER INSTRUCTIONS

.1 Compliance: comply with manufacturer written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions and data sheets.

3.2 INSTALLATION

.1 Install blinds at all windows, unless detailed/indicated otherwise.

.2 Use non-corroding metal fasteners for installation, concealed in final assembly.

.3 Include centre brackets where necessary to prevent headrail deflection.

.4 Install brackets to resist pulling away and loosening.
- .1 Fix in place using screws of sufficient length to hold secure through wall finish into stud framing/blocking.
- .2 Co-ordinate wall framing to include intermediate blocking as required for attachment of components.
- .3 Direct fastening to gypsum board alone not acceptable.

.5 Adjust to provide operation without binding.

.6 Leave blinds in up position.

3.3 CLEANING

.1 Do cleaning in accordance with Section 01 74 11 - Cleaning.

.2 Remove finger marks caused during installation.

.3 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 DEFINITIONS

.1 Provide means supply and install.

.2 Work means material and labour.

.3 Consultant or Engineer means WSP CANADA Inc.

1.2 GENERAL SCOPE

.1 Provide the work indicated in the contract documents and as required to provide complete, tested and fully operational systems including all work not normally indicated but necessary for a complete and operational installation.

.2 The Contractor is expected to be experienced and competent and knowledgeable about the trades and applicable codes, ordinances and industry standards and shall perform the work accordingly, on schedule and fully coordinated with all other trades.

.3 The Contract Documents for this Division are an integral part of the complete contract documents for the project and will be interpreted in conjunction with all other Divisions.

1.3 CODES, REGULATIONS AND STANDARDS

.1 The work of this Section shall conform to the edition of codes, regulations and standards in effect at the time of award of Contract, and conform to the requirements of the Authorities Having Jurisdiction.

1.4 LIABILITY

.1 Be responsible for layout of work and for any damage caused by improper execution of work.

.2 Be responsible for condition of materials and equipment supplied and protect all work until work completed and accepted.

1.5 PERMITS AND FEES

.1 Obtain all required permits and pay all fees including service connection fees as applicable to the work of this Section. Comply with all Provincial, Municipal and other legal regulations and bylaws applicable to the work.

.2 Where Authorities Having Jurisdiction provide inspection, arrange for their inspection of all work. On completion of the work, furnish final unconditional certificates of approval by the inspecting authorities.

1.6 DRAWINGS AND MEASUREMENTS

.1 Except where precisely indicated, the contract documents are diagrammatic and generally indicate the scope of work and general arrangement and establish minimum quality and performance requirements. Where there are conflicting requirements the Contractor shall allow for and provide the better quality and/or greater quantity unless the conflicting requirements are interpreted otherwise in writing by the Consultant.

.2 Consult the Architectural drawings for exact locations of fixtures and equipment.

1.7 WARRANTY

.1 Provide the Owner with a written warranty that the equipment installed and the work performed under this contract will remain in serviceable condition for one (1) year from the date of final acceptance. Warranty shall include parts and labour.

1.8 WORKMANSHIP

.1 Workmanship shall be in accordance with well-established practice and with standards accepted and recognized by the Consultant and the Trade.

.2 The Consultant may reject any work not conforming to the Contract Documents or to accepted standards of performance, quietness of operation, finish or appearance.

.3 Employ only tradesmen with valid Provincial Trade Qualification Certificates to perform only work permitted by their certificates.

1.9 SHOP DRAWINGS

.1 Shop drawings/product data shall be reviewed, signed and processed as described by the Mechanical Contractors Association of British Columbia.

.2 Provide an electronic copy and five (5) hard copies of shop drawings of all equipment on the drawings and specifications to the Consultant for review.

.3 Review or non-review of shop drawings does not alter the requirements of the equipment and materials provided to conform to the specification.

1.10 ASBESTOS

.1 All material/products provided shall be free of asbestos.

1.11 SEISMIC RESTRAINT

.1 Provide seismic restraints for the piping and ductwork systems and all equipment specified in this Section to meet the requirements of the Building Code, to be in general conformance to SMACNA Guidelines, to keep the equipment in place during a seismic event, to minimize damage to the systems and equipment from a seismic event, to prevent systems and equipment from causing personal injury during a seismic event.

.2 Arrange and pay for the services of a Structural Professional Engineer registered in British Columbia referred to here as the Seismic Engineer. The Seismic Engineer shall review, seal and sign all submittals required for all components, assemblies, attachments and installation procedures for the seismic restraint of all piping, ductwork and equipment installed under this Section. The Seismic Engineer shall provide all necessary direction to the contractor during installation of the seismic restraint installation and submit a statutory declaration that the final seismic restraint installation conforms to the submittal documents sealed by the Seismic Engineer and satisfies all regulatory requirements.

.3 The Seismic Engineer shall submit Letters of Assurance for the seismic restraint to the Consultant.

.4 The Seismic Engineer shall coordinate attachment to the equipment with the equipment manufacturer to ensure the method and location of attachment of the seismic restraint to the equipment does not compromise the structural integrity of the equipment.

.5 It is the entire responsibility of equipment manufacturers to design their equipment so that the strength and anchorage of the mounting points and internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure during a seismic event of code design magnitude.

1.12 ACCESS DOORS

.1 Provide suitably sized flush mounted access doors in non-accessible type ceilings and walls, where necessary for access to service and/or to inspect mechanical equipment and accessories, life safety devices and where specifically indicated.

.2 Provide stainless steel access doors in wet areas.

.3 Size access doors to accommodate the required access.

1.13 MISCELLANEOUS METAL

.1 Be responsible for all miscellaneous steel work relative to this Section of the Specifications, including but not limited to:

.1 Support of equipment.

.2 Hanging, supporting, anchoring, and related work as it applies to piping, ductwork and mechanical equipment.

.3 Earthquake restraint devices.

.2 All exterior miscellaneous steel shall be hot-dipped galvanized.

.3 All steel work not galvanized shall be primed, undercoat painted and finish painted. On galvanized materials, which are subsequently welded, apply Galvicon.

1.14 SPARE PARTS

.1 Provide spare parts as follows:

.1 One set of V-belts for each V-belt drive.

.2 One set of filters for each filter or filter bank installed

1.15 COORDINATION

.1 Examine all contract drawings to verify space and headroom limitations for the required work. Coordinate the work with all trades and modify without changing the design intent to facilitate a satisfactory installation. Make no changes involving extra cost to the Owner without the Consultant's prior written approval.

.2 Work out jointly all interference problems on the site and coordinate all work before fabricating, or installing any material or equipment. No consideration of payment will be made for additional work due to fabrication or installation of materials before a coordination issue was identified and resolved.

.3 Coordinate deliveries with the General Contractor.

1.16 EQUIPMENT INSTALLATION AND ACCESSIBILITY

.1 Provide unions and flanges to permit equipment maintenance, disassembly or removal, to minimize disturbance to piping and duct systems and to avoid interfering with building structure or other equipment.

.2 All work shall be readily accessible for adjustment, operation and maintenance. Supply access doors where required in building surfaces for installation by building trades.

.3 Pipe equipment drains to floor drains.

.4 Ensure that equipment does not transmit noise or vibration to other parts of the building as a result of poor installation practices.

1.17 CUTTING, PATCHING, DIGGING AND CORING

.1 Lay out all cutting, patching, digging and coring required to accommodate the mechanical services. Coordinate with other Divisions. Be responsible for correct location and sizing of all openings required under this Section. Allow oversized openings for pipe penetrations where continuous insulation is specified.

.2 Openings through structural members of the building shall not be made without the approval of the Consultant.

1.18 ESCUTCHEONS AND PLATES

.1 Provide on pipes passing through walls, partitions, floors and ceilings where exposed to view in finished areas.

.2 Plates shall be stamped steel, split type, chrome plated or stainless steel, concealed hinge, complete with springs, suitable for external dimensions of piping/insulation. Secure to pipe or finished surface. Outside diameter shall cover opening or sleeve.

1.19 CLEANING AND FINAL ADJUSTMENT

.1 Submit a letter certifying that the interior and exterior of all systems including strainers and filters are clean.

1.20 PAINTING AND IDENTIFICATION

.1 Apply a coat of rust inhibiting primer to all exposed, bare steel provided under this Section.

.2 Where mechanical services are visible from an occupied space through a grille, paint all visible surfaces matte black.

.3 Identify all ductwork in mechanical equipment rooms to denote system and/or zone served and indicate air flow direction with an arrow.

.4 Make good any damage to factory finishes on equipment supplied under this Section.

.5 Piping Identification

.1 Each system shall be labelled including directional flow arrows. Obtain from the Consultant the Pipe Identification Schedule.

.2 Identify piping adjacent to valves, at least once in each room, at 15 m [50 ft.] maximum spacing in open areas, both sides where piping passes through walls, partitions and floors, at penetration of each pipe chase or confined space, at each access opening.

.3 Identification labels may be stencilled or be vinyl cloth or vinyl film, with adhesive compatible with the surface temperature.

.6 Valve Tags

.1 Provide valve identification tags appropriately secured. Tags may be of brass, aluminum, metalphoto, laminated plastic or fiberglass, stamped or engraved, 25 mm [1"] minimum diameter.

.2 Schedule the valve numbers using a sequential numbering system. Provide a valve tag list indicating valve number, system, location, normal operating position (open or closed) and the area it serves.

.7 Secure engraved laminated plastic identification tags (black face and white letters) on the following items:

.1 Temperature control instruments, gauges and panels, coordinated with control diagrams identification.

1.21 OPERATION AND MAINTENANCE MANUALS

.1 Provide maintenance data for incorporation into Operational and Maintenance manual.

.2 Provide one suitably sized 3-ring binder with suitable label with all required materials inside to the Engineers as a draft copy for review. Make all required changes and resubmit the one binder to the Engineer. Repeat until accepted.

.3 Then submit three manuals identical to the accepted copy to the Owner. Obtain a receipt and send a copy to the Engineer:

.1 Thee (3) hard copies - organized in binders, refer to below.

.2 Two (2) PDF electronic copies of full binder contents on CD, DVD, or flash drive.

.4 Provide an index and tab each section.

.5 The manual shall include:

.1 Layman’s description of all systems and their operation.

.2 Air and water balance report.

.3 Commissioning report.

.4 Copy of any required approvals, certifications and acceptance by Authorities Having Jurisdiction.

.5 All shop drawings.

.6 List of local source of supply.

.7 Manufacturer’s operating and maintenance literature and wiring and control diagrams.

1.22 RECORD DRAWINGS

.1 Keep a set of contract prints on site for the sole purpose of keeping an up-to-date record marked in red of the installation of the mechanical work where they vary from the drawings.

.2 Changes for all mechanical work and piped site service trades, including sketches for Change Orders and Site Instructions shall be kept on this set of drawings.

.3 All inaccessible concealed services shall be accurately located. Dimension the locations and inverts of buried or concealed services before they are concealed.

.4 Minor changes in the routing of services within a space which are readily observable and obvious after all construction is complete, need not be recorded.

.5 Identify each drawing in lower right hand corner in letters at least 10 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" and under this add the Contractor’s name, an authorized signature and the date.

.6 Submit the prints for review by the Engineer. Make any additional changes identified by the Engineer including returning to the site if necessary to make measurements and/or to confirm installation locations and details. Resubmit to the Engineer.

.7 Upon completion of the Engineer's review, submit final Record Drawings to the Engineer. Final record drawings shall include revised CAD files with PDF plots to be prepared by a qualified draftsperson to the same standards as the original drawings.

1.23 DEMONSTRATION AND INSTRUCTION TO OWNER

.1 Provide certified personnel to demonstrate and provide maintenance instructions for each mechanical system to the Owner's operating staff. Provide adjustments of mechanical equipment and any changes or modification in equipment made under terms of guarantee.

.2 Finalize demonstration and instructions by obtaining a signed statement from the Owner that the demonstration and instructions have been given satisfactorily.

1.24 BALANCING AND COMMISSIONING

.1 Employ a Balancing Agency to:

.1 Prepare Operation and Maintenance Manuals.

.2 Commission each mechanical system.

.3 Adjust duct and terminal balance dampers and adjust or change drive sheaves to balance supply, return and exhaust air systems to provide the design air quantities (within +10%/-5%) at each outlet and inlet and to maintain the design relationship between the supply, return and exhaust air system quantities.

.4 Permanently mark the final balance position on all balance dampers.

.5 Submit a report to the Consultant indicating final fan speed, motor operating amperages, system static pressure, filter static pressure, design air quantities and final air quantities obtained.

1.25 SUBSTANTIAL PERFORMANCE

.1 The work will not be considered to be ready for use or substantially complete until the following requirements have been met:

.1 All reported deficiencies have been corrected.

.2 Testing and balancing completed.

.3 Operation and Maintenance Manuals completed.

.4 Record Drawings ready for review.

.5 System Commissioning has been completed and verified.

.6 All demonstrations to the Owner have been completed.

.2 Work under this Section which is still outstanding when Substantial Performance is certified will be considered deficient and hold-back will be established to be withheld until Total Performance and will be equal to at least twice the Consultant's cost estimate of completing that work.

PART 2 INSULATION

2.1 GENERAL

.1 Apply insulation and accessories so that the finished product is smooth and neat and with longitudinal seams concealed from view. Apply insulation, accessories and finishes in accordance with the manufacturer's recommendations.

.2 Insulation and vapour barrier shall be continuous through all non-rated separations.

.3 Finish and seal insulation at hangers, supports, access doors, fire dampers and other insulation protrusions.

.4 Where exposed, terminate piping insulation 75 mm [3"] back from all uninsulated fittings for working clearance and bevel insulation at 45° and finish with a hard coat insulating cement to match the adjacent insulation.

.5 Where concealed, terminate piping insulation 75 mm [3”] back from all uninsulated fittings, with heavy coat of vapour barrier coating to secure glass fibres.

2.2 PIPING INSULATION

.1 Materials:

.1 Mineral Fibre - Low and Medium Temperature, vapour barrier jacket. Maximum thermo conductivity: 0.033 W/m-°C at 24°C [0.23 Btu-in/(hr-ft2-°F) at 75°F]:

.2 Flexible Foamed Elastomeric Insulation.

.3 Flexible Closed Cell Insulation.

.4 Flexible elastomeric and flexible closed cell insulation adhesive.

.5 Flexible elastomeric and flexible closed cell insulation finish coating.

.6 Vapour barrier jacket adhesive.

.7 Vapour barrier coating on reinforcing membrane or on insulating cement.

.8 Aluminum Jacket:

.1 22 ga. corrugated or smooth aluminum jacketing.

.2 Longitudinal slip joints and 50 mm [2"] end laps.

.3 Factory applied protective liner on interior surface.

.2 Scope: Warm/Hot Piping

.1 All domestic hot water supply piping - 25 mm [1”] thickness.

.2 Installation:

.1 Mineral fibre insulation.

.2 Tape over all joints.

.3 Fittings - tightly wrapped flexible insulation to full thickness with PVC fitting cover.

.4 Valves, Strainers - fitted pipe insulation with drains, and caps uninsulated.

.5 Flanges, mechanical joints - oversized pipe insulation overlapping adjoining insulation at least 75 mm [3"].

.3 Scope: Cold Piping

.1 All domestic cold water piping - 25 mm [1”].

.2 All traps on sanitary piping - 25 mm [1”].

.3 All heat traced piping - 25 mm [1”].

.4 Installation:

.1 The insulation shall include provision of a continuous vapour barrier.

.2 Mineral fibre insulation.

.3 Tape over all joints with vapour-barrier adhesive.

.4 Fittings - tightly wrapped flexible insulation to full thickness with PVC fitting cover.

.5 Valves, Strainers - fitted pipe insulation with drains and caps uninsulated.

.6 Flanges, mechanical joints - oversized pipe insulation overlapping adjoining insulation at least 75 mm [3"].

.4 Scope: Refrigerant Piping

.1 25 mm [1"] thick flexible foamed elastomeric or flexible closed cell preformed piping insulation. Secure longitudinal and butt joints with adhesive. Insulate all fittings and components. Finish with flexible elastomeric or flexible closed cell insulation coating. Maintain continuous vapour-barrier for suction and mixed phase piping.

.5 Pipe Insulation Finishes

.1 "Concealed" insulation will require no further finish except in damp locations where it shall have a vapour barrier jacket continuously sealed.

.2 "Exposed" insulation inside the building shall be finished as follows:

.1 Apply thermocanvas jacket with fabric adhesive.

.2 Over insulating fittings apply hard coat cement and finish with thermocanvas or apply PVC fitting covers. Over all other insulated components apply thermocanvas jacket with fabric adhesive.

.3 Finish fabric with one (1) coat of fabric coating.

.3 "Exposed" outdoor insulation shall be finished as follows:

.1 Insulation shall have a vapour sealed vapour barrier jacket.

.2 Over the pipe insulation jacket apply aluminum weather protecting jacket. The longitudinal seam shall be located to shed water.

.3 Over insulated fittings, valve bodies, valve bonnets, strainers and flanges apply aluminum jacket or preformed aluminum fittings to provide a complete jacket system. Secure with necessary fastenings.

.4 Locate seams on underside and seal all outdoor jacketing watertight.

2.3 HEAT TRACING FOR PIPING

.1 Provide complete, CSA approved system of heat tracing on the following:

.1 All domestic water within the crawlspace.

.2 All sanitary traps within the crawlspace.

.2 Domestic water heat tracing:

.1 System shall be thermostatically controlled with a thermostat with a non-adjustable set point of 5°C [40°F] complete with a 900 mm [36”] capillary.

.2 16.5 W/m [5 W/ft].

.3 Thermostat: Line voltage remote bulb type thermostat with:

.1 120 Volt.

.2 3m copper capillary tube.

.3 Moisture and dust-resistant enclosure.

.3 Sanitary trap heat tracing:

.1 Preassembled with plug and thermostatic bulb.

.2 120 Volt.

.4 Installation:

.1 Prior to installing heating cables, ensure the pipe system are complete and have passed all necessary tests.

.2 Cables to be secured to pipes using tape at 300mm [12”] intervals on pipe.

.3 Ensure that heating cables do not touch or cross each other.

.4 Coordinate cable installation with insulation application. Loop additional cable at fittings, valves, and flanges.

.5 Run only cold leads in conduit and ensure sensing bulb does not touch cable. Ground shield to building ground.

.6 Make power and control connections.

.7 After pipes are traced test all lengths prior to installation of pipe insulation.

.8 Insulate all heat traced piping and traps.

.9 Provide suitable identification for those pipe systems provided with heat tracing. At 6 m [20 ft] intervals provide an adhesive backed nameplate "Caution - Heat Tracing".

2.4 DUCTWORK INSULATION

.1 Materials:

.1 External Insulation - Flexible. Maximum thermo conductivity: 0.040 W/m-°C at 24°C [0.27 Btu-in/(hr-ft2-°F) at 75°F].

.2 Duct Liner - Flexible. Minimum noise reduction criteria (NRC): 0.70 as per ASTM C423 'Type A mounting'.

.2 Scope: Ductwork exterior thermal insulation:

.1 Outdoor air ductwork (from intake to HRV) - 50 mm (2”) thickness.

.2 Installation:

.1 Adhere insulation with insulation adhesive applied in 150 mm [6”] wide strips on 300 mm [12”] centres.

.2 Adhere vapour barrier tape over all butt joints, raw edges, holding washers and other points of penetration of the vapour barrier jacket.

.3 Scope: Ductwork, interior flexible acoustic insulation:

.1 Where indicated by single hatching - 25 mm [1”] thickness.

.2 Installation:

.1 Adhere insulation with insulation adhesive applied to the entire metal surface.

.2 Seal all transverse joints, raw edges, and other points of penetration of the coating with reinforcing membrane and insulation coating/sealer.

.3 Seal all longitudinal joints with insulation coating sealer.

.4 Protect leading and trailing edges of duct sections with sheet metal nosing having 15 mm overlap and fastened to duct.

PART 3 FIRE PROTECTION

3.1 MULTI-PURPOSE DRY CHEMICAL EXTINGUISHERS

.1 2.3 kg [5 lbs] Extinguisher: Multipurpose stored pressure rechargeable fire extinguisher, squeeze grip positive on/off operation, heavy duty glossy enamel finish steel cylinder, pull

pin safety lock, forged valve, rating for 2-A, 10-B, C with universal wall mounting bracket.

.2 Installation

.1 Install or mount extinguishers on brackets as indicated.

.2 Identify extinguishers in accordance with the recommendations of NFPA 10.

.3 Attach a tag or label to extinguishers, indicating the month and year of installation, which provides space for subsequent service date recording.

PART 4 PLUMBING SYSTEMS

4.1 GENERAL

.1 All work and equipment shall be in accordance with the Building Code and the Authorities Having Jurisdiction.

.2 Tests shall be as follows:

.1 Sanitary drains - hydraulic, 3 m [10 feet] for 8 hours.

.2 Domestic water - hydraulic, 1034 kPa [150 psig] for 8 hours.

4.2 PIPING, VALVES AND FITTINGS

.1 Drainage Piping

.1 Inside buildings and in Crawlspace:

.1 ABS drain and waste pipe and fittings.

.2 D.W.V. copper pipe and fittings.

.2 Outside buildings:

.1 D.W.V. copper pipe and fittings.

.2 Water Piping:

.1 Type ‘L’ copper pipe above ground with cast brass or wrought copper fittings 95/5 Sn/Sb solder.

.3 Hangers and Supports:

.1 Cadmium plated hanger rods. All steel hangers in contact with copper piping shall be copper plated or plastic dipped.

.4 Install dielectric couplings at copper piping connections to plumbing equipment of dissimilar material.

.5 Ball Valves:

.1 Lever handle, brass two piece body, blow-out proof stem, PTFE seats, brass ball chrome plated

.2 Sweat ends to ANSI/ASME B16.18, Class 150.

.3 Threaded ends to Class 150.

.6 Strainers:

.1 Bronze body, screwed connections, bronze or stainless steel perforated screen.

.7 Pressure Reducing Valve:

.1 Screwed, bronze or cast iron body.

.8 Backflow preventers:

.1 Vacuum breakers:

.1 Continuous pressure, high hazard, anti-siphon, anti-spill vacuum breaker.

.2 12 mm [1/2”] unit on pipe sizes up to 25 mm [1”].

.3 20 mm [3/4”] unit on pipe sizes up to 40 mm [1-1/2”].

.2 Double check valve (DCV):

.1 Factory assembled station complete with inlet and outlet isolation valves.

.9 Water Entry Station Assembly:

.1 Ball valve, strainer, union, DCV backflow preventer, union, pressure reducing valve, ball valve, bypass with valve.

.10 Hose Bibbs:

.1 Exterior - Frost proof complete with backflow preventer and operating key.

.2 Interior - Chrome plated vacuum breaker on outlet.

.11 Trap Primers:

.1 Flow actuated devices piped to the closest plumbing fixture.

.12 Water Hammer Arrestors:

.1 Piston style with stainless steel casing or bellows style with welded stainless steel nesting bellows, ANSI approved and PDI certified.

.13 Cleanouts:

.1 Nickel bronze to suit floor finish.

.14 Lead Flashings:

.1 2.27 kg [5 lb.] lead - vent terminals - floor drains, roof drains, shower areas.

.15 Pressure Gauges:

.1 Bourdon tube type. Cock and snubber. 100 mm [4”] minimum diameter gauge.

.16 Domestic Hot Water Tank (Electric):

.1 Commercial grade porcelainized glass-lined tank, electric hot water heater, CSA certified, maximum hydrostatic working pressure 1034 kPa [150 psi].

.2 Rigid R-16 polyurethane foam, mineral wool or fibreglass insulation.

.3 Enamelled steel jacket.

.4 Fully automatic controls, manually adjustable thermostat, 120 volt control circuit with fused transformer.

.5 3 year extended warranty certificate.

.6 Complete with pressure and temperature relief valve.

.7 Vacuum relief valve. Pipe overflow to floor drain.

.17 Expansion Tank (ET-DHW):

.1 Steel construction with sealed-in elastomer diaphragm.

4.3 FIXTURES

.1 WC1 - Water Closet, Floor Mounted, Tank Ultra-low Flush

.1 Close coupled, vitreous china, 4.8 lpf [1.28 gpf].

.2 White open front seat less cover, Seat shall be compatible with the fixture.

.3 12 mm [1/2”] cold water chrome plated supply with stop.

.2 LB1 - Lavatory Basin, Counter Mounted

.1 Enamelled steel 100 mm [4”] punching to suit trim.

.2 Single handle deck mounted faucet.1.92 l/min at 414 kPa [0.5 gpm at 60 psi].

.3 Chrome plated open grid strainer.

.4 Chrome plated P-trap.

.5 12 mm [1/2”] hot and cold supplies with stops.

.3 SH1 - Shower Stall

.1 Gelcoat finish reinforced with fibreglass, 1988 high x 908 wide x 933 mm deep [78-1/4” x 35-3/4” x 36-3/4”] without top. Confirm handing.

.2 Pressure balance shower valve with lever handle, showerhead, integral stops and checks. 0.95 l/s at 414 kPa [1.5 gpm at 60 psi].

.3 Stainless steel drain. P-trap.

.4 12 mm [1/2”] hot and cold supply.

.4 S1 - Sink, Single Compartment, Ledge-Back, 200 mm [8”] Deep

.1 Undercoating, basket strainer, tail piece, clamps, confirm punchings. Compartment size: 430L x 380W x 200D mm [17" x 15" x 8"], overall size: 560L x 440W mm [22” x 17-1/4"].

.2 Single handle deck mounted kitchen sink faucet.

.3 40 mm [1-1/2”] cast brass P-trap. Provide dishwasher trap.

.4 12 mm [1/2”] hot and cold supplies with stops.

.5 Dishwasher Connections:

.1 12 mm [1/2”] hot with stop.

.2 Pipe drain to sink waste.

.6 CW1 - Clothes Washer

.1 Automatic washing machine valve with supply and drain. Valves with 50 mm [2”] drain. Unit shall be recessed and mounted to facilitate easy access.

.2 50 mm [2”] P-trap with standpipe.

.3 12 mm [1/2”] hot and cold with stops.

.7 FD1 - Floor Drain

.1 Cast iron floor drain with membrane clamp and 130 mm [5”] diameter nickel bronze strainer. Cast iron non-plated parts to be epoxy coated. Trap primer connection.

PART 5 HVAC SYSTEMS

5.1 PIPING, VALVES AND FITTINGS

.1 Pipe Material:

.1 Service: Equipment drains and overflows.
Material: Schedule 40, D.W.V. copper.

.2 Pipe Fittings - Copper Pipe:

.1 Cast bronze: to ANSI B16.18 or wrought copper and bronze: to ANSI B16.22.

.3 Flanges - Copper Pipe:

.1 Brass or bronze: to ANSI B16.15 or cast iron: to ANSI B16.4.

.4 Pipe Joints:

.1 50 mm [2”] and smaller: screwed fittings, except where otherwise noted, with teflon tape or pulverized lead paste.

.2 Provide dielectric couplings on all systems except closed loop systems wherever pipes of dissimilar metals are joined.

.5 Install piping with all necessary changes of direction, expansion loops, anchors and guides to prevent overstressing the piping and equipment piping connections from thermal expansion and contraction.

.6 Hangers and Supports:

.1 Cadmium plated hanger rods. All steel hangers in contact with copper piping shall be copper plated or plastic dipped.

.7 Refrigerant Tubing and Fittings

.1 Tubing:

.1 Processed tubing for refrigeration installation, deoxidized, dehydrated and sealed.

.2 Hard copper tube, type L, to ASTM B88M.

.3 Annealed copper tube to ASTM B280, with minimum wall thickness as per CSA B52.

.2 Fittings

.1 Service: design pressure 300 psig and temperature 250°F.

.2 Brazed: wrought copper to ANSI B16.22 or cast bronze to MIL-F-1183E.

.3 Flanged: bronze or brass, Class 150 and Class 300 to ANSI B16.24.

.4 Flare: Bronze or brass, for refrigeration, to ANSI B16.26.

.5 Long radius type for elbows and return bends.

.3 Joints

.1 Brazing materials shall be SIL-FOS-15 phosphor-copper-silver alloy for copper piping jointed by copper fittings and silver solder for brass fittings.

5.2 DUCTWORK AND ACCESSORIES

.1 General

.1 Construction and installation of ductwork shall meet the standards of the latest editions of the SMACNA duct manuals and ASHRAE handbooks.

.2 The project drawings are diagrammatic. Effort has been made to indicate offsets and transitions, but not all are necessarily shown. Changes may be required to ductwork to avoid interference with structure and other services. Determine all required adjustments prior to fabrication and provided the adjustments without additional cost to the contract.

.3 Square throated - radius heel elbows shall not to be used.

.4 Duct sizes on drawings are the airway size clear of any specified internal lining. Size internally insulated ducts so that the free area of the duct is the dimension shown on the drawings.

.5 During construction, protect ductwork openings from the entry of dirt, dust and debris with suitable covers.

.6 Provide roof curbs, flashing and counter flashing on ducts through roofs and flashing and counter flashing on ducts through exterior walls.

.7 Install duct necks before grilles, registers and diffusers. Install cushion heads at diffusers.

.8 Provide suitably sized, factory manufactured access panels for dampers, fire dampers, at devices requiring maintenance and elsewhere as indicated.

.2 Ducts - Galvanized Steel - 500 Pa [2" W.G.] Static Pressure rating

.1 Ductwork Galvanized steel shall be lock forming quality with galvanizing coat both sides to ASTM A525 G90.

.2 Provide 100 mm [4”] flexible connections where ducts connect to fans, equipment, and as shown.

.3 Ducts - Flexible:

.1 Flexible duct may not be used on this project.

.4 Ductwork Sealing:

.1 SMACNA Seal Classification A for all ductwork.

.5 Balance Dampers

.1 Provide balance dampers where indicated on the drawings and as required by the Balancing Agent to properly balance the system.

.1 Of same material as duct, 16 ga., V-groove stiffened.

.2 Multi-blade, factory manufactured where over 300 mm [12”] high.

.3 Locking quadrant with shaft extension to accommodate insulation thickness.

.4 End bearings both ends. Nylon on dampers up to 300 mm [12”] high, oilite bronze on dampers over 300 mm [12"] high or diameter.

.5 Channel frame of same material as adjacent duct, complete with angle stop.

.6 Fire Dampers

.1 Provide Type B fire dampers where indicated on drawings.

.2 Fire dampers shall be listed and bear label of ULC or Warnock Hersey, meet requirements of B.C. Building Code and authorities having jurisdiction, tested in accordance with CAN4-S112.

.3 Install in accordance with SMACNA Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems.

PART 6 CONTROLS

6.1 GENERAL

.1 Set up, adjust, test and commission the control system to achieve optimum operation of the HVAC system. This includes sequencing, timing and readjustment, as required. These modifications shall continue through the construction period, commissioning period and warranty period as required to achieve optimum operation of the mechanical system.

.2 This Section is a performance specification clarified in certain sections to establish minimum standard of equipment, installation or level of control. The specification describes the basic functions required but not all of the installation details or components.

The Controls Contractor is expected to have sufficient experience to be able to design and estimate the cost of an appropriate control system. Materials and work necessary to achieve a satisfactory result will not be considered extra to the contract.

6.2 ELECTRICAL COMPONENTS, WIRING AND CONDUIT

.1 By Control Contractor:

.1 All control system components to make a complete and operable system, except those supplied as part of packaged equipment controls, but including all auto-sequencing devices and electrical interlocks required to accomplish the sequences specified hereafter. Refer to the electrical equipment schedule, the electrical drawings and the electrical specification Division serving mechanical systems. Materials, equipment, connections and power not provided by the Electrical Division but required for the Control System shall be provided under this section.

.2 All control circuit transformers (120/1/60 or 24/1/60 and as designated).

.3 All control wiring and metallic conduit for mechanical system controls.

.4 Supply, installation and connection of all electric control items.

.5 All wiring and conduit from power distribution system to any control devices needing power.

.6 Coordinate with the Electrical Contractor.

.7 Electrical work installed under this Section shall be to the standards specified under Electrical Division.

.8 Obtain electrical permit.

.2 Carrier System:

.1 All wiring in mechanical service spaces, where exposed to view and all 120 volt wiring shall be run in EMT conduit except the final 900mm [36"] of wiring to all operators and to all sensors subject to vibration shall be run in flexible metallic conduit.

.2 Run wiring not installed in conduit parallel to building lines and support every one meter independent of piping, ductwork, and equipment.

.3 Provide steel fittings with nylon throats for all conduit connections.

.4 Identify each wire and cable at every termination point. Identify conduit with colour bands at no more than 7.5m [25'] intervals and on both sides of walls and floor

6.3 EQUIPMENT SUPPLIED FOR INSTALLATION UNDER OTHER SECTIONS

.1 Hand over automatic control dampers to the appropriate trade sections for installation.

.2 The Controls Contractor shall be responsible for arranging, coordinating and supervising the installation of the above devices in a suitable manner and readily accessible location.

6.4 CALIBRATION AND DEMONSTRATION

.1 Set up and calibrate all sensors during the initial start-up of the systems and check, recalibrate and readjust and debug operation as necessary.

.2 Demonstrate the controls system to the satisfaction of the Consultant and the Owner.

6.5 PRODUCTS

.1 7 Day, 24 Hour Programmable Thermostat:

.1 7 Day, 24 Hour programmable thermostat, for the control of the heat pump and HRV.

.2 Control Dampers:

.1 Parallel type blade for all two position dampers unless otherwise indicated.

.2 Extruded aluminum or formed galvanized steel blades, frames, gussets and blade stops.

.3 Shafts - galvanized steel with keyways for securing blades to shafts.

.4 Hardware - keyed to prevent blade slippage and to provide smooth blade movement.

.5 Bearings - oil impregnated sintered bronze.

.6 Assemblies - rigid and adequately braced with corner gussets.

.7 Bearings and seals - suitable for exposure to a minimum of -30°C [-22°F] and a maximum of 100°C [212°F].

.8 Low leakage type with blade and frame seals.

.9 Maximum leakage in closed position shall be 50 L/s per square metre [10 CFM per square ft.] of face area at 1000 Pa [4" w.g.] pressure differential.

.10 Galvanized coating on all sheared edges of galvanized steel frames and blades exposed to outside atmosphere.

.11 Indicated size is outside frame dimension. Confirm with installer before fabrication.

.12 Dampers shall be adequate for the maximum system pressure. Refer to the appropriate section of the specification.

.13 Damper Actuator:

.1 Size actuators to control dampers against maximum pressure or dynamic closing pressure whichever is greater.

.2 Size damper actuators so that they will provide smooth and full travel of the dampers while stroking in both directions.

.3 Installation:

.1 All equipment shall be installed according to manufacturers' published instructions.

.2 Adjust all existing and new damper blades to ensure that they close tightly against seals and stops.

.3 All sensors shall be stabilized to such a level as to permit on-the-job installations that will require minimum field adjustments or calibration.

.4 Install labels on all sensors and actuators identifying the point name.

6.6 SEQUENCE OF OPERATION

.1 Domestic Hot Water System

.1 The internal controls of the Domestic Hot Water Tank shall control the operation of the system to maintain a water temperature of 60˚C [140˚F] within the tank.

.2 Split System Heat Pump:

.1 The heat pump shall by controlled by a programmable thermostat to maintain a set point in Room 115. There shall be an appropriate dead band between cooling and heating modes.

.3 Heat Recovery Ventilator:

.1 Provide a timeclock to cycle the HRV ON/OFF.

.2 During the OCCUPIED it shall RUN and be OFF during the UNOCCUPIED periods.

.3 Hardwire the motorized control dampers CD-HRV1 and CD-HRV2 to open when the fan starts.

.4 Exhaust fan EF-101:

.1 Provide a thermostat within the room to control the operation of EF-101 (cooling) and UH-101 (heating).

.2 Provide a dead band between cooling and heating modes such that EF and UH do not run simultaneously.

.3 Provide a wall mounted override switch to turn the exhaust fan ON/AUTO. Label switch:
"EXHAUST FAN OVERRIDE
ON / AUTO"

.4 Hardwire the motorized control damper CD-EF101 to open when the fan starts.

.5 Exhaust fan EF-112:

.1 Provide a thermostat within the room to control the operation of EF-112.

.2 Hardwire the motorized control damper CD-EF112 to open when the fan starts.

.6 Exhaust fan EF-119 Storage/Garbage Room:

.1 The exhaust fan shall run continuously.

.2 Provide a wall mounted ON/OFF switch within the room.

.7 Existing Simplex Sanitary Sump Pump:

.1 Recommission existing control panel (relocated under this contract) and sump pump.

.2 The operation of the existing sump pump shall remain as existing.

.3 All wiring to pump & floats and relocation of existing control panel to Rm 101 by Electrical.

PART 7 EQUIPMENT

7.1 FIXED LOUVRES - ALUMINUM

.1 Provide 100 mm [4"] deep, extruded aluminum alloy [6063-T5] with aluminum bird screen.

.2 Finish: factory applied enamel. Colour: to Architect's approval.

.3 Note the custom shape of some louvres. Refer to Architectural and Mechanical details.

7.2 SPLIT SYSTEM HEAT PUMP UNIT

.1 Units shall be complete with:

.1 Electric heater for defrost cycle.

.2 Anti-corrosion coating on the casing, supports and coil of the condensing unit suitable for a marine environment. Anti-corrosion coating shall be factory applied, second party application of coating shall not be accepted. Bare aluminum coils (fins and tubes) are not an acceptable equivalent for the coated coil.

.3 Supplier shall confirm within the shop drawings that the unit performance is with the applied anti-corrosion coating.

.4 Low-ambient package suitable for operation at -10˚C [15˚F].

.5 Wired controller with remote sensor.

7.3 HEAT RECOVERY VENTILATOR

.1 Provide a heat recovery ventilator as indicated on the drawings and schedules

.2 Unit shall consist of a fan in each airstream, positively draining pan (no standing water), automatic defrost function, in an acoustically insulated cabinet.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.46-M1988, Electric Air-Heaters.

.2 Underwriters' Laboratories (UL) Inc.

.1 UL 1042-1994, Electric Baseboard Heating Equipment.

1.2 PRODUCT DATA

.1 Submit product data sheets for baseboard convectors. Include:

.1 Mounting methods.
.2 Physical size.
.3 kW rating, voltage, phase.
.4 Cabinet material thicknesses.
.5 Limitations.
.6 Colour and finish.

.2 Manufacturer's Instructions: Provide to indicate special handling, installation and maintenance procedures.

1.3 CLOSEOUT SUBMITTALS

.1 Submit operation and maintenance data for baseboard convectors in accordance with Section 01 78 00 - Closeout Submittals.

Part 2 BASEBOARD CONVECTORS

.1 Heaters: to CSA C22.2 No.46 latest edition standard wattage density as indicated with connection box.

.1 Element through-type fitted with aluminum convector vanes and resistor wire enclosed in mineral insulation in copper sheath.

.2 Element: locked to cabinet and supported at additional points throughout length to allow for linear expansion with non metallic supports.

.3 Cabinet: to CSA C22.2 No.46 latest edition pre-drilled back for securing to wall. Integral air diffusion reflector with wireway at bottom and built-in clamps.

.1 Bottom inlet/front outlet.
.2 Sloping front outlet.
.3 Panel: steel, metal thickness, bottom 0.8 mm, front 1.6 mm thick.
.4 Finish: phosphatized and finished with 2 coats air-dry, baked enamel, white colour.

.4 Blank cabinet sections and inside corners complete with wireway in sections including splice plates, to match heater cabinets in respects for continuous baseboard effect as indicated.

2.2 CONTROLS

.1 Wall mounted thermostats: type low voltage.

Part 3 Execution

3.1 INSTALLATION

.1 Install baseboard convector heaters, blank sections and controls.

.2 When wireway is used, remove knock-outs and insert insulating bushing between units.

.3 Install grounding wire to maintain ground integrity between heating, blank, and auxiliary sections.

.4 Install thermostats in locations indicated.

.5 Make power and control connections.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Ensure heaters and controls operate correctly.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies electric unit heaters and their controls and installation.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).

.1 CSA C22.2 No.46-M1988 latest edition, Electric Air-Heaters.

1.3 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit product data sheets for unit heaters. Include:

.1 Mounting methods.
.2 Physical size.
.3 kW rating, voltage, phase.
.4 Cabinet material thicknesses.
.5 Limitations.
.6 Colour and finish.

.3 Submit product data sheets for unit heaters.

.1 Include product characteristics, performance criteria, physical size, limitations and finish.

.4 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence and cleaning procedures.

1.4 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for unit heaters for incorporation into manual.

Part 2 Products

2.1 UNIT HEATERS

.1 Unit heater: to CSA C22.2 No.46 – latest edition, horizontal discharge complete with adjustable louvers finished to match cabinet.

.2 Fan type unit heaters with built-in high-heat limit protection.

.3 Fan motor: totally enclosed, permanently lubricated ball bearing type with resilient mount.

.1 Built-in fan motor thermal overload protection.

.4 Hangers Required:

.5 Elements: mineral insulated steel sheath with aluminum brazed fins.

.6 Cabinet: aluminum, with brackets for rod or wall mounting.

.1 Phosphatized and finished with 2 coats air baked enamel in white colour.

2.2 CONTROLS

.1 Wall mounted thermostats: type low voltage electronic.

Part 3 Execution

3.1 INSTALLATION

.1 Suspend unit heaters from ceiling or mount on wall as indicated.

.2 Install thermostats in locations indicated.

.3 Make power and control connections.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Test cut-out protection when air movement is obstructed.

.3 Test fan delay switch to assure dissipation of heat after element shut down.

.4 Test unit cut-off when fan motor overload protection has operated.

.5 Ensure heaters and controls operate correctly.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This Section describes the Common Work Results applicable to electrical disciplines.

1.2 GENERAL

.1 The general conditions and general requirements together with all amendments and supplements contained in the General Specifications shall form an integral part of the electrical specification and will be made part of this contract.

.2 Reference to “Electrical Divisions” shall mean all Divisions 26, 27, 28, 33, 34 and 48 in the Master Format or the Canadian Master Specifications.

.3 The word "Provide" shall mean "Supply and Install" the products and services specified. "As Indicated" means that the item(s) specified are shown on the drawings.

.4 Confirm with the architectural plans and specifications the extent and nature of the work and how it will affect the electrical work. Include in the tender sum for any complications or additional work described therein.

.5 Review mechanical plans and specifications for the extent of electrical work required to make mechanical systems complete and include this work in the tender sum.

.6 Review structural plans for limitations of penetrations or inclusions of electrical equipment. In the tender sum, allow for avoiding critical areas with electrical equipment.

.7 Review existing site conditions for limitations of penetrations or inclusions of electrical equipment. In the tender sum, allow for avoiding critical areas with electrical equipment.

.8 Comply with the requirements of the General Contract, and coordinate the installation with all other trades on site.

.9 Confirm on-site the exact location of equipment, outlets, and fixtures and the location of outlets for equipment supplied by other trades.

1.3 WORK INCLUDED

.1 This work shall include the supply and installation of all the necessary materials and apparatus for complete operating systems as indicated on the plans or mentioned in this specification, with the exception of materials or apparatus specifically mentioned to be omitted or to be supplied by owner.

.2 Items obviously necessary or reasonably implied to complete the work, shall be included as if shown on drawings and noted in the specifications.

.3 All materials, tools, appliances, scaffolding, apparatus and labour necessary for the execution, erection and completion of the systems described herein shall be furnished. This includes providing lighting and power for own work.

.4 This contract shall include, but is not confined to, the following scope of work:

.1 Incoming services
.2 All electrically related civil works, trenching, backfilling, resurfacing
.3 Underground ducts including concrete encasement and pullboxes.
.4 Main power service
.5 Power distribution equipment
.6 Power connections and outlets
.7 Power factor correction system
.8 Surface wireways
.9 Manual transfer
.10 Mechanical equipment connections
.11 Lighting system
.12 Lighting controls
.13 Exit signs
.14 Emergency lighting
.15 Data/Communications system
.16 Door, Motion, Smoke system

.5 Complete all electrical connections to equipment and accessories pertaining to this contract and leave all in operating condition to the electrical Consultant's satisfaction.

1.4 WORK EXCLUDED

.1 The contract scope of work shall not include the following:

.1 Low voltage mechanical systems control wiring where indicated in electrical and mechanical specifications to be done by controls contractor shall be excluded from the electrical contractor work as noted.

1.5 DRAWINGS AND SPECIFICATIONS

.1 The drawings and specifications compliment each other and what is called for by one is binding as if called for by both. If there is any doubt as to meaning or true intent due to a discrepancy between the electrical drawings and specifications, and all other contract documents, obtain written ruling from Consultant prior to tender closing. **Failing this, the most expensive alternative is to be allowed for.**

.2 The plans show the approximate location of outlets and apparatus but the right is reserved to make such changes in location as may be necessary to meet the emergencies of construction in any way. No extra will be allowed for such changes to any piece of electrical equipment unless the distance exceeds 3 metres, or if the relocation is required after initial installation is complete.

.3 It is imperative that the contractor visit the site and completely familiarize himself as to the work to be undertaken.

1.6 CODES AND STANDARDS

.1 All electrical work shall be carried out in accordance with the latest edition of the CEC C22.1 (Canadian Electrical Code) as amended and adopted by the Province of British Columbia and to the satisfaction of the Electrical Inspection Authority having jurisdiction, except where specified or specifically stated otherwise.

.2 Do underground systems in accordance with CSA C22.3 No.1 latest edition, except where specified or specifically stated otherwise.

.3 All work shall be carried out in accordance with the National Building Code current edition (including all local amendments) to the satisfaction of local building inspector authority having jurisdiction.

.4 Any electrical material and/or equipment supplied by any contractor or sub-contractor for installation on this project must bear evidence of CSA approval or special CSA certification acceptable to the Authorities having Jurisdiction.

1.7 CARE, OPERATION AND START-UP

.1 Instruct Operating Personnel in the operation, care and maintenance of systems, system equipment and components.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.8 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235 latest edition.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.9 PERMITS, FEES AND INSPECTION

.1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.

.2 Pay all associated fees.

.3 Fees will cover all routine inspections by the District Electrical Inspector. Any fees for follow-up inspections found to be necessary by the District Electrical Inspectors as a result of incorrect work shall be borne by this contractor without any cost to the owner.

.4 Notify Consultant of changes required by Electrical Inspection Department prior to making changes.

.5 Furnish Certificates of Acceptance from Electrical Inspection Department Authorities having Jurisdiction on completion of work to Consultant.

.6 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work. Obtain electrical permit and pay associated fees.

.7 Consultant will provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost to the Contractor.

.8 Furnish to Consultant on completion of work Certificates of Acceptance from Electrical Inspection Department.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with the Construction Waste Management Plan as established by the Construction Manager.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal: paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Consultant.

.5 Fold up metal banding, flatten and place in designated area for recycling.

1.11 SINGLE LINE ELECTRICAL DIAGRAMS

.1 Provide single line electrical diagrams under plexiglass as follows:

.1 Electrical distribution system: locate in main electrical room.

.2 Drawings: 600mm x 600mm minimum size.

1.12 LOCATION OF OUTLETS

.1 Locate outlets in accordance with these specifications and as indicated on the Architectural and Electrical drawings.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000mm, and information is given before installation.

.4 Locate light switches on latch side of doors. Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

1.13 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise on the Architectural and Electrical drawings.

- .1 Local switches: 1400 mm.
- .2 Wall receptacles:
  - .1 General: 300 mm.
  - .2 Above top of continuous baseboard heater: 200 mm.
  - .3 Above top of counters or counter splash backs: 175 mm.
  - .4 In mechanical rooms: 1400 mm.
- .3 Panelboards: as required by Code or as indicated.
- .4 Telephone and data outlets: 300 mm.
- .5 Keypads 1200mm.

1.14 LOAD BALANCE

.1 Measure phase current to panelboards with normal loads (lighting and mechanical) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Submit, at completion of work, report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load. State voltage, time and date at which each load was measured.

1.15 EXTRA WORK

.1 Any extra work ordered to be done shall be governed by this specification unless specific instructions or clauses are contained in the Change Order. In such cases, these instructions or clauses shall supersede those of the specification for this particular application only.

1.16 FIELD QUALITY CONTROL

.1 All electrical work to be carried out by qualified, licensed electricians or supervised apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks. The activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.

.2 The work of this division to be carried out by a contractor who holds a valid Master Electrical Contractor License as issued by the Province that the work is being conducted.

.3 Conduct and pay for following tests:

.1 Power generation and distribution system including phasing, voltage, grounding and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and lighting control.

.4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

.5 Systems: security system.

.6 Communications.

.4 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.

.5 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350V with a 500V instrument.

.2 Megger 350V - 600 V circuits, feeders and equipment with a 1000V instrument.

.3 Check resistance to ground before energizing.

.6 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.7 Submit test results for Consultant's review.

1.17 CO-ORDINATION OF TRADES

.1 Consult with Construction Manager and all subtrades involved to confirm the location of the various outlets and equipment, and cooperate fully to ensure that no conflict arises during the installation.

.2 Special care shall be taken that equipment, outlets, junction boxes or pullboxes will not be obstructed by other structure, equipment, pipes or ducts installed under this general contract by other trades.

.3 Check drawings of all trades to verify space and headroom limitations for work to be installed. Coordinate work with all trades and make changes to facilitate a satisfactory installation. Make no deviations to the design intent involving extra cost to the Owner, without the Consultant’s written approval.

.4 The drawings indicate the general location and route to be followed by the electrical services. Where details are not shown on the drawings or only shown diagrammatically, the services shall be installed in such a way as to conserve head room and interfere as little as possible with the free use of space through which they pass. Service lines shall run parallel to building lines. All services in the ceiling shall be kept as tight as possible to beams or other limiting members at high level. All electrical services shall be coordinated in elevation to ensure that they are concealed in the ceiling or structural space provided unless detailed otherwise on drawings.

.5 Work out jointly all interference problems on the site and coordinate all work before fabricating, or installing any material or equipment. Where necessary, produce interference/coordination drawings showing exact locations of electrical systems or equipment within service areas, shafts and the ceiling space. Distribute copies of the final interference/coordination drawings to the Architect and the Consultant and all affected parties.

.6 Ensure that all materials and equipment fit into the allotted spaces and that all equipment can be properly serviced and replaced, if and when required. Advise the Consultant of space problems before installing any material or equipment. Demonstrate to the Consultant on completion of the work that all equipment installed can be properly, safely serviced and replaced, if and when required.

1.18 PROTECTION OF EQUIPMENT

.1 This contractor shall provide and ensure maximum protection of electrical equipment on the site. Electrical equipment, including existing electrical equipment, shall be kept clean and dry at all times and caution shall be taken to ensure no mechanical damage is done to the equipment. Equipment shall not be delivered to the site until it can be stored safely or placed in final position and the space is clean.

1.19 DAMAGES

.1 If the finish of electrical equipment is damaged either when received or during installation, have such equipment completely refinished and restored to its original condition at no cost to the owner.

.2 Irreparably damaged equipment shall be replaced at no cost to the owner.

1.20 SHOP DRAWINGS

.1 Submit electronic shop drawings, product data and samples in accordance with the contract specifications.

.2 Shop drawings to have been reviewed and stamped by contractor prior to submittal.

.3 Shop drawings and product data shall indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.

.4 Where applicable, include wiring, single line and schematic diagrams.

.5 Include wiring drawings or diagrams showing interconnection with work of other sections.

.6 Prior to manufacture of any item made specifically for this job, submit detailed drawings of the item through the Construction Manager.

.7 Shop drawings must be received by the Consultant at a date early enough to permit reasonable study prior to approval and manufacture, or to permit alterations where necessary. Late submissions of shop drawings will be sufficient reason for a stoppage of construction pending approval, or removal and replacement of any unsatisfactory item at the contractor's expense.

.8 Shop drawings/product data content:

.1 Shop drawings submitted title sheet.

.2 Data shall be specific and technical.

.3 Identify each piece of equipment.

.4 Information shall include all schedule data.

.5 Advertising literature will be rejected.

.6 The project and equipment designations shall be identified on each document.

.7 The shop drawings/product data shall include:

.1 Dimensioned construction drawings with plans and sections showing size, arrangement and necessary clearances, with all equipment weights and mounting point loads.

.2 Mounting arrangements.

.3 Control explanation and internal wiring diagrams for packaged equipment.

.4 A written description of control sequences relating to the schematic diagrams.

1.21 CUTTING AND PATCHING

.1 This contractor is responsible for all cutting or blocking out required to install electrical equipment.

.2 If this contractor makes excessive cuts or does not coordinate work so that finished work requires cutting or patching, then this contractor shall pay for all patching to original condition.

.3 Any dispute resulting from this shall be referred to the Consultant for decision.

.4 Prior to any major cutting of walls or floor, review the proposed location, size and method with the Consultant. This includes notification when cutting or coring into any fire rated construction.

1.22 PROTECTION OF EXPOSED LIVE EQUIPMENT

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live parts "LIVE 120 VOLTS", or with appropriate voltage.

.3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.

1.23 INSPECTIONS AND TESTS

.1 Notify the Consultant and authorities having jurisdiction at least five (5) working days in advance when the installations will be ready for inspection or testing.

.2 Test reports, signed by all attending authorities, shall be submitted to the Consultant through the General Contractor after successful completion of an inspection or test.

.3 Conduct all tests in a thorough and complete manner to the satisfaction of the Consultant and pay for any fees incurred to complete tests.

.4 Furnish the Consultant with a copy of Certificate of Inspection from Authorities having Jurisdiction indicating that all work has been satisfactorily completed and issued prior to final connection.

1.24 CLEAN UP

.1 Vacuum clean all new raceways and any electrical equipment. Ensure that no debris or spare parts are left in any electrical equipment.

.2 Any scrap material shall be removed from the site and disposed of by the Contractor.

.3 At time of final cleaning, clean lighting reflectors, lenses and other lighting surfaces that have been exposed to construction dust and dirt.

1.25 SURPLUS MATERIALS

.1 All material removed from existing site and not being reused in this contract shall be the property of the owner and delivered as directed by the owner’s representative. Material as it becomes surplus shall be reviewed by the owner or owner's representative and that part considered of value to the owner shall be classed as surplus material, all other becomes scrap material, and shall be disposed of by the contractor.

1.26 SPARE PARTS

.1 This contract calls for spare parts or material. These are to be provided new in unopened cartons to the owner at the time of substantial completion of the contract.

.2 Obtain a signed receipt from the owner's representative for all these parts or materials and include a copy in the front of the maintenance manual. Without this receipt these items will be treated as a deficiency and the cost withheld at twice the estimated value by the Consultant, or Owner Representative.

1.27 AS BUILT DRAWINGS

.1 Obtain two (2) sets of white prints for the sole purpose of recording changes in installation as they occur. One (1) set is to be used in the field for day-to-day recording, and one (1) set for submittal after completion.

.2 These plans shall be kept up-to-date as changes occur and shall be available to be inspected by the Consultant.

.3 Arrange and pay for the incorporation of any "as-built" changes to digital PDF plans and AutoCAD (Revit) plans on disks. These changes shall be of similar quality of presentation as the original plans. NOTE: All plans whether requiring as-built changes or not, shall be included in this disk.

.4 Should the contractor require the Electrical Consultant to prepare the as-built CAD disk, the cost would be $275 per plan, unless excessive changes have been required. Costs associated with such excessive changes should be included with the change orders.

.5 These amended drawings shall be given to the Consultant at time of final inspections.

.6 "As-built" drawings shall include the location and circuit numbers of junction boxes in ceiling spaces, and all conduit placed in or under poured concrete. Note normal depth of conduits below top of concrete slab.

1.28 OPERATING AND MAINTENANCE MANUALS

.1 Submit **four sets** of operating and maintenance manuals including four (4) cd's for equipment or as requested by the general section of the contract. Include descriptive and technical data, all shop drawings, operating procedures, routine and preventative maintenance, wiring diagrams, spare parts lists, warranties, service companies, suppliers for replacement parts, test results, fire alarm certificate of verification, electrical inspection authority certificate and contract guarantee.

.2 Submit documentation in **green colored** heavy duty three ring binders, with lettering on spine identifying: "OPERATING AND MAINTENANCE MANUAL", project title and system names.

.3 Submit one copy for approval by Consultant prior to assembly of final sets.

1.29 DEMONSTRATION OF SYSTEMS

.1 Instruct operating personnel in the operation, care and maintenance of equipment.

.2 Arrange and pay for services of manufacturer's factory service Consultant to supervise start-up of installation, check, adjust, balance and calibrate components of generator system.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.30 WARRANTY

.1 Within a period of one year from the date of final acceptance of work, replace or repair at own expense any defect in workmanship or material. Reused material shall be operating satisfactorily at the time of final acceptance but subsequent failures are not the responsibility of this contractor.

.2 Warranties for equipment having more than one year guarantee shall be made out to owner, and copies shall be provided in the maintenance manuals.

.3 Maintenance from manufacturer and contractor of all equipment shall be included for first year, including all lamps except incandescent.

1.31 PAINTING

.1 Arrange and pay for the painting of the devices noted in these specifications, in particular:

.1 exposed conduits and conduit fittings.

.2 Painting shall be to match colour and finish of adjacent walls, with at least two coats of sprayed enamel paint to the satisfaction of the Architect.

1.32 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Provide a coordination/protective study and short circuit study of all equipment specified herein and submit for review.

.2 Include the following:

.1 120/208V panelboards, transformer, transfer switch and connecting feeder cables.

.2 600V and 120/208V transformer damage curves magnetizing currents for the transformer.

.3 Generator overcurrent device, generator short circuit curves

.4 Any additional data necessary for successful completion of the coordination and short circuit study.

1.33 ARC FLASH HAZARD ASSESSMENT

.1 The Electrical Contractor is to include in tender to retain the services of an Electrical Engineer to perform an arc flash hazard assessment of electrical power distribution equipment installed under this contract in accordance with NFPA-70E requirements and IEEE-1584 Guidelines.

.2 Arc flash hazard assessment is to take place at time of completion of power distribution equipment installation and is to include power system wide short circuit and protective device coordination study of the electrical equipment installed to determine arc flash hazard threshold incident energy level boundaries and PPE requirements at each distribution panel installed.

.3 Printed warning labels to be provided for installation by the Electrical Contractor at each panel indicating the following:

.1 Flash hazard boundary (inches)

.2 Cal/cm^2 Flash hazard at 18 inches

.3 PPE level and required protective equipment

.4 Shock hazard in KV when cover is removed

.5 Available fault current level in KA

.4 Include copy of arc flash assessment in with maintenance manuals.

Part 2 Products

2.1 MANUFACTURERS AND CSA LABELS

.1 Visible and legible, after equipment is installed.

2.2 MATERIALS AND EQUIPMENT

.1 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Inspection Department.

.2 Factory assemble control panels and component assemblies.

2.3 WARNING SIGNS

.1 As specified and to meet the requirements of the BC Electrical Inspection Authority and the Consultant.

.2 Decal signs, minimum size 175mm x 250mm.

2.4 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

2.5 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates and labels as follows:

.2 Nameplates:

.1 Lamicoid 3mm thick plastic engraving sheet, mechanically attached with self tapping screws.

.2 Nameplate colors shall be as follows:

.1 Normal power: Black face with white letters;

.2 Life safety emergency power: Red face with white letters;

.3 Standby power: Blue face with white letters.

.3 Nameplate sizes shall be as follows

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.3 Labels:

.1 Embossed plastic labels with 6mm high letters unless specified otherwise.

.4 Wording on nameplates and labels to be approved by Consultant prior to manufacture.

.5 Allow for average of twenty-five (25) letters per nameplate and label.

.6 Identification to be English

.7 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.8 Identify equipment with Size 3 labels engraved "ASSET INVENTORY No. [___]". Number as and if directed by Consultant.

.9 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.10 Terminal cabinets and pull boxes: indicate system and voltage.

.11 Transformers: indicate capacity, primary and secondary voltages.

2.6 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to CSA C22.1 [latest edition].

.4 Use colour coded wires in communication cables, matched throughout system.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies materials and installation for seismic restraint systems for electrical installations.

1.2 REGULATORY REQUIREMENTS

.1 Restraints shall meet the requirements of the latest edition of the British Columbia Building Code and amendments.

.2 The Seismic Engineer shall be able to provide a proof of professional insurance and the related practice credentials, upon request. The Seismic Engineer shall be familiar with SMACNA, ECABC & NFPA guidelines as well as the BC Building Code requirements.

.3 The Contractor's Seismic Engineer shall submit original signed BC Building Code "Letters of Assurance" "Model Schedules S-B and S-C" to the Prime Consultant or Electrical Consultant.

.4 The above requirements shall not restrict or supplant the requirements of any local bylaws, codes, or other certified agencies which may have jurisdiction over all or part of the installation.

1.3 SCOPE

.1 It is the responsibility of equipment manufacturers to design their equipment so that the strength and anchorage of internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.

.2 Manufacturer's shop drawings to be submitted with seismic information on equipment structure, bracing and internal components and as required by Division 01.

.3 Provide restraint on all equipment and machinery, which is part of the building electrical services and systems, to prevent injury or hazard to persons and equipment in and around the structure. Restrain all such equipment in its normal position in the event of an earthquake.

.4 The total electrical seismic restraint design and field review and inspection will be by a B.C. registered professional structural engineer who specializes in the restraint of building elements. Contractor to allow for coordination, provision of seismic restraints, as well as all costs for the services of the Seismic Restraint Engineer. This Engineer, herein referred to as the Seismic Engineer, will provide normal engineering functions as they pertain to seismic restraint of electrical installations.

.5 The Contractor shall be aware of, and comply with, all current seismic restraining requirements and make provision for those that may come into effect during construction of the project. Make proper allowance for such conditions in the tender.

.6 The Seismic Engineer shall provide detailed seismic restraint installation shop drawings to the Contractor. Copies of the shop drawings to be included in the final project manual.

.7 Provide seismic restraints on all equipment, and/or installations or assemblies, which are suspended, pendant, shelf mounted, freestanding and/or bolted to the building structure or support slabs.

.8 The Seismic Engineer shall provide inspections during and after installation. The Contractor shall correct any deficiencies noted without additional cost to the contract.

.9 Include all costs associated with the Seismic installation and certification in the base tender.

1.4 SHOP DRAWINGS & SUBMITTALS

.1 Submit shop drawings of all seismic restraint systems including details of attachment to the structure, either tested in an independent testing laboratory or approved by the seismic Engineer.

.2 Submit all the proposed types and locations of inserts or connection points to the building structure or support slabs. Follow the directions and recommendations of the Seismic Engineer.

Part 2 Execution

2.1 GENERAL

.1 All seismic restraints systems shall conform to local authority having jurisdiction and all applicable code requirements.

2.2 CONDUITS

.1 Provide restraint installation information and details on conduit and equipment as indicated below:

.2 Vertical Conduit:

.1 Attachment - Secure vertical conduit at sufficiently close intervals to keep the conduit in alignment and carry the weight of the conduits and wiring. Stacks shall be supported at their bases and, if over 2 stories in height, at each floor by approved metal floor clamps.

.2 At vertical conduit risers, wherever possible, support the weight of the riser, at a point or points above the center of gravity of the riser. Provide lateral guides at the top and bottom of the riser, and at intermediate points not to exceed 9.2 m [30 ft] o.c.

.3 Riser joints shall be braced or stabilized between floors.

.3 Horizontal Conduits:

.1 Supports - Horizontal conduit shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging.

.2 EMT tubing - tubing shall be supported at approximately 1.2 m [4 ft] intervals for tubing.

.4 Provide transverse bracing at 12.2 m [40 ft] intervals maximum unless otherwise noted. Provide bracing at all 90° bend assemblies, and pull box locations.

.5 Provide longitudinal bracing at 24.4 m [80 ft] intervals maximum unless otherwise noted.

.6 Do not brace conduit runs against each other. Use separate support and restraint system.

.7 Support all conduits in accordance with the capability of the pipe to resist seismic load requirements indicated.

.8 Trapeze hangers may be used. Provide flexible conduit connections where conduits pass through building seismic or expansion joints, or where rigidly supported conduits connect to equipment with vibration or seismic isolators.

.9 A conduit system shall not be braced to dissimilar parts of a building or two dissimilar building systems that may respond in a different mode during an earthquake. Examples: wall and a roof; solid concrete wall and a metal deck with lightweight concrete fill.

.10 Provide large enough conduit sleeves through walls or floors to allow for anticipated differential movements with firestopping where required.

.11 It is the responsibility of the contractor to ascertain that an appropriate size restraint device be selected for each individual piece of equipment. Submit details on shop drawings. Review with seismic Engineer and submit shop drawings to consultants for their reference.

2.3 FLOOR MOUNTED EQUIPMENT

.1 Bolt all equipment, e.g. transformers, generators, etc. to the structure. Design anchors and bolts for seismic force applied horizontally through the center of gravity to a seismic force of 0.5g. For equipment which may be subject to resonances, use a nominal 1.0 g seismic force.

.2 Provide flexible conduit connections between floor mounted equipment to be restrained and its adjacent associated electrical equipment.

2.4 LIGHT FIXTURES

.1 Fluorescent fixtures in suspended ceilings shall be hung independently of the ceiling system. Fixtures shall be secured to concrete or structural deck above by at least two seismic cables which are connected to the fixture at diagonal points.

.2 Surface and recessed style fixtures shall be hung independently of the ceiling system. Fixtures shall be secured to concrete or structural deck above by seismic cables.

.3 Fixtures which are hung independently of ceiling systems shall have minimum of one seismic cable in addition to the chain or cable used to support the fixture. Seismic restraint cables shall be secured into the concrete or structural deck above.

.4 Cables shall be corrosion resistant and approved for the application.

.5 Fixtures which are rod hung shall have seismic ball alignment fittings at the ceiling and fixture.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies the materials and installation for wire and box connectors, rated to 1000V.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-C22.2No.18 latest edition, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.

.2 CSA C22.2No.65 latest edition, Wire Connectors.

.2 National Electrical Manufacturers Association (NEMA)

Part 2 Products

2.1 MATERIALS

.1 Pressure type wire connectors to: CSA C22.2No.65, with current carrying parts of copper alloy sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CSA C22.2No.65, with current carrying parts of copper alloy sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:

.1 Connector body and stud clamp for stranded copper conductors.

.2 Clamp for stranded copper conductors.

.3 Stud clamp bolts.

.4 Bolts for copper conductors.

.5 Sized for conductors as indicated.

Part 3 Execution

3.1 NOT USED

.1 Not Used

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies coppe5rated 0-1000 Volts and the most common electrical insulation and covering materials.

.2 This section does not include fire rated building wire to ULC S139 and CSA C83, marine, hazardous, mining, instrumentation, communication and fire alarm wiring.

1.2 REFERENCES

.1 CSA C22.2 No .0.3 latest edition, Test Methods for Electrical Wires and Cables.

.2 CAN/CSA-C22.2 No. 131 latest edition, Type TECK 90 Cable.

1.3 GENERAL REQUIREMENTS

.1 Typically use insulated 98% conductivity copper conductor wiring enclosed in conduit for the general wiring systems unless otherwise indicated.

.2 Teck cable may only be used where specifically indicated on the drawings or in the specifications. Where permitted, Teck wiring up to 750 system volts to be PVC jacketed armoured cable, multi-copper conductor type Teck90 1000 volt having a PVC jacket with FT-4 flame spread rating.

.3 Flexible AC90 armoured cabling (BX) shall not be used for the general wiring system other than final drops to recessed light fixtures in concealed locations.

.4 Provide all control wiring except HVAC controls as specified in Mechanical Divisions.

.5 Refer to Equipment Schedule(s) for detailed responsibilities.

.6 Non-metallic sheathed wiring is not to be used on this project.

Part 2 Products

2.1 WIRE AND CABLE GENERAL

.1 Conductors: stranded for 10 AWG and larger. Minimum size #12 AWG.

.2 Insulation to be 600 volt RW90XLPE (X link) for the general building wiring in conduit.

.3 Use RWU90XLPE for underground installations.

.4 Site services sub-circuits, including site lighting, to be minimum #10 AWG for power and #12 for controls. Increase wiring size for lengthy and/or loaded circuits so that system will not exceed the maximum voltage drop as recommended by the Canadian Electrical Code CSA 22.1 [latest edition].

.5 Main feeders to be conduit and copper insulated wiring unless otherwise noted on drawings. Provide ground wiring for all conduits in or below slabs. Increase conduit size as required.

.6 Armoured AC90 (BX) cable may only be utilized for luminaire to luminaire recessed tee bar luminaire drops from ceiling mounted outlet boxes. Use anti-short connectors.

2.2 TECK CABLE

.1 Cable: to CAN/CSA-C22.2 No. 131 latest edition.

.2 Conductors:

.1 Grounding conductor: copper.

.2 Circuit conductors: copper, size as indicated.

.3 Insulation:

.1 Type: ethylene propylene rubber.

.2 Chemically cross-linked thermosetting polyethylene rated type RW90, 600V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: interlocking galvanized steel or aluminum.

.6 Fastenings:

.1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.

.2 Channel type supports for two or more cables at 1000 mm centers.

.3 Threaded rods: 6 mm dia. to support suspended channels.

.7 Connectors:

.1 Watertight approved for TECK cable.

2.3 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from galvanized steel or aluminum strip.

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Fittings.

.2 In underground ducts in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Fittings.

.3 All wires are to be pulled in together in a common raceway, using liberal amounts of Compound 77 lubricant.

.4 All power circuits connected to isolated ground type receptacles are to have individual separate neutral c/w insulated bonding conductor.

.5 No combining of circuits onto common neutral will be permitted. Use 2 pole or 3 pole breakers for combined circuits, no connector clips will be allowed.

.6 Ensure that all single phase loadings are reasonably closely balanced over the main feeders.

.7 All dimmer circuits are to have individual neutral conductors for each circuit.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies U shape support channels either surface mounted. Suspended or set in poured concrete walls or ceilings.

Part 2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41mm, 2.5mm thick, surface mounted, suspended, or set in poured concrete walls and ceilings.

Part 3 Execution

3.1 INSTALLATION

.1 Secure equipment to surfaces with lead anchors or nylon shields as required.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to suspended ceilings with toggle bolts.

.4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.5 Fasten exposed conduit or cables to building construction or support system using straps.

- .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
- .2 Two-hole steel straps for conduits and cables larger than 50 mm.
- .3 Beam clamps to secure conduit to exposed steel work.

.6 Suspended support systems.

- .1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.
- .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

.7 For surface mounting of two or more conduits use channels at 1.5m on centre spacing.

.8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.10 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.11 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.

.12 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies materials and installation for splitters, junction boxes, pull boxes and cabinets.

1.2 PRODUCT DATA

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data: submit manufacturer's product data sheets indicating dimensions, materials, and finishes, including classifications and certifications.

.3 Shop Drawings: submit shop drawings for custom manufactured items showing materials, finish, dimensions, accessories, layout, and installation details.

Part 2 Products

2.1 SPLITTERS

.1 Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

.2 Main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.

.3 At least three spare terminals on each set of lugs in splitters less than 400 A.

2.2 JUNCTION AND PULL BOXES

.1 Welded steel construction with screw-on flat covers for surface mounting.

.2 Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.

Part 3 Execution

3.1 SPLITTER INSTALLATION

.1 Install splitters and mount plumb, true and square to the building lines.

.2 Extend splitters full length of equipment arrangement except where indicated otherwise.

3.2 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor.

.3 Install terminal blocks as required.

.4 Only main junction and pull boxes are indicated. Install pull boxes so as not to exceed 30 m of conduit run between pull boxes.

3.3 IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results - Electrical.

.2 Install size 2 identification labels indicating system name, voltage and phase, as appropriate to clearly indicate the enclosure use.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies rigid and flexible wiring fasteners, fittings and installation.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES - GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required for special devices.

.3 Gang boxes where wiring devices are grouped. Do not use sectional boxes.

.4 Blank cover plates for boxes without wiring devices.

.5 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 SHEET STEEL OUTLET BOXES

.1 Electro-galvanized steel single and multi-gang device boxes for flush installation, minimum size 76 x 51 x 38 mm or as indicated. For 347 V switches, use 347 V type device boxes.

.2 Larger 102 mm square x 54mm deep outlet boxes to be used for single gang when more than one conduit enters one side, for telecommunication outlets (for slack storage), or for flush mounting devices in finished plaster and/or tile walls. Provide raised device covers as required.

.3 For larger boxes (those requiring more wiring space, MUTOAs, etc.) use pre-ganged 102 mm high x 51 mm deep solid type as required. Allow extra gang for telecommunication outlets.

.4 For larger boxes for special receptacles (multi-phase, high ampacity) use 102 mm square or 119 mm square boxes 54 mm deep with appropriate cover(s).

.5 Boxes for surface mounted switches, receptacles, or telecommunications outlets to be 102 mm square, or 102 mm high utility, boxes, with rounded corners and raised surface covers. Minimum 38 mm (54 for telecom.) deep

.6 Lighting fixture outlets: 102 mm square outlet boxes or octagonal outlet boxes.

.7 Provide extension and plaster rings as required.

2.3 SURFACE CONDUIT BOXES

.1 Cast FS or FD aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacles.

2.4 FITTINGS – GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of foreign materials.

.3 Conduit outlet bodies for conduit up to 35 mm. Use pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

.1 Typical outlet box mounting heights are indicated in Section 26 05 00 or refer to wiring device and communication specification sections and to architectural layouts for particular mounting heights of outlet boxes where indicated.

.2 Support boxes independently of connecting conduits.

.3 Fill open boxes with paper, sponges, foam or similar approved material to prevent entry of construction material. Remove upon completion of work.

.4 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.5 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not to be used.

.6 All outlet boxes to be flush mounted in all areas, excluding mechanical rooms, electrical rooms, and above removable ceilings.

.7 No sectional or handy boxes to be installed.

.8 Coordinate location and mounting heights of outlets above counters, benches, splash-backs and with respect to heating units and plumbing fixtures. Coordinate with architectural details.

.9 Outlets installed back to back in party stud walls to be off-set by one stud space.

.10 Back-boxes for all communications systems equipment to be provided in accordance with specific manufacturer's recommendations and as specified in the communications sections of these specifications.

.11 Separate outlets located immediately alongside one another to be mounted at exactly the same height above finished floor. Similarly, outlets mounted on a wall in the same general location at varying heights to be on the same vertical centre-line unless otherwise noted.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies rigid and flexible conduits, fasteners, fittings and installation.

1.2 REFERENCES

.1 Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware: to CSA C22.2 No. 18.

.2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.

.3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83.

.4 Rigid PVC conduit: to CSA C22.2 No. 211.2.

.5 PVC (DB2) conduit: to CSA #C22.1 211-1.

.6 Flexible PVC conduit: to CAN/CSA-C22.2 No. 227.3.

1.3 BASIC WIRING METHODS

.1 Underground or in concrete exterior to building:

.1 All wiring shall be in Schedule 40 RPVC conduit.

.2 Partition walls and ceilings:

.1 All wiring to be run in EMT conduit for:

.1 Branch circuits.

.2 Low voltage systems.

.3 Distribution feeders and sub-feeders.

.4 Surface wiring in electrical and mechanical rooms.

.3 Motors, transformers and all vibrating equipment:

.1 Short (600mm to 1200mm) PVC jacketed flexible conduit with liquid tight connectors shall be used. Allow sufficient slack to avoid strain on connectors at extreme extension of equipment movement.

.4 Surface raceways - interior:

.1 All surface raceways shall be EMT, except if located without protection in areas susceptible to damage, which shall be rigid steel conduit.

.5 Surface raceways - exterior:

.1 All surface raceways shall be UV compensated Schedule 40 RPVC conduit, protected from damage and excessive heating to the Consultant's satisfaction.

1.4 LOCATION

.1 Electrical drawings are diagrammatic and do not show all conduits, wire, cable, etc. Electrical contractor to provide conduit, wire cable, etc., for a complete operating job to meet in all respects the intent of the drawings and specifications.

.2 Outlet positions shown on architectural drawings (plans and elevations) to take precedence over locations and mounting heights indicated on electrical plans or in specifications.

.3 Locate electrical devices on walls with regard given for convenience of operation and conservation of wall space. Switches, receptacles, fire alarm pull stations, etc. generally to be vertically lined up where items are in the same general location. Adjacent common devices to be installed in common outlet box.

.4 Review the exact location criteria of each electrical outlet and device with the Architect and Consultant prior to rough-in. Relocate any item installed without architectural confirmation as required by the architect or Consultant at no cost to the owner as long as the relocation is within 3m of the location originally shown on the electrical drawings.

.5 Do not install outlets back-to-back in party walls; allow a minimum of one stud space horizontal clearance between boxes. Install behind all outlets in party walls a Lowry Acoustic backing pad.

.6 Locate light switches on latch side of doors. Locate disconnect devices in mechanical rooms on latch side of door.

.7 All outlets located on exterior walls to be complete with moulded plastic vapour barriers to maintain integrity of wall vapour barrier system.

.8 All raceways and wiring shall be installed concealed in building fabric, except for mechanical and electrical rooms where they shall be installed on the surface.

.9 All outlet boxes, junction boxes, and cabinets to hold electrical devices shall be mounted so the equipment can be flush mounted unless indicated otherwise.

.10 All junction boxes and other raceway access devices shall be mounted to avoid being visible from public areas. Obtain approval from Architect or Consultant for any and all junction boxes that, due to the building design, cannot be concealed.

.11 All junction boxes mounted, out of necessity, on surface of solid walls shall be painted to match adjacent surface, with junction boxes painted to match designated systems.

Part 2 Products

2.1 RIGID PVC RACEWAY SYSTEM

.1 Rigid PVC fittings shall be of the same manufacturer as the conduit.

.2 PVC boxes and covers shall be Sceptre “F” Series or equivalent complete with all components and adaptors.

.3 PVC junction boxes exceeding the size of "F" Series shall be Sceptre: "JB" Series boxes and be complete with junction box adaptors.

.4 All fittings with removable covers shall be complete with VC gaskets and brass securing screws and inserts. All metal components shall be brass or stainless steel.

2.2 PVC DUCT RACEWAY

.1 PVC duct fittings shall be of the same manufacturer as duct.

.2 PVC duct shall be colour coded white for communications, grey for power.

2.3 EMT RACEWAY

.1 Electrical Metallic Tubing (EMT) shall be galvanized steel of sufficient quality and thickness to allow smooth field formed bends.

.2 EMT couplings, connectors and fittings shall be steel. Cast type units shall not be used on this installation.

2.4 PVC JACKETTED FLEXIBLE CONDUIT

.1 PVC jacketed flexible conduit (liquid tight) shall be interlocking spiral aluminum conduit with continuous extruded PVC jacket.

.2 Conduit fittings shall be steel liquid tight type that fit over PVC jacket and seal uniformly all round.

2.5 OUTLET BOXES AND JUNCTION BOXES

.1 Except as noted for rigid PVC raceways, all outlet boxes and junction boxes shall be one piece formed or welded.

.2 Outlet boxes to be galvanized steel.

.3 Junction boxes to be galvanized steel or aluminum.

2.6 ACCESS HATCHES

.1 Provide and install access hatches in drywall ceilings to access junction boxes. Coordinate with other trades and check locations with architect before installing.

.2 Access hatches shall have the following specifications:

.1 Door: aluminum frame with gypsum board inlay.
.2 Frame: Recessed aluminum
.3 Finish: to receive the same finish and paint as the surrounding surface.
.4 Hinge: concealed, non-corroding.
.5 Latch: flush screwdriver cam latch.

.3 Access hatches to be of a size to suit but not less than 305mm square.

2.7 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 50 mm and smaller. Two hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1500mm oc.

.4 Threaded rods, 6 mm dia., to support suspended channels.

2.8 CONDUIT FITTINGS

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

.2 Factory "ells" where 90° bends are required for 25 mm and larger conduits.

.3 Watertight connectors and couplings for EMT in all exterior applications. Set-screws are not acceptable.

.4 are not acceptable.

2.9 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection in all directions.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.10 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

.3 Use rigid galvanized steel threaded conduit except [where specified otherwise].

.4 Use epoxy coated conduit underground corrosive areas.

.5 Use electrical metallic tubing (EMT) except in cast concrete and above 2.4 m not subject to mechanical injury.

.6 Use rigid PVC conduit underground, in corrosive areas, and surface mounted in wet areas not subject to damage.

.7 Use flexible metal conduit for connection to motors in dry areas, connection to recessed incandescent fixtures without a prewired outlet box, connection to surface or recessed fluorescent fixtures and work in movable metal partitions.

.8 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.

.9 Use explosion proof flexible connection for connection to explosion proof motors.

.10 Install conduit sealing fittings in hazardous areas. Fill with compound.

.11 Minimum conduit size for lighting and power circuits: 19mm.

.12 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.13 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.14 Install fish cord in empty conduits.

.15 Run 2-25 mm spare conduits up to ceiling space and 2-25 mm spare conduits down to ceiling space from each flush panel. Terminate these conduits in junction boxes in ceiling space or in case of an exposed concrete slab, terminate each conduit in [flush concrete] [surface] type box.

.16 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.

.17 Dry conduits out before installing wire.

.18 Conduits shall be installed mechanically continuous from outlet to outlet and without pockets. All the necessary standard bushings, elbows and bends shall be provided. All conduit bends shall have a radius of not less than six (6) times the internal diameter of the conduit and in no case shall the equivalent of more than four quarter bends from outlet to outlet be made. For all conduit sizes to be used for low voltage raceway, the conduits shall have a minimum bending radius of 230mm.

.19 Conduit bends shall be made with no more than 10% flattening of the conduit. Bends shall be smooth throughout deformations.

.20 On surface wall runs, all conduit shall be installed in true vertical or horizontal direction and on ceilings in true 90 degree angles or parallel to the walls. Crossings of conduits shall also be made at 90 degree angles. Parallel running conduit shall be kept on equal spacing on the entire length of run including bends.

.21 All conduits shall be fastened to structure with steel straps (no cast type straps allowed).

.22 Where more than three conduits are run parallel in ceiling cavity, they shall be installed on cantruss type channel, complete with all manufacturer’s fittings to secure channel to structure and to conduit.

.23 Raceways extending out concrete slabs shall be securely protected using rebar stubs or similar material. All duct stubs are to be kept sealed during construction

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended or surface channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.3 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This Section specifies materials and installation for metal and fiberglass cabletroughs and fittings.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.1 No.126.1, Metal Cable Tray Systems.

1.3 PRODUCT DATA

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data: submit manufacturer's product data sheets for cable tray indicating dimensions, materials, and finishes, including classifications and certifications.

.3 Shop Drawings: submit shop drawings showing materials, finish, dimensions, accessories, layout, and installation details.

.4 Identify types of cable trays used.

Part 2 Products

2.1 CABLE TRAY (INTERIOR PATHWAYS)

.1 All ladder tray to be steel or aluminum, complete with angles, offsets, corners, saddles, tees, etc. as indicated and required to suit the installation. Radii on fittings shall be 300mm minimum.

.2 All steel non-painted tray shall be hot dip galvanized after fabrication to CSA G164-1965 ASTM designation A386.

.3 All tray shall have 45 degree corners at all vertical and horizontal corners, tees and width change locations.

.4 Cable tray to have a minimum cable loading depth of 114mm. Cable tray width to be a minimum of 305mm wide for communications.

.5 Suspended tray supports to be trapeze style hangers of minimum 40mm square “Unistrut” supported from 9.5mm threaded rod hangers from preset or afterset concrete inserts or direct steel support.

.6 Fire Barrier Pillows to be self contained firestop product for use in through-penetration firestops. Product to achieve up to three (3) hours fire rating in accordance with ASTM E 814 tests.

2.2 SUPPORTS

.1 Provide splices and supports for a continuously grounded system as required.

Part 3 Execution

3.1 GENERAL INSTALLATION – POWER & COMMUNICATIONS

.1 Cable trays are usually installed in the false ceiling space of hallways and located to keep conduit lengths to a minimum.

.2 Provide cable tray in approximate location and general routing as shown on drawings.

.3 Provide dropouts when cables exiting all horizontal cable trays.

.4 Support suspended cable tray from trapeze style hangers with hangers spaced as recommended by the manufacturer based on a maximum load capacity for the tray. Support trays at all corners, offsets and tee fittings

.5 Where shown and appropriate, support cable tray from wall using a cantilever support arrangement. Cable trays may be supported using wall mounted support on masonry walls or from the building steel only.

.6 Generally cable trays shall be separated at a minimum 450mm from the adjacent wall unless otherwise indicated.

.7 Cable tray location and mounting heights to be coordinated on site with other trades to provide minimum headroom and serviceability. Verify drawing details to allow for all services run in ceiling spaces. Provide vertical and horizontal offsets as required to suit job site conditions.

.8 Cable tray sections shall be joined by approved connector plates and rust-resistant (plated) hardware. Torque all hardware as per manufacturer's recommendations.

.9 Unless otherwise indicated, bond all cable tray with a minimum #6 AWG copper bonding conductor installed continuously within the full length of all cable trays. Securely connect the bond wire to the tray at each end and at a minimum of 15m intervals. Connect bonding conductor to the building ground system at one or both ends.

.10 Provide pulleys and rollers to install cables.

.11 Install ventilated type tray in corridors and as vertical risers. Where cable trays pass through solid walls and floors, trays shall be solid type with cover and shall extend a minimum of 450 mm on each side of the wall or floor.

.12 Where cable tray passes through fire separations install fire pillows as required to maintain proper fire rating.

.13 Cable tray may require installation of risers, bend, etc. to adjust tray up or down as well as sideways for the tray routing to fit within limits of space available, and to clear other services, ducts, pipes etc. along the route. Routing may be adjusted somewhat as necessary to enable installation of services under other trades. These field adjustments are to be done at no extra cost to the Owner.

.14 Where tray runs change elevation, trays shall overlay each other when manufactured waterfall assemblies can not be used. To prevent cables stress install drop-outs on the top tray when overlap method is to be used. Further, tray sections shall be coupled together to provide some rigidity. This coupling maybe made by using a short length of tray and adjustable elbows or may be coupled by means of common support rods at the tray overlap.

.15 Sharp metal edges in cable trays which could cut the cable shall be smoothed and the cable dressed away from these edges. Manufacturer surface imperfections shall be touched up with a cold galvanizing coating before installing cable.

.16 There shall be no wiring joints or splices within the cable tray.

3.2 INSTALLATION - COMMUNICATIONS

.1 Use ventilated cable tray for Voice/Data service cable down drops in the Communication Rooms.

.2 Cables shall be secured in place in tray with tie wraps where in horizontal runs and with cable clamps in vertical runs. Low tension cabling shall be secured to tray by use of Velcro style straps. Support cables routed vertically through a service riser with a basket type wire grip equal to Hubbell Kellems grip for power cables and data cables including fiber optic cables.

.3 The “communications” cable tray system is for extra-low voltage cabling only. There shall be no cables within the tray that has a voltage exceeding 36V.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies the installation of direct buried cables and cables in ducts including protection, markers and testing.

1.2 REFERENCES

.1 Canadian Standards Association, (CSA International)

.2 Insulated Cable Engineers Association, Inc. (ICEA)

Part 2 Products

2.1 MARKERS

.1 Concrete type cable markers: 600 x 600 x 100 mm with words: cable, joint or conduit impressed in top surface, with arrows to indicate change in direction of duct runs.

Part 3 Execution

3.1 CABLE INSTALLATION IN DUCTS

.1 Install cables as indicated in ducts.

.1 Do not pull spliced cables inside ducts.

.2 Install multiple cables in duct simultaneously.

.3 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.4 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.

.5 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.6 After installation of cables, seal duct ends with duct sealing compound.

3.2 FIELD QUALITY CONTROL

.1 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

.2 Acceptance Tests

.1 Ensure that terminations and accessory equipment are disconnected.

.2 Ground shields, ground wires, metallic armour and conductors not under test.

.3 Leakage Current Testing.

.1 Raise voltage in steps from zero to maximum values as specified by manufacturer for type of cable being tested.

.2 Hold maximum voltage for specified time period by manufacturer.

.3 Record leakage current at each step.

.3 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.

.4 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials, components, cabinets, instruments and installation for metering .

1.2 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI C39.1- latest edition, Requirements, Electrical Analog Indicating Instruments.

.2 Canadian Standards Association, (CSA International)

.1 CAN3-C17- latest edition, Alternating - Current Electricity Metering.

1.3 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.

Part 2 Products

2.1 DIGITAL POWER METER

.1 Current/Voltage Inputs

.1 Have no less than 4 voltage inputs and 4 current inputs

.2 Shall be able to accept 208VAC LL without using potential transformers.

.3 Shall support nominal current ratings of 1A, 2A, 5A, 10A, and/or 20A and an overcurrent rating of 200A for 1s (1A nominal mode).

.2 Power Supply

.1 95 to 240VAC (±10%) @ 47 to 440Hz / 120 to 310 VDC

.3 Measured Values

.1 Digital Meter shall provide at minimum the following voltage values:

.1 Voltage L–L Per-Phase

.2 Voltage L-L 3-Phase Avg

.3 Voltage 3-Phase Avg

.4 Voltage % unbalanced

.2 Digital Meter shall provide at minimum the following current values:

.1 Current Per-Phase

.2 Current, Neutral (measured)

.3 Current 3-Phase Avg

.4 Current % Unbalanced

.3 Digital Meter shall provide at minimum the following power values:

.1 Real Power (Per-Phase, 3-Phase Total)

.2 Reactive Power (Per-Phase, 3-Phase Total)

.3 Apparent Power (Per-Phase, 3-Phase Total)

.4 Power Factor – True (Per-Phase, 3-Phase Total)

.5 Power Factor – Displacement (Per-Phase, 3-Phase Total)

.4 Digital Meter shall provide at minimum the following energy values:

.1 Accumulated Energy (Real kWh, Reactive kVARh, Apparent kVAh) (Signed/Absolute)

.2 Incremental Energy (Real kWh, Reactive kVARh, Apparent kVAh) (Signed/Absolute)

.3 Conditional Energy (Real kWh, Reactive kVARh, Apparent kVAh) (Signed/Absolute)

.4 Reactive Energy by Quadrant

.5 Digital Meter shall be capable of deriving values for any combination of measured or calculated parameter.

.4 Demand

.1 Digital Meter shall be able to provide min/max demand, present demand interval, running average demand, and predicted demand on multiple demand channels.

.2 Digital Meter shall be able to perform multiple accepted demand calculation methods including block, rolling block, and thermal demand with user-programmable demand period lengths.

.5 Accuracy

.1 Digital Meter shall meet ANSI C12.20 accuracy class 0.2.

.2 Digital Meter shall provide 4-quadrant metering

.6 Sampling

.1 Digital Meter shall be able to perform high speed sag/swell detection of voltage disturbances on a cycle-by-cycle basis, providing the duration of the disturbance, the minimum, maximum, and average value of the voltage for each phase during the disturbance. Disturbances less than one cycle in duration can be detected.

.7 Logging

.1 Digital Meter will store all critical internal and revenue data upon sudden power loss and shall have non-volatile memory.

.2 Digital Meter shall have a time-stamped event log with the following features:

.1 The number of records in the log is programmable.

.2 Each event is recorded with the date and time of the event, the cause and effect of the event, and the priority of the event.

.3 All events relating to setpoint activity, relay operation and self-diagnostics is recorded in the event log.

.4 Time stamps have a resolution of 1 millisecond.

.5 Time stamps can be synchronized to within 100 ms between devices on the same serial communications medium.

.6 Minimum event recording response time is ½ cycle (8.3ms 60Hz, 10ms 50Hz) for high speed events and 1 second for other events.

.7 The priority of setpoint events is programmable.

.3 Digital Meter shall be able to log any parameter in the meter including min/max and waveforms.

.8 Alarming

.1 Digital Meter have setpoint driven alarming capability

.2 Digital Meter shall be able to generate an email on an alarm condition.

.3 Digital Meter shall have millisecond timestamp resolution on alarm entries.

.4 Digital Meter shall support consecutive high-speed alarm conditions which trigger on a cycle-by-cycle basis with no "dead" time between events (i.e. no need for a rearming delay time between events).

.5 Digital Meter shall be able to operate relays on alarm conditions.

.6 Digital Meter shall be able to initiate datalog captures on alarm conditions.

.7 Digital Meter shall be able to control digital output relays in an AND or an OR configuration, using pulse mode or latch mode operation, for control and alarm purposes.

.8 Digital Meter shall be able to combine any logical combination of any number of available setpoint conditions to control any internal or external function or event.

.9 Communications

.1 The Digital Meter shall be capable to communicate with central comms.

.10 Display

.1 Digital Meter shall have an integral display

.1 The integral display shall be a backlit LCD display

.2 The display shall be suitable for NEMA 12 enclosures.

.2 Digital Meter shall support direct display of all parameters on the front panel.

.3 The Digital Meter shall have provisions for creating periodic or non-periodic schedules for up to two (2) years. These schedules may be used to perform the following functions:

.1 Time of Use (TOU)

.2 Demand Control

.3 Load Scheduling

.4 Logging

.5 Periodic Resetting

2.2 CURRENT TRANSFORMERS

.1 Current transformers shall be C200 class, metering accuracy sized as noted on drawings.

.2 Transformers shall be solid core for new panelboards.

.3 Set screw type terminals shall be used throughout with closed loop type, crimp on wire terminals.

2.3 METERING INSTRUMENT TRANSFORMER CABINET

.1 Sheet steel CSA enclosure EEMAC-1 unless otherwise indicated to accommodate metering equipment as required.

2.4 TEST TERMINAL BLOCKS

.1 Test terminal blocks: as required.

2.5 SHOP INSTALLATION

.1 Install meters and instrument transformers in separate compartment of switchboard or enclosure.

.2 Install instruments on switchboard or enclosure.

.3 Ensure adequate spacing between current transformers installed on each phase.

.4 Verify correctness of connections, polarities of meters, instruments, potential and current transformers, transducers, signal sources, electrical supplies.

Part 3 Execution

3.1 METERING INSTALLATION

.1 Install Digital Meter control cabinet as noted in drawings. All installations shall be fully integrated to main assemblies at the factory and shall be completely tested for operation prior to shipping to site.

.2 Use of Digital Meter with remote display units is applicable as required to facilitate compliant installation of meters using 600V voltage inputs. The use of potential transformers to permit mounting of metering on swinging doors is not acceptable when remote display is available.

.3 Connect Digital Meter to communication as noted in drawings, typically copper Ethernet. Patch cables shall be STP (shielded twisted pair), CAT 6 with positively engaging locking tabs.

.4 All potential inputs to Digital Meter shall be fitted with protection fuses. Fuses shall be mounted in flip-open style fuse holder that will also provide isolation means for Digital Meter.

.5 Provide power supply fusing protection. Fuses shall be mounted in flip-open style fuse holder that will also provide isolation means for Digital Meter. Fuse holders shall be rated for disconnecting meter power supply under load.

3.2 FIELD QUALITY CONTROL

.1 Conduct tests in accordance with Section 26 05 00 - Common Work Results - Electrical and in accordance with manufacturer's recommendations.

.2 Perform simulated operation tests with metering, instruments disconnected from permanent signal and other electrical sources.

.3 Verify correctness of connections, polarities of meters, instruments, potential and current transformers, transducers, signal sources and electrical supplies.

.4 Perform tests to obtain correct calibration.

.5 Do not dismantle meters and instruments.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This Section specifies the materials and components for dry type transformers up to 600 V primary, equipment identification and transformer installation.

1.2 REFERENCES

.1 Use transformers of one manufacturer throughout the project.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No.47, Air Cooled Transformers (Dry Type).

.2 CSA C9, Dry Type Transformers.

1.3 PRODUCT DATA

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittal procedures.

Part 2 Products

2.1 STANDARD TRANSFORMERS (TYPE I)

.1 Type: ANN, 600 volts, 3 phase delta primary.

.2 Primary taps: 2x 2 1/2% full capacity taps above and 2x 2 1/2% taps below the nominal voltage.

.3 Secondary: 3 phase, 60 Hz 120V/208V 4 wire Y (see drawings for kVA rating). Electrostatic shielded grounded star secondary.

.4 Class H, 220°C insulation with temperature rise not exceeding 150°C maximum in 40°C ambient.

.5 Efficiency: **Energy Star** rating

.6 Basic Impulse Level (BIL): standard.

.7 Hipot: standard.

.8 Windings: High grade copper windings, double dipped, vacuum impregnated high temperature non hygroscopic silicon varnish.

.9 Impedance: Sizes 225 kVA and below to be between 5% and 6%.

.10 Average Sound Level: Noise emission shall not exceed 50 dB at full-load

.11 Impedance at 17 degrees C: standard.

.12 Enclosure: air ventilated EEMAC 1, removable metal front panel. Provide air cooled type, natural circulation in ventilated enclosure.

.13 Mounting: provide external vibration isolator kit. Provide "Super W Pads" Neoprene.

.14 Finish: in accordance with Section 26 05 00 – Common Work Results - Electrical.

.15 Scott-T connected transformers not acceptable.

.16 Minimum efficiency of 98%.

.17 Harmonic mitigation type transformers shall include the following in addition to the above:

.1 3rd harmonic and other zero sequence currents shall be treated in the secondary windings of the transformer through flux cancellation, and shall not be coupled into the primary winding. Trapping these currents in the primary delta winding, as is the case for the delta-wye transformer configuration, is not acceptable.

.2 5th and 7th harmonics are treated by introducing the appropriate primary-to-secondary phase-shift in the transformer such that these currents subtract at the common bus with 5th & 7th harmonic currents produced by other similar harmonic current sources fed from the same bus.

.3 Fundamental current imbalance shall be reduced on the primary side of the transformer compared to the secondary side.

.4 Load Compatibility: K-20 load current handling capability, crest factor up to 5; up to its nameplate kVA rating without derating.

.5 Electrostatic Shielding: Each winding is independently single shielded with a full-width copper electrostatic shield.

.6 Harmonic Cancellation Performance Guarantee: Shall be provided by the manufacturer.

Part 3 Execution

3.1 MOUNTING

.1 Mount dry type transformers on floor unless otherwise noted on drawings.

.2 Provide 100 mm concrete house-keeping base pad unless otherwise detailed.

.3 Ensure adequate clearance around transformer for ventilation.

.4 Install transformers in level upright position.

.5 Remove shipping supports only after transformer is installed and just before putting into service.

.6 Loosen isolation pad bolts until no compression is visible.

.7 Provide wonderboard or approved alternate is installed closer than 300mm from any combustible surface.

3.2 CONNECTIONS

.1 Make primary and secondary connections in accordance with the manufactures diagrams.

.2 Check all factory connections for correct tightness before energization.

.3 Torque the building system wiring transformer connections using a torque wrench set to the manufacturers recommended settings. Note the torque setting on the equipment identification label for future maintenance reference.

.4 All external wiring connections to transformer casing shall be enclosed in flexible conduit. Typically minimum 900mm flex to minimize vibration transmission to building structure.

.5 Conduit to only enter transformers within the bottom third of the transformer casing. (to minimize heat transfer to conduit).

.6 Energize transformers immediately after installation is completed, where practicable.

3.3 EQUIPMENT IDENTIFICATION

.1 Size 7 label in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Include the transformer identification (as indicted on the project drawings), primary power source equipment designation, equipment served and torque setting of connections. E.g. Transformer T1, served from CDPH-1, serving CDPL-1, Cable Connection Torque x Nm.

3.4 GROUNDING

.1 Provide a ground conductor with all feeder runs to dry type transformer installations. The ground shall be either green insulated or identified and connected as a ground to the ground pad in the transformer enclosure and then to the secondary neutral of the transformer. From the transformer ground pad make cable connection to non-current carrying ground of the distribution centre or panel supplied from transformer.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This Section specifies standard and custom panelboards and their installation.

1.2 SCOPE OF WORK

.1 Provide and install panelboards as indicated on the drawings, single line diagram, panel schedules and these specifications.

.2 Types of panelboards in this section include the following:

.1 CDP type Power distribution panelboards.

.2 Lighting and power panelboards

1.3 PRODUCT INFORMATION

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

.2 Shop drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

.3 Shop drawings to include matching tub and trim details for factory installed low voltage relay cabinets where specified.

1.4 PLANT ASSEMBLY

.1 Install circuit breakers in panelboards before shipment from plant.

.2 In addition to CSA requirements, manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

.3 All panelboards to be of a common manufacturer.

1.5 FINISH

.1 Apply finishes in accordance with Section 26 05 00 – Common Work Results - Electrical.

.2 Panel finish in electrical and equipment rooms and closets to be standard ASA Grey baked enamel. Confirm with Consultant prior to shop finishing panels.

Part 2 Products

2.1 PANELBOARDS, DOORS AND TRIMS

.1 Panelboards: to CSA C22.2 No. 29 and product of one manufacturer.

.2 Bus and breakers unless otherwise indicated on the drawings and in the specifications, shall be rated for:

.1 Minimum 10 kA at 208Y/120V.

.2 Minimum 22 kA at 600Y/347V.

.3 Copper bus with full size neutral.

.4 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number.

.5 Mains capacity, number of circuits and number and size of branch circuit breakers as indicated.

.6 Provide all necessary connectors and mounting hardware in every space to facilitate installation of future breakers. Provide blank fillers for all spaces.

.7 Concealed hinges and concealed trim mounting screws, hinged locking door with flush catch.

.8 Panelboards to have flush doors. (Gasketted where required for damp locations).

.9 Provide two keys for each panelboard and key similar voltage and system panelboards alike.

.10 Panel tubs to be typically 600mm wide.

.11 Provide door within door trims where indicated to facilitate ease of service maintenance Each tub trim cover to be hinged and self supporting and to swing out to expose breaker cable terminations and wireways. Hinged trim shall be secured with cover screws on opening side by concealed machine screws. Hinged breaker cover shall be recessed into the hinged overall tub cover. Breaker cover shall have latch type closures. Submit details on shop drawings prior to manufacturing.

.12 Panels to have integral Surge Protection Device (SPD) where indicated. See drawings for quantities and locations.

.13 Provide 200% rated neutrals for panelboards with 5 conductor feeders, where indicated on single line diagram.

2.2 BREAKERS

.1 All breakers to be:

.1 For Panelboards: Bolt on type molded case, non-adjustable and non-interchangeable trip, single, two and three pole, 120/208V or 347/600V and with trip free position separate from "On" or "Off" positions.

.2 Two and three pole breakers to have common simultaneous trip and able to be located in any circuit position within the panelboard.

.3 Main breaker (where required) to be separately mounted at top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

.4 Provide circuit breakers with indicated trip ratings as shown in the panelboard schedules or the Single Line Diagram.

.5 Provide spare circuit breakers as indicated on panel schedules or single line diagram as applicable. Provide minimum 10% spare breakers.

.6 Provide breaker type Ground Fault Interrupter(s) (GFI) as indicated.

.7 Provide Lock-on devices for Exit sign circuits and Emergency Battery Equipment circuits.

2.3 PANELBOARD IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results - Electrical.

.2 Nameplate for each panelboard size 5 (2 line) engraved as indicated and include panel designation and voltage/phase.

.3 Complete updated circuit directory with typewritten card(s) located in slide-in plastic pocket(s) fixed to the back of the related door. Directory card to indicate the panel designation, mains size, voltage/phase and the location and load controlled of each circuit. Include a “letter sized” paper copy of each directory in the project maintenance manual.

.4 Provide a plasticized typewritten information card fixed to the back of the each panel door. Information card to indicate the panel designation and location, feeder type and size and locations of any controlling contactors and feeder pullboxes. Include a "letter sized" paper copy of each information card in the project maintenance manual.

Part 3 Execution

3.1 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb true and square, to adjoining surfaces.

.2 Panelboards located in service rooms, mechanical rooms, and electrical rooms to be mounted on unistrut supports.

.3 Mount panelboards to height given in Section 26 05 00 or as indicated.

.4 Connect loads to circuits as indicated.

.5 Connect neutral conductors to common neutral bus with respective neutral identified.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies materials and installation for fused and non-fused disconnect switches.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).

.1 CAN/CSA C22.2 No.4-[M89 (R2000)], Enclosed Switches.

.2 CSA C22.2 No.39-[M89 (R2003)], Fuseholder Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

1.4 HEALTH AND SAFETY

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan.

.5 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 DISCONNECT SWITCHES

.1 Fusible, horsepower rated, disconnect switch in CSA Enclosure to CAN/CSA C22.2 No.4 size as indicated.

.2 Provision for padlocking in on-off switch position by three locks.

.3 Mechanically interlocked door to prevent opening when handle in ON position.

.4 Quick-make, quick-break action.

.5 ON-OFF switch position indication on switch enclosure cover.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

Part 3 Execution

3.1 INSTALLATION

.1 Install disconnect switches complete with fuses if applicable.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies materials and installation for manual load transfer equipment which can monitor voltage on all phases of normal power supply, initiate cranking of standby generator unit, transfer loads and shut down standby unit when normal power is re-established.

.2 The Contractor shall furnish and install the low voltage automatic transfer switch having the ratings, features/accessories and enclosures as specified herein and as shown on the contract drawings.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 CSA C282 – Emergency Electrical Power Supply for Buildings.
- .2 CSA C22.2 No.178- latest edition, Manual Transfer Switches.
- .3 CSA C22.2 No. 5.1 Moulded Case Circuit Breakers.

1.3 SCOPE OF WORK

.1 Provide two 30A-2P interlocking breakers (10kA). One for normal power and one for portable standby generator.

Part 2 Products

2.1 NOT USED

.1 Not Used

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

.1 ANSI/IEEE 837 latest edition, Standard for Qualifying Permanent Connections Used in Substation Grounding.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA-B72 latest edition, Installation Code for Lightning Protection Systems.

.2 CSA 22.1 latest edition, Canadian Electrical Code

1.3 DESCRIPTION OF SYSTEM

.1 System to consist of metallic air terminals, lightning conductors connecting air terminals to ground and interconnected ground electrodes, and/or ground cables.

.2 Sky wire cone, where sky line elevated at height to protected structure beneath, but having no direct connection to sky line which is connected to system of ground electrodes.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate materials and methods of attachment of conductors to [air terminals] [sky wire] and electrodes.

1.5 REGULATORY REQUIREMENTS

.1 System subject to: approval by authority having jurisdiction.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Department Representative.

.5 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 MATERIALS

.1 Air terminals: copper tubing.

.2 2/0 gauge, copper stranded conductor.

.3 Fastenings and attachment straps: copper.

.4 Electrodes: copper coated steel.

.5 Use aluminum conductors, terminals, connectors and fastenings for aluminum sheathed buildings, change to copper conductors below 6 feet above floor level. Copper conductors, terminals, connectors and fastenings for tower sheathed in other than aluminum.

.6 Connections: copper connections formed by thermit process permanent mechanical connectors or inspectable wrought copper compression connectors to ANSI/IEEE 837.

Part 3 Execution

3.1 INSTALLATION

.1 Install lightning protection to CAN/CSA-B72 latest edition.

.2 Bond discharge conductors to service mast or other non-current-carrying electrical parts.

.3 Submit certificate of installation to Department Representative.

3.2 INSPECTION

.1 Obtain inspection certificate from Department Representative for discharge conductor passing through any fire supporting membrane.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies materials and installation for emergency lighting systems.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.141-M1985 (R1999), latest addition Unit Equipment for Emergency Lighting.

1.3 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Data to indicate system components, mounting method, source of power and special attachments.

Part 2 Products

2.1 EQUIPMENT

.1 Emergency lighting equipment: to CSA C22.2 No.141.

.2 Supply voltage: 120, 347 V, ac.

.3 Output voltage: 24 V dc.

.4 Operating time: **[30] [60] [120]** min.

.5 Battery: sealed, maintenance free.

.6 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01V for plus or minus 10% input variations.

.7 Solid state transfer circuit.

.8 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

.9 Signal lights: solid state, for 'AC Power ON' and 'High Charge'.

.10 Lamp heads: integral on unit, 345 degrees horizontal and 180 degrees vertical adjustment. Lamp type: LED, 4W.

.11 Cabinet: suitable for direct or shelf mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.

.12 Finish: white.

.13 Auxiliary equipment:

.1 Ammeter.
.2 Voltmeter.
.3 Test switch.
.4 Time delay relay.
.5 Battery disconnect device.
.6 AC input and DC output terminal blocks inside cabinet.
.7 Bracket.
.8 Hardwire connection for AC.
.9 RFI suppressors.

2.2 WIRING OF REMOTE HEADS

.1 Conduit: in accordance with Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.

.2 Conductors: in accordance with Section 26 05 21 – Wires and Cables 0-1000 V, sized as indicated [in accordance with manufacturer's recommendations].

Part 3 Execution

3.1 INSTALLATION

.1 Install unit equipment.

.2 Direct heads.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies materials and installation for exit signs complete with directional arrows.

1.2 TYPE OF EXIT SIGN

.1 Install specification grade LED type exit signs in general public areas where indicated on drawings.

1.3 PRODUCT DATA

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data: submit manufacturer's product data sheets indicating dimensions, materials, and finishes, including classifications and certifications.

Part 2 Products

2.1 EXIT SIGN – PICTORIAL GREEN RUNNING MAN

.1 Thin line, LED type with white finish thermoplastic housing and battery back-up.

.2 All exit signs shall comply with CAN/CSA C860.

.3 Exit signs shall be complete with 10 year warranty.

.4 Check drawings for combination exit and 2 x LED lights.

2.2 MOUNTING TYPE

.1 Exit signs to be suitable for universal mounting. Allow for exit signs to be mounted as to best suit ceiling/wall type and architectural features:

- .1 Surface wall mounted
- .2 End wall mounted double face
- .3 Ceiling mounted single face
- .4 Ceiling mounted double face

.2 Exit signs to have direction arrows where indicated.

.3 Provide steel rod pendant supports for exit signs to mount to +3.5m A.F.F. in high ceiling areas as required.

Part 3 Execution

3.1 INSTALLATION

.1 Install exit signs as shown on plans complete with double face units where indicated.

.2 Connect to life safety emergency power circuit as indicated on the plans.

.3 Exit signs must be clear of all visual obstruction.

.4 Contractor to confirm locations before final installation.

3.2 LOCATION

.1 Review locations of exit signs with engineer and architect to ensure effectiveness and compatibility with decor before rough in. Failure to do so may result in relocation at no extra charge to the project.

3.3 MOUNTING HEIGHT

.1 Wall mounted signs shall be clear above doors and, if space allows, 2.4 metres to centre, but with 25mm clearance of ceiling.

.2 Ceiling mounted signs shall be mounted directly on ceiling, unless it is obstructed from view. Stem mount using two fixture rods (9.5mm white smooth type).

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

.1 Supply and installation of new horizontal Voice/Data/Auxiliary Cat. 6 UTP cable, connectors and cover plates, racks and patch panels, etc.

1.2 STANDARDS AND CODES

.1 ANSI-J-STD-607-A

.2 TIA/EIA -606-A

.3 TIA/EIA-569-A

.4 TIA/EIA -568-B.1 & all addenda

.5 TIA/EIA -568-B.2 & all addenda

.6 TIA/EIA -568-B.3

.7 NBCC - 1995

1.3 CONTRACTOR QUALIFICATIONS

.1 The cabling contractor must be a certified system vendor of the manufacturer's components and/or cable being bid. The technicians working on the projects must be fully trained and qualified, by the manufacturer, for the installation and testing of all cabling and components being used.

.2 Upon request from the Departmental Representative, the Contractor shall provide certified documentation of the qualifications described above. Failure to meet or provide such documentation will be the basis for disqualification of the cabling Contractor.

.3 All staff performing any type of work contained in this specification must be certified in the installation, termination and testing of all aspects of UTP cable systems by the manufacturer.

Part 2 PRODUCTS

2.1 FIBRE CABLE

.1 2 Pairs of multimode, duplex, 50 micron fiber cable with SC Type connectors.

2.2 HORIZONTAL CABLING

.1 Four pair, Cat 6, unshielded, twisted, 22 AWG to 24 AWG, 100 ohm, solid copper, FT4 rated. Keystone format.

.2 Transmission requirements shall meet or exceed all requirements of TIA/EIA-568-B.2 for Category 6 cabling and components.

.3 Pinned in compliance with T568A standard.

2.3 CONNECTORS/COUPLERS/ ADAPTERS

.1 Category 6 UTP cable connectors:

.1 8P/8W modular female connectors at both ends of horizontal cabling.
.2 8P/8W modular male connectors at both ends of patch cords.
.3 IDC connectors for installation in consolidation points.
.4 All connectors shall meet or exceed all requirements of TIA/EIA-568-B.1 & B.2
.5 Non-keyed, 4-pair, 8P/8W modular jacks, T568A wiring.
.6 Use snap-in type connectors at both ends of cables.
.7 Blue for data, pink for voice, white for auxiliary.
.8 Keystone format.

2.4 PATCH CORDS

.1 Modular patch cords:

.1 Stranded conductors Cat 6 patch cords, 4 pair, 24 AWG, 8P/8W, T568A wired.
.2 Determine Required lengths and quantities:

.2 Label each patch cord with sequential number and the cable length. e.g. 30-3 is patch cable 30 which is 2m long.

.3 Provide patch cords for all horizontal cables.

2.5 Patch Panel

.1 Modular patch panel.

.2 24-port, high density, individual cut-outs for snap in type female 8P/8W.

.3 Must not take up more than 1 unit of rack.

.4 Keystone format.

2.6 FACEPLATES

.1 Flush faceplates for wall mounted outlets

.1 For use on all flush mounted Voice/2 x Data/Aux
.2 Supply 4-port face plate. Install blanks on all unused
.3 Single gang, flush mounted - white.

2.7 HORIZONTAL CABLING

.1 Supply and install 4 drops to each outlet (1V, 2D, 1A).

.2 Cables to be used are unshielded, twisted, 4-pair, solid copper core, Category 6, 100 ohm, 22 AWG to 24 AWG, FT4 rated.

.3 Each cable is to be hardwired directly to the IDC connector, T568A wired modular jack at both ends.

.4 Leave 1m of cable slack in the communications cabinet end and 300mm at the outlet end.

.5 To maintain the cable geometry, the cable sheath shall be removed only as much as necessary to terminate the cable pairs on the connecting hardware, regardless of the termination hardware type, i.e. 8P/8W jack or IDC. IDC mounting hardware has to be suitable to allow for proper bend radius of fully jacketed cables every 600mm.

.6 Horizontal fields should be color coded as per TIA/EIA-606-A.

2.8 GROUNDING

.1 Install a ground lug in communications panel.

.2 Install #6 insulated copper ground wire.

.3 Provide labeling as per TIA/EIA-606-A.

.4 Bond communications panel with #6 insulated ground wire.

.5 Provide labeling as per TIA/EIA-606-A.

2.9 WALL MOUNTABLE EQUIPMENT RACKS

.1 The wall mountable equipment racks shall meet the following specifications:

.1 Be of fully welded steel construction;
.2 Unless otherwise specified, be made of 12 gauge steel;
.3 Be equipped with wall mounting plate;
.4 Provide 77 inch (44U) of usable rack mounting space;
.5 Provide aluminum of 19 inch of usable rack width;
.6 Be tapped with mounting holes (10-32) and in accordance with EIA-310C mounting hole spacing standard.
.7 Be equipped with ground lugs.

Part 3 EXECUTION

3.1 TESTING CAT 6 CABLE

.1 The cabling Contractor must perform a permanent link to verify and ensure full functional capabilities.

.2 Testing of each cable must be performed on a pair-to-pair basis.

.3 Testing must be performed on all cables terminated at work-stations and in the consolidation points.

.4 All testing must be implemented in both directions.

.5 Tests are to be done using a Level II-E tester in accordance with TIA/EIA-568-B.1 and contain the following data:

.1 Wire map
.2 Insertion loss.
.3 Length.
.4 Near-end crosstalk (NEXT) loss.
.5 Power sum near-end crosstalk (PSNEXT) loss.
.6 Equal-level far-end crosstalk (ELFEXT).
.7 Powersum equal-level far-end crosstalk (PSELFEXT).
.8 Return loss.
.9 Propagation delay.
.10 Delay skew.

.6 Marginal or conditional pass will not be acceptable.

3.2 LABELS

.1 Labels:

.1 Boldface laser quality printed labels on patch panels and faceplates (black print on white background). Font shall be as large as possible.
.2 There shall be no handwritten labels of any kind.

.2 Horizontal UTP cable labeling:

.1 Label format for the components is to follow the format below:
.2 Example
.3 VI indicates Port 1 on the voice patch panel

.3 Both ends of each cable shall be labelled with the same designation and patch panel port ID to which it is connected. Labels should be placed 150 to 300 mm from each jack or connector.

.4 Label each installed 8P/8W, T568A jack with ID and the patch panel port ID to which it is connected.

.5 All IDC field labeling and patch panel labeling shall have background colours as per TIA/EIA-606-A.

.1 Inter-building cable labeling:
.2 Label as per TIA/EIA-606-A standards.

3.3 DOCUMENTATION

.1 One copy of the floor plan, typically referred to as "as-built drawings" and detailing the items below, is to be provided upon completion.

.1 Produce the drawing using AutoCAD 2000. Provide 2 hard copies and an AutoCAD disk of as-built drawings.

.2 Required details: location and label of each installed 8P/8W, T568A jack.

.2 Provide hard and soft copies of all test results.

.3 Provide a Category 6 certificate document issued by the cable/component manufacturer, guaranteeing transmission capabilities of the cabling system to support 1000 Mbps devices for a period of 15 years.

.4 Installation technicians must be certified through the manufacturer's certification program. Technicians must provide evidence of their training certification. Contractor must supply documentation verifying their current participation in the manufacturer's certification program.

.5 Manufacturer's certification:

.1 The manufacturer's certification must guarantee that design or installation on the part of the certified Contractor will not negate or void any portion of the certified system.

.2 Manufacturer must guarantee that:

.1 All material and labour is covered in this circumstance for the full certification period, and

.2 In the event that the Contractor is no longer in business, the full certification remains valid.

.6 The installed structured cabling system must be covered by a warranty which includes, as a minimum:

.1 15 year coverage.

.2 Warranty against defects in material and workmanship from the date of installation.

.3 Repair or replacement of a failed component, covering parts and labour, at no charge.

.4 Single point of contact for all warranty service.

.7 Upon request and at no additional cost to PWGSC, provide a manufacturer's technical representative to conduct an on-site visit to ensure complete technical compliance.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies empty telecommunications raceway systems with either overhead, cabletrough or cellular distribution system.

1.2 SYSTEM DESCRIPTION

.1 Empty telecommunications raceways system consists of outlet boxes, cover plates, grounding, cabinets, conduits, cabletroughs, pull boxes, sleeves and caps, fish wires, service poles, service fittings, concrete encased ducts.

Part 2 Products

2.1 MATERIAL

.1 Conduits: in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.2 Underground cable ducts: in accordance with Section 33 65 76 - Direct Buried Underground Cable Ducts.

.3 Cabletroughs: in accordance with Section 26 05 36 - Cable Trays for Electrical Systems.

.4 Junction boxes and cabinets: in accordance with Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets.

.5 Outlet boxes, conduit boxes, and fittings: in accordance with Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets.

.6 Fish wire: polypropylene type.

Part 3 Execution

3.1 INSTALLATION

.1 Install empty raceway system, including distribution system, fish wire, terminal cabinets, outlet boxes, floor boxes, pull boxes, cover plates, conduit, sleeves and caps, cabletroughs, service poles, miscellaneous and positioning material to constitute complete system.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies the materials and installation of combination door, motion and smoke system.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 Canadian Electrical Code, C22.1 (latest edition).

1.3 SYSTEM DESCRIPTION

.1 System to consist of alarm control panel, motion detectors, smoke detectors, key pads, contacts, exterior horn and door controller located at door to be supervised.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

1.5 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for building entrance control system for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

.2 Include description of system operation.

.3 Include parts list, using component identification numbers standard to electronics industry.

1.6 INSTALLER QUALIFICATIONS

.1 The installation and commissioning of security systems shall be by qualified alarm service technicians. Only qualified companies with extensive experience, reliable references, and substantial service backup will be allowed to provide the work of this section.

.2 Installation of door strikes shall be by qualified, licensed locksmiths.

Part 2 Products

2.1 CONTROL PANEL

.1 Control panel: surface mounted with 15 supervised zone capacity, modular design. "Power on" light, "reset" key switch, "acknowledge button", common "trouble light, buzzer and silencing switch". Separate alarm lamp, trouble lamp and deactivating key switch for each zone and necessary modules, and relays as required for operation as indicated. Power supply from 120V ac circuit with rectifier to supply 24 V dc to operate complete system. Standby power of nickel cadmium batteries sized to provide supervisory and trouble signal current for 24 hours. Capable of differentiating between open line condition and alarm. Panel to display "trouble" conditions when fault occurs in wiring.

2.2 DOOR CONTROLLERS

.1 Door controllers shall be located in Copy Room 112. Controller shall be capable of monitoring two doors, and provide reader and door lock power. Controller shall have battery backup to operate for a minimum of twenty-four hours of full operation with no power. A lithium battery shall protect the card schedule database and time base in the absence of all power.

.2 Controller shall monitor normally open or normally closed status points, with wiring supervised by end-of-line resistors. Status inputs shall be used for door contacts.

.3 Controller shall have controllable relays, which shall be used to annunciate door held or forced open violations and other alarm conditions capability to allow monitoring from local remote stations.

.4 Door controllers shall communicate with main control panel.

.5 Provide 120 volt power source for controller from 120 volt source.

2.3 POWER SUPPLIES AND BATTERIES

.1 Provide power supplies/transformers as required to power each door controller system.

.2 Provide batteries as required to power system for a minimum of twenty-four hours of full operation with no power.

2.4 NETWORK INTERFACE

.1 Interface capability from control panel via Ethernet connection to communication.

2.5 MAGNETIC DOOR SWITCHES

.1 Door switches: suitable for flush mounting on door as indicated.

2.6 CARD READERS

.1 Proximity card readers shall be installed at each controlled door. Readers shall be vandal resistant with no exposed hardware. Readers shall be powered by the door controller, and shall have a dual-colour LED indicating reader powered, access granted, and access denied.

.2 Readers shall be compatible for use with door access system. Confirm exact card requirement before ordering card readers.

2.7 DOOR CONTACTS

.1 Every controlled door shall be equipped with a door contact for reporting door forced or held open conditions to the controller.

.2 Door contacts to be recessed magnetic type. Coordinate installation with door hardware supplier.

2.8 ELECTRIC DOOR STRIKES

.1 Heavy duty, continuous rated, UL-listed, fail-secure electric door strikes provided and installed by others.

.2 Coordinating door hardware and frames with the door supplier to accept door strikes is part of the work of this contract. Magnetic locks are not an acceptable alternative to electric strikes.

.3 Provide minimum 19mm conduit from each door strike location for connection to door access controllers.

2.9 ACCESS CARDS

.1 Access cards shall be proximity type, standard "credit card" size, with card identification unique throughout the world. Cards shall have embossed serial number, with no other manufacturer's identification. Cards shall have slot in narrow side to allow user to attach clip or neck chain.

.2 Supply and deliver to Owners' representative 10 cards before substantial completion.

2.10 HOST COMPUTER

.1 Provide and install PC type networked computer for continuous monitoring of security door supervision components and events and programming/management of system access cards, readers, and controllers.

2.11 KEYPADS

.1 Alphanumeric keypads shall be provided at all main points of entry, as indicated on plans. Keypad panels shall have an LCD display.

2.12 MOTION DETECTORS

.1 Passive infrared (PIR) motion detectors shall be provided as indicated.

2.13 LOCAL ALARM

.1 Buzzer for local alarm at each door location and mount in single gang box as indicated.

.2 Exterior alarm for activation of system.

2.14 SMOKE ALARMS

.1 Smoke alarm devices to be separately monitored. Activation will cause system alarm and off site monitoring.

Part 3 Execution

3.1 INSTALLATION

.1 Install door access system to control doors as indicated on plans.

.2 Install card readers, door contacts, and coordinate door strikes installation in controlled doors in accordance with manufacturer's instructions and recommendations.

.3 Wire controller data network and field wiring in accordance with manufacturer's instructions. All wiring shall be CSA listed, FT4 rated. All wiring shall be tagged and identified.

.4 All system wiring shall be concealed. Wiring to controlled doors shall be run on secure side only.

.5 Install complete door supervision system as indicated and in accordance with manufacturer's instructions.

3.2 COMMISSIONING, START-UP, AND TRAINING

.1 Place system in full operation, and provide certificate from manufacturer's authorized representative that the system is functioning in accordance with manufacturer's instructions and specifications.

.2 Program controllers and set up initial card database in accordance with Owner's Representative's instructions.

.3 Provide training for Owners representative's operation and maintenance personnel to ensure that they are fully conversant in the use, care, programming, maintenance, and repair of the system. Allow for the following training sessions:

.1 Two one-hour sessions for system users

.2 One three-hour session for system administrators

.3 One three-hour session for maintenance personnel

.4 If, in the reasonable opinion of the Engineer, the training is inadequate to ensure full understanding due to inadequate preparation by or communications skills of the trainer, additional training shall be provided at no additional cost to the Contract and to the satisfaction of the Engineer.

3.3 SEQUENCES OF OPERATION

.1 System operation: when supervised door is opened, zone indicating lamp flashes and operates audible alarm at control panel. When "acknowledge" button is operated, audible signal is silenced and flashing light changes to steady glow.

.2 System restored to normal when door is closed and "reset" key switch on control panel operated.

.3 Buzzer located at each door to give pulsating signal when door opened. Upon acknowledgment from control panel signal to change to continuous note. Buzzer at door location to be silenced only after door reclosed and "reset" key switch operated. Closing of door alone not to affect signal once it has started to sound.

.4 When deactivating switch is operated, supervised door on that zone opened without causing alarm. Zone trouble lamp illuminated when zone is deactivated but audible trouble signal not to sound.

.5 Fault in wiring of one zone to cause audible signal to sound even if zone in deactivated position.

3.4 SITE TESTS

.1 Perform tests in accordance with Canadian Electrical Code latest edition.

.2 Test system components in presence of Department Representative to ensure correct operation of system. On completion of tests, submit to Consultant certificate listing components tested.

END OF SECTION

PART 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 74 19 – Construction/Demolition Waste Management and Disposal.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).

.1 ASTM D1557-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft^3 (2,700 kN-m/m^3)).

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.5 – M91 (March 1999), Low Flash Petroleum Spirits Thinner.

.2 CAN/CSGB-1.74 – 2001, Alkyd Traffic Paint.

.3 Master Municipal Contract Documents (MMCD), Platinum Edition Volume II - 2009, British Columbia. Contractor to maintain a copy on-site at all times.

1.3 SAMPLES AND SUBMITTALS

.1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit asphalt mix design to Departmental Representative for review at least 1 week prior to commencing work.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 – Construction/Demolition Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Divert unused aggregate materials from landfill to facility for reuse as approved by Departmental Representative.

.4 Dispose of unused paint and paint thinner materials at official hazardous material collections site as approved by Department Representative.

.5 Do not dispose of unused paint thinner material into sewer system, into streams, lakes, onto ground or in other location where it will pose health environmental hazard.

.6 Divert unused asphalt from landfill to facility capable of recycling materials.

PART 2 Products

2.1 MATERIALS

.1 Prime coat: N/A

.2 Tack coat: CAN/CGCB – 16.2, Grade SS-1

.3 Asphalt cement: CGSB – 16.3-M 90, Grade 80-100

.4 Asphalt concrete: MMCD Upper Course #1 and 2

.5 Traffic paint: yellow and white to CAN/CGSB-1.74.

.6 Paint thinner: to CAN/CGSB-1.5.

PART 3 Execution

3.1 FOUNDATIONS

.1 Roadway foundations to be constructed in conformance to MMCD Section 31 24 13 – Roadway Excavation, Embankment and Compaction.

.2 Foundations for roadways and parking lots comprise:

.1 compacted granular subbase, thickness to match existing.

.2 compacted granular base, thickness to match existing.

.3 Compaction: compact each lift of granular material to 100% standard Proctor density. Maximum lift thickness: 200 mm.

3.2 PAVEMENT THICKNESS

.1 Pavement thickness for roadways and parking lots is to conform to the following gradation:

.1 Patching and in-fill adjacent to curbs and sidewalks: MMCD Upper Course #2.

.2 PAVEMENT REPAIR

.1 Repair all areas of paving damaged by excavation and construction up to edge of construction.

3.3 PAVEMENT CONSTRUCTION AND TESTING

.1 Construction of asphalt concrete to MMCD 32 12 16 – Hot-Mix Asphalt Concrete Paving.

.2 Surface preparation to MMCD 32 12 16 – Hot-Mix Asphalt Concrete Paving.

.3 Cold milling to MMCD 32 01 16.7 – Cold Milling.

.4 Contractor to retain and pay for services of geotechnical engineer and testing laboratory acceptable by the Departmental Representative for inspection and nuclear densometer testing of backfill materials and asphalt paving.

.1 Testing to include asphalt thickness and compaction at intervals acceptable to the Departmental Representative.

3.4 TRAFFIC MARKINGS

.1 Reinstate any parking space divisions and traffic markings removed or damaged by any of the Work.

.2 Paint parking space divisions and other pavement markings in accordance with manufacturers recommendations and as indicated.

.3 Use paint thinner in accordance with manufacturer's requirements.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This Section specifies RPVC and plastic polyethylene pipe used for direct buried underground cable ducts.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.2 No. 211.1- latest edition, Rigid Types EBI and DB2/ES2 PVC Conduit.

.2 CSA C22.2 No. 211.3- latest edition, Reinforced Thermosetting Resin Conduit (RTRC) and Fittings (Bi-national standard, with UL 1684).

1.3 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

Part 2 Products

2.1 PVC DUCTS AND FITTINGS

.1 Rigid PVC duct: to CSA C22.2 No. 211.1, Type DB2/ES2, with moulded fittings, for direct burial expanded flange ends, Trade size 100 mm Nominal length: plus or minus 12 mm.

.2 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make complete installation.

.3 Rigid PVC 90^{o} and 45^{o} bends.

.4 Rigid PVC 5^{o} angle couplings.

.5 Expansion joints as required.

2.2 SOLVENT WELD COMPOUND

.1 Solvent cement for PVC duct joints with low VOC content, 785 Grams/Liter (g/l). Maximum VOC emission as applied and tested per SCAQMD Rule 1168, Test Method 316A: 510 g/l.

2.3 CABLE PULLING EQUIPMENT

.1 6 mm stranded nylon pull rope tensile strength 5 kN.

2.4 MARKERS

.1 Concrete type cable markers: as indicated, with words: "Cable", "Joint" or "Conduit" impressed in top surface, with arrows to indicate change in direction of duct runs.

Part 3 Execution

3.1 INSTALLATION

.1 Install duct in accordance with manufacturer's instructions.

.2 Clean inside of ducts before laying.

.3 Ensure full, even support every 1.5 m throughout duct length.

.4 Slope ducts with 1 to 400 minimum slope.

.5 During construction, cap ends of ducts to prevent entrance of foreign materials.

.6 Pull through each duct mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.

.7 In each duct install pull rope continuous throughout each duct run with 3 m spare rope at each end.

.8 Install markers as required.

END OF SECTION

APPENDIX A

WSP Geotechnical Assessment New Search and Rescue Station, Powell River, B.C. June 30 2017

30 June 2017 (Revised July 17, 2017)
Project No: 171-06978

Real Property and Technical Support Division
Fisheries & Oceans Canada, Pacific Region
Suite 200 – 401 Burrard Street
Vancouver BC V6C 3S4

Attn: Don Storry, P.Eng., Senior Project Engineer

Re: Geotechnical Assessment
New Search and Rescue Station, Powell River, BC

1. Introduction

As requested, WSP Canada Inc. (WSP) has completed a geotechnical assessment for a proposed new Search and Rescue (SAR) building at the former barge facility on Marine Drive in Powell River, BC. The purpose of the assessment was to characterize subsurface conditions in support of foundation design for the new building. The scope of work was described in WSP's proposal dated 18 May 2017 for which authorization was received via email dated 20 May 2017.

This report presents our understanding of the project, a summary of the findings of a desktop and test pit assessment and geotechnical discussion and recommendations for design and construction of the proposed facility. Attached to this report are a site and test pit location plan, annotated photographs, seismic hazard calculation and test pit logs. Further geotechnical input is anticipated to be required in support of final design and construction.

This report was revised on 17 July 2017 to include the City of Powell River as an approved user.

2. Project & Site Description

2.1 Project Description

We understand that a new SAR building is to be constructed in Powell River at the site of an existing warehouse building in the south harbour area approximately 400 m south of the BC Ferries terminal (i.e. former barge facility) as shown in Figure 1. Details of the building were not available at the time of writing but it is expected to be a light weight one storey steel frame building constructed within the footprint area of the existing warehouse building after demolition. We understand that a pre-fabricated, modular building with a crawl space is being considered as one

1935 Bollinger Road
Nanaimo, BC, Canada V9S 5W9

Tel.: +1 250 753-1077

Tel.: +1 250 753-1203
1935 Bollinger Road
Nanaaimo, BC V9S 5W9

wsp.com

of the building options. The anticipated footprint of the new building is shown on Figure 1. We understand that a portion of the existing building is to remain adjacent to the new SAR building. The separation distance between the buildings was not known at the time of report preparation.

In terms of seismic design, we understand from Fisheries & Oceans Canada that the building is to be considered of normal importance and that it does not have a post disaster designation nor is it required to be functional following a design earthquake. We further understand that it will be acceptable for utility services to the building to be disrupted.

2.2 Site Description

The footprint area occupied by the existing warehouse building comprises a flat apron of fill that has been extended west from the original natural shoreline (Photos 1 to 3). A pile supported structural platform (dock) extends over the foreshore to the west of the building (Photo 1). The shoreline is armoured with coarse rip rap below the dock and along the edge of the apron of fill as shown in Photo 4. At the time of the field review the area was asphalt surfaced for the most part with the exception of an area near the toe of the access road embankment.

2.3 Background Information

In general, the original natural shoreline consists of a steep slope along the east edge of the site that is dominated by dense glacial till. Historically, the ocean eroded into this till deposit and deposited geologically recent sandy shore deposits. More recently, an apron of granular fill was placed on top of the shore deposits to develop the area currently used to support the warehouse.

A review of information from the Powell River Historical Museum & Archives indicates that the apron of fill was placed in the mid to late 1960s. A comparative shoreline view of the project site from Dunstan's Studio's collection circa 1952 and Google Earth imagery from 2017 is shown in Photos 5 and 6.

Historical aerial photos from the University of British Columbia were also reviewed. The fill pad was first observed in the 1964 aerial photos but the dock and structure were not visible at that time. The dock and structure appear in the 1967 aerial photo indicative that these structures were constructed between 1964 and 1967. No information was found in the archives to document the fill placement (type, compactive effort, thickness).

WSP's files for work at the BC Ferries terminal and Wharf at Westview development were also reviewed as part of the desktop study. The reclaimed land at the Wharf at Westview site to the north of the project site includes in order of increasing depth: variable fill ranging from sand to cobbles and boulders (3 to 6 m thick) underlain by natural beach sand with variable gravel content (1 to 4.5 m thick) underlain by dense silt and sand interpreted to be glacial till (3 to 9.5 m depth). Previous assessments indicated that saturated portions of the lower fill and underlying beach deposits were susceptible to liquefaction under the design earthquake, which was predicted to result in relatively large vertical and lateral movements (slope instability) and/or bearing support

issues for pipes and buildings. Ground improvement was recommended and carried out during development of the Wharf at Westview to mitigate liquefaction and improve seismic performance.

Previous work for pile installations at the BC Ferries Terminal indicates that the thickness of sand/sand and gravel above the till in that area ranged from about 2 to 7 m.

3. Test Pit Program

Four test pits (TP17-01 to 04) were advanced on 7 June 2017 with a tracked excavator contracted from T&R Contracting Ltd at the approximate locations shown on Figure 1. Test pits were advanced to depths below ground surface ranging from 3.6 to 4.1 m, and were generally terminated due to extensive sloughing of the side walls. Conditions were logged by a WSP representative and samples obtained for laboratory classification and moisture content determinations. A description of the ground conditions encountered are provided on the test pit logs attached in Appendix 1 and shown in Photographs 7 and 8.

In summary of the logs, the conditions encountered consisted of a variable thickness of fill that ranged in composition from sand to angular rock fill. Inferred natural sandy gravel was encountered below the fill at Test Pit TP17-02 (3.8 m depth) and very dense sand with some fines and gravel interpreted to be glacial till was encountered below the fill at Test Pit TP17-04 (3.6 m depth) only. Natural ground was not reached at the two test pits advanced in the eastern part of the site due to the thickness of fill in that area (i.e. nearest the proposed building, TP17-01 and 03).

Light seepage was observed at 3.8 m depth at Test Pit TP17-02 but otherwise seepage or wet conditions were not observed at the other test pit locations. The depth and fluctuation of groundwater would be expected to be controlled by sea levels.

4. Geotechnical Discussion & Recommendations

4.1 General

The site is generally not favourable from a geotechnical perspective. Soils below the building footprint include variable fills that extend deeper than the test pits and are inferred to rest on top of loose granular shore deposits underlain by a sloping till surface. The loose shore deposits below the water table are be expected to be susceptible to liquefaction with the potential for permanent ground deformations under strong seismic shaking. This could take the form of seismically induced vertical and lateral movements that prior more detailed work in the area indicated to be in the order of 0.5 to 1 m or more.

The depth to firm ground at the proposed building location was not reached with the test pit program. Accordingly, for the purposes of this assessment, ground conditions below 4 m depth have been inferred based on the general setting, previous project work in the nearby foreshore area, and the performance of the existing structures. Further assessment would be required to verify inferred conditions.

In discussions with Fisheries & Oceans Canada and the design team, a number of alternative approaches were introduced by WSP for the building including selecting a different location away from the shore (i.e. away from the zone of greatest anticipated movement), ground improvement to mitigate potential ground movements, piled foundations, or a robust shallow foundation designed to accommodate potential ground movements. Based on these discussions, the preferred foundation approach was a robust shallow foundation, further details of which are provided in Section 4.2, below.

4.2 Foundation Design

In light of the performance criteria discussed above, the structure may be supported on a structural reinforced concrete raft slab or interconnected strip footings (i.e. no isolated foundation elements) supported on a pad of engineered fill. The purpose of the engineered fill is to provide a uniform base upon which to construct the building. In the vicinity of the proposed building existing angular rock fill ranging from 1 to 2 m thick was encountered at 0.9 m depth (i.e. TP17-01 and 03). The new pad of engineered fill will sit atop a retightened surface of this angular rock fill, as described in Section 4.3, below.

Foundation elements resting on an approved surface of well compacted engineered fill may be designed for a Serviceability Limit States Bearing Pressure of 100kPa and a Factored Ultimate Limit States Bearing Pressure of 150 kPa. As an alternative, in the case of a raft foundation, the raft may be designed on the basis of a Modulus of Subgrade Reaction (MSR) of 20 MPa/m. The use of a MSR is an interactive process that is influenced by scaling factors and the geotechnical engineer should review the results prior to finalizing the raft design. Structural design may be based on Site Class D conditions (per Clause 4.1.8.4(6) of Division B of BC Building Code 2012). Further geotechnical review would be recommended if the building period is greater than 0.5s.

As indicated above, we anticipate that this site will experience permanent ground deformation towards the waterfront as a result of liquefaction under strong seismic shaking and that differential lateral and vertical movements may occur within the building footprint and could result in tilt. The potential for a post-seismic tilt should be considered by the design team. In addition, service connections to the buildings could be disrupted by movements of the fill/natural soil or building during a seismic event. Flexible connections could be considered to reduce the potential for damaging these pipes.

The potential for static settlements induced in the existing fill by the new imposed loads and/or self-weight settlement of the fill is difficult to predict in variable fill and loose beach deposits. However, given the age of the fill and the prior loading from the existing building, we anticipated the risk of adverse settlement to be low. Equally, the consequence of any potential settlement should be low given the design requirements needed to satisfy the potential seismic ground movement. No obvious signs of piping or soil migration in the coarse fill as a result of tidal surges or fluctuations were observed to suggest this to be an active process.

Perimeter drainage should be provided in accordance with the NBCC.

4.3 Site Preparation

Site preparation activities are integral with the foundation design described above. We recommend the following site preparation within the footprint and extending 1 m beyond the perimeter of the building:

1. Excavation of the upper approximately 1 m to expose the underlying angular blast rock fill;
2. Re=compaction of the exposed rock fill "subgrade" with multiple passes of a heavy drum roller compactor or large hoe-pack in the presence of the geotechnical engineer;
3. Placement of medium weight non-woven geotextile separator (such as Armtec 200 or approved equivalent) in accordance with manufacturer's instructions. The geotextile separator may need to extend up the edges of the excavation to near finished grade; and,
4. Placement and compaction of Engineered Fill consisting of a 19 mm minus crushed sand and gravel to underside of footings/raft foundation.

The excavated fill is not likely to be suitable for reuse as engineered fill below the building due to its variable sandy, non-crushed content. Excavation will be required adjacent to existing piles and existing building foundations. The contractor will need to advance the excavation in a manner that does not damage the piles or building footings. Temporary shoring or bracing of the existing building is not expected but this will need to be reviewed and verified once final layout is determined. We note the potential for angular rock fill that can include large particles which can disrupt a larger area than the actual work when disturbed.

Seepage was not observed at proposed excavation elevation at the test pit locations and extensive dewatering is not expected to be needed. The potential for high tide influence and/or storm run up should be considered once construction scheduling is known.

We note that the fill soils contain particles of various sizes, including silt and clay sizes (fines). An effective Erosion and Sediment Control Plan (ESCP) should be in place prior to construction to prevent silt laden water from leaving the project area. If requested, WSP can assist with preparation or review of an ESCP.

5. Future Geotechnical

Further geotechnical engineering input is anticipated as the project develops. At this time we envisage that the following scope could be needed:

- Geotechnical engineering support to civil and structural engineer during detailed design, as needed. We anticipate some interaction related to the foundation design;
- Geotechnical review of tender documents in the context of geotechnical recommendations;
- Provision of BC Building Code Schedules (Geotechnical Permanent);
- Construction field review services including attendance at project meetings, subgrade review, materials testing, etc.
- Geotechnical engineering support in relation to unforeseen conditions as needed.

We would be pleased to provide an estimate for these services once more is known regarding the details of the project and schedule.

6. Closure

This report has been prepared for the exclusive use of the Department of Fisheries & Oceans Canada – Pacific Region for application to the proposed SAR building in Powell River. The work described in the report was carried out in accordance with the Terms or Reference for Geotechnical Reports presented in Appendix 2. The City of Powell River is considered an approved user of this report subject to the terms under which it was prepared.

We trust that the information presented herein meets your current requirements. Please contact the undersigned if you have any questions or need further information as design progresses

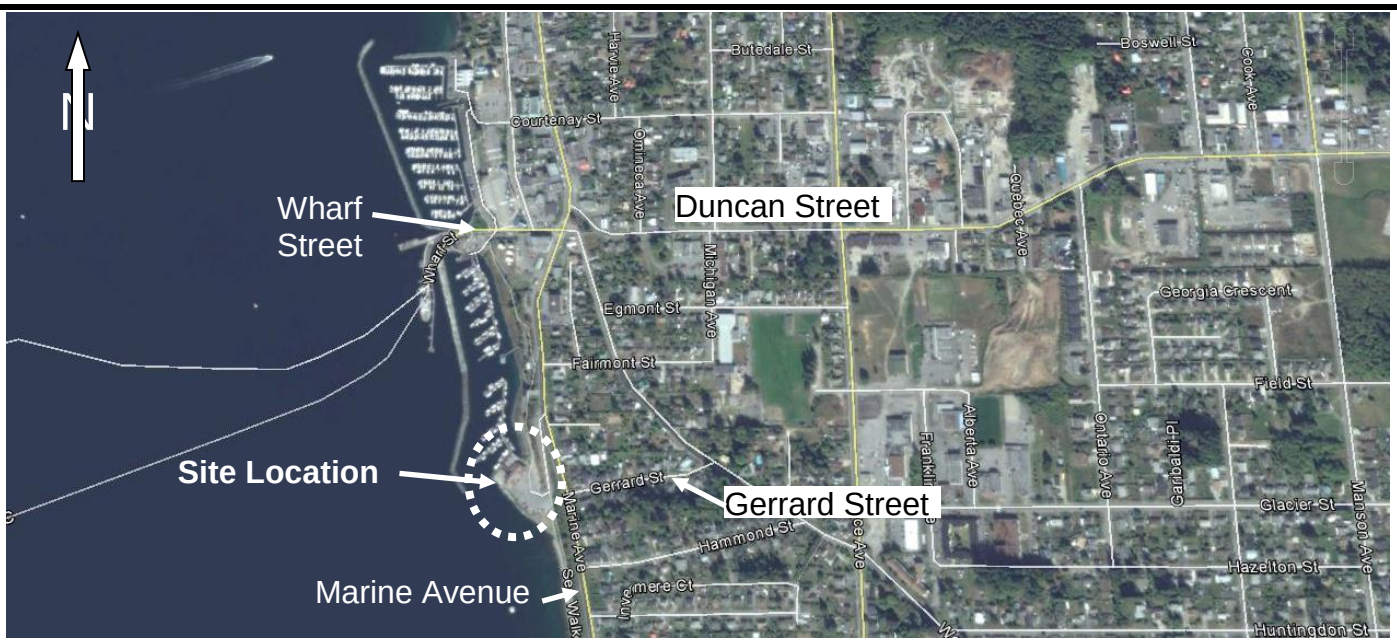
WSP Canada Inc.,

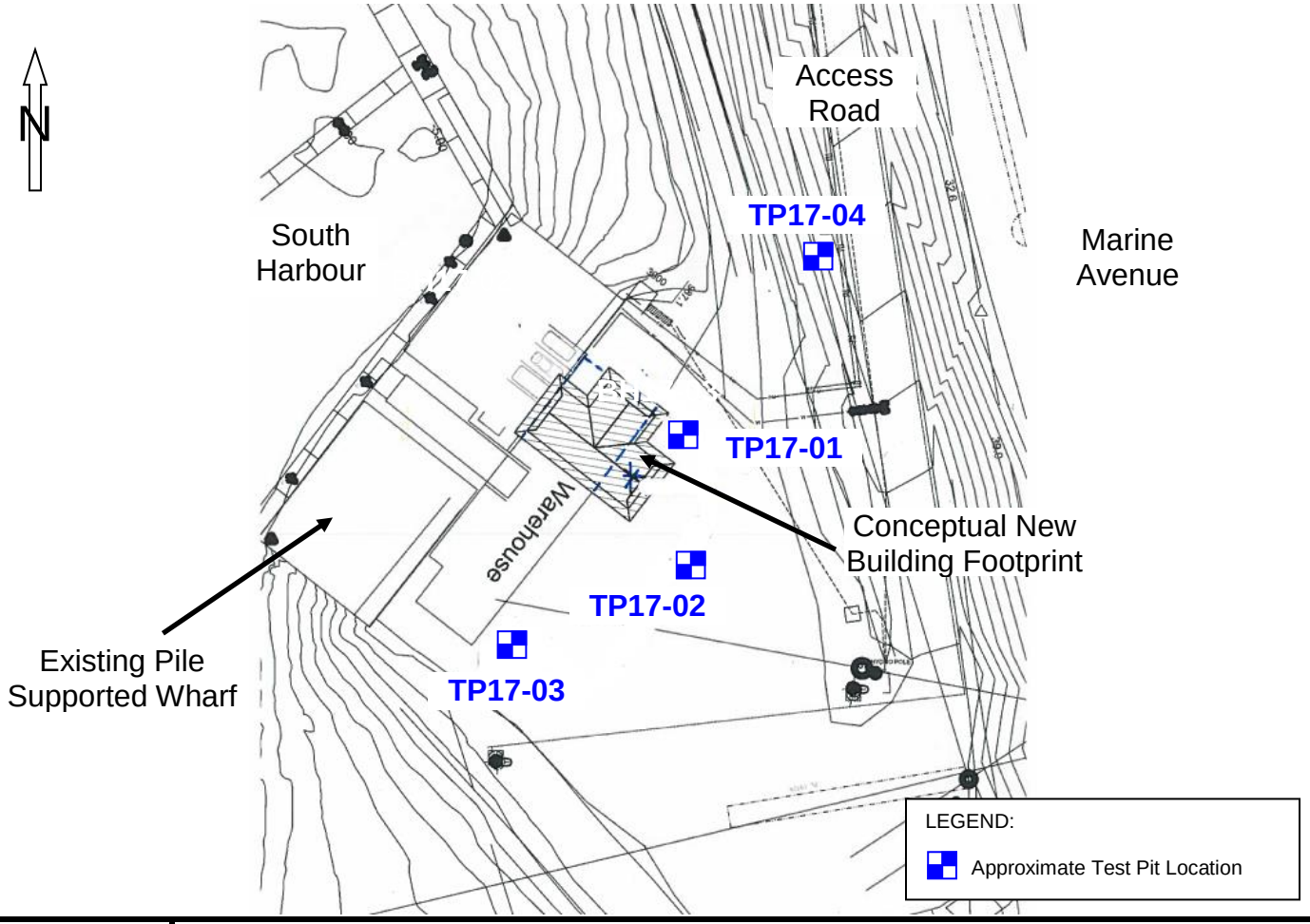
Reviewed by:

Per: Darryl Furey, M.Eng., P.Eng.
Senior Geotechnical Engineer

Carl Miller, M.Sc., P.Eng.
Senior Geotechnical Engineer

Attachments: Figure 1 Site & Test Pit Location Plan
Seismic Hazard Calculation
Photographs
Appendix 1 Test Pit Logs
Appendix 2 Terms of Reference for Geotechnical Reports.





	PROJECT: POWELL RIVER SEARCH & RESCUE GEOTECHNICAL ASSESSMENT				
	TITLE: SITE PLAN – TEST PIT LOCATIONS				
	CLIENT: DEPARTMENT OF FISHERIES & OCEANS PACIFIC REGION				
FIGURE NO.: 1	DATE: JUNE 2017	FILE NO.: 171-06978-00	SCALE: NTS	DRAWN BY: DF	REV NO.: 0

WSP Canada Inc., 1935 Bollinger Road, Nanaimo, B.C., V9S 5W9 Phone: 250-753-1077 Fax: 250-753-1203 Email: nanaimo@wspgroup.com

2010 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 français (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

Requested by: , WSP Canada Inc. June 23, 2017

Site Coordinates: 49.832 North 124.5287 West

User File Reference: Powell River SAR

National Building Code ground motions:
2% probability of exceedance in 50 years (0.000404 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA (g)
0.667	0.493	0.288	0.159	0.307

Notes. Spectral and peak hazard values are determined for firm ground (NBCC 2010 soil class C - average shear wave velocity 360-750 m/s). Median (50th percentile) values are given in units of g. 5% damped spectral acceleration (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA) values are tabulated. Only 2 significant figures are to be used. ***These values have been interpolated from a 10 km spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the calculated values.*** Warning: You are in a region which considers the hazard from a deterministic Cascadia subduction event for the National Building Code. Values determined for high probabilities (0.01 per annum) in this region do not consider the hazard from this type of earthquake.

Ground motions for other probabilities:

Probability of exceedance per annum	0.010	0.0021	0.001
Probability of exceedance in 50 years	40%	10%	5%
Sa(0.2)	0.166	0.347	0.472
Sa(0.5)	0.116	0.250	0.343
Sa(1.0)	0.063	0.142	0.197
Sa(2.0)	0.034	0.078	0.109
PGA	0.084	0.167	0.222

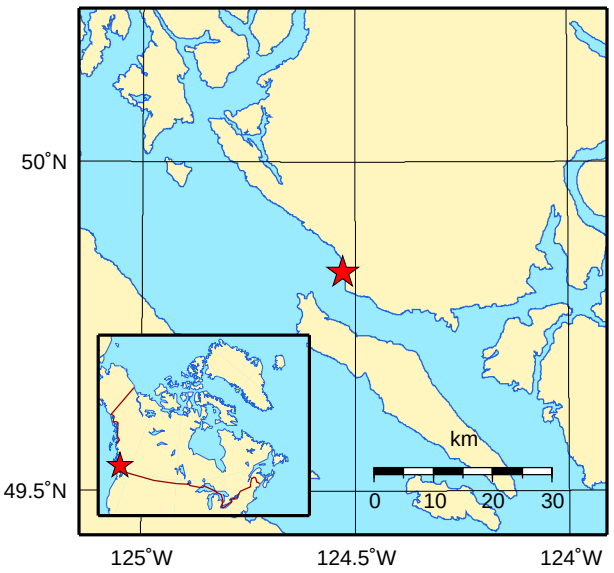
References

National Building Code of Canada 2010 NRCC no. 53301; sections 4.1.8, 9.20.1.2, 9.23.10.2, 9.31.6.2, and 6.2.1.3
Appendix C: Climatic Information for Building Design in Canada - table in Appendix C starting on page C-11 of Division B, volume 2

User's Guide - NBC 2010, Structural Commentaries NRCC no. 53543 (in preparation)
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File xxxx
Fourth generation seismic hazard maps of Canada: Maps and grid values to be used with the 2010 National Building Code of Canada (in preparation)

See the websites *www.EarthquakesCanada.ca* and *www.nationalcodes.ca* for more information



Aussi disponible en français

Photo 1: General view of site from access road looking southwest. (Photo provided by client)

Photo 2: General view of site looking north along the base of the access road.

Photo 3: General view of existing access road that has been constructed into the foreshore slope, looking north.

Photo 4: Typical existing rip rap foreshore erosion protection looking southwest along the south edge of the site. This is illustrative of the potential nature of some of the buried fill.

Photo 5: General view of shoreline circa 1952 at site. (Photo from Dunstan's Studio, c/o Powell River Historical Museum & Archives).

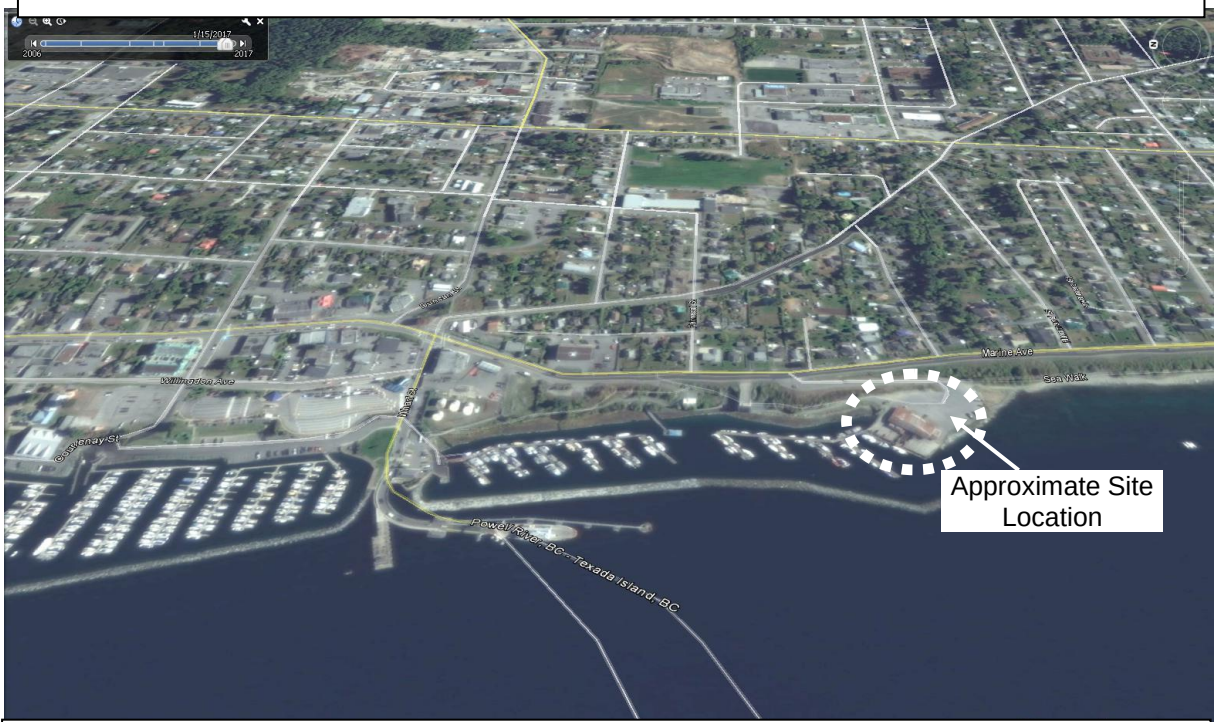


Photo 6: Google Earth tilted view of shoreline and site in 2017.

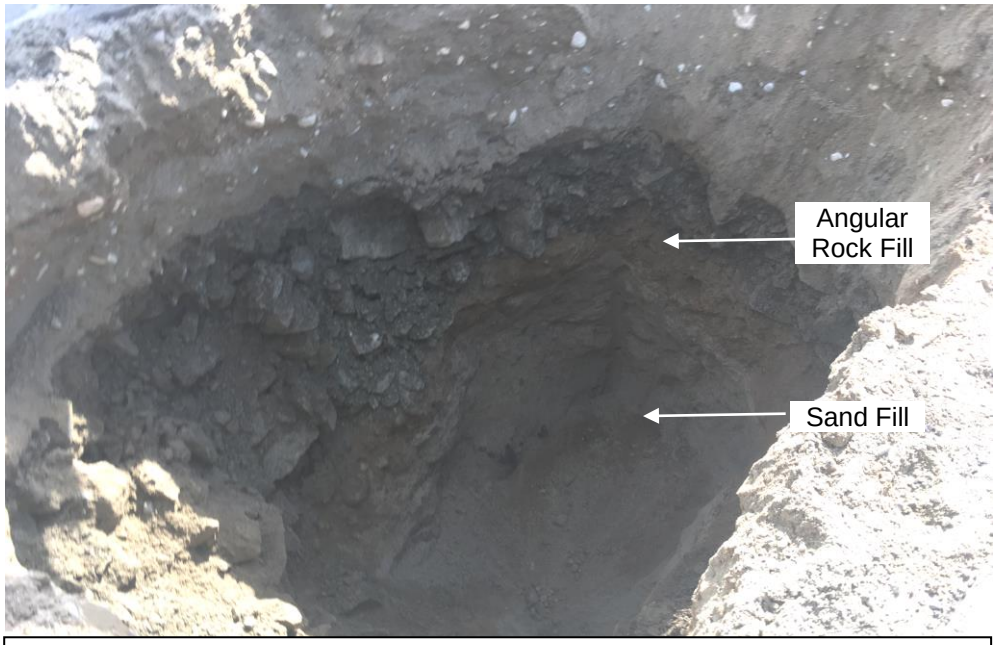


Photo 7: View of variable fill conditions at TP17-01: mixed sand and gravel over blast rock over sand with cobbles and coarse gravel. Note no seepage.

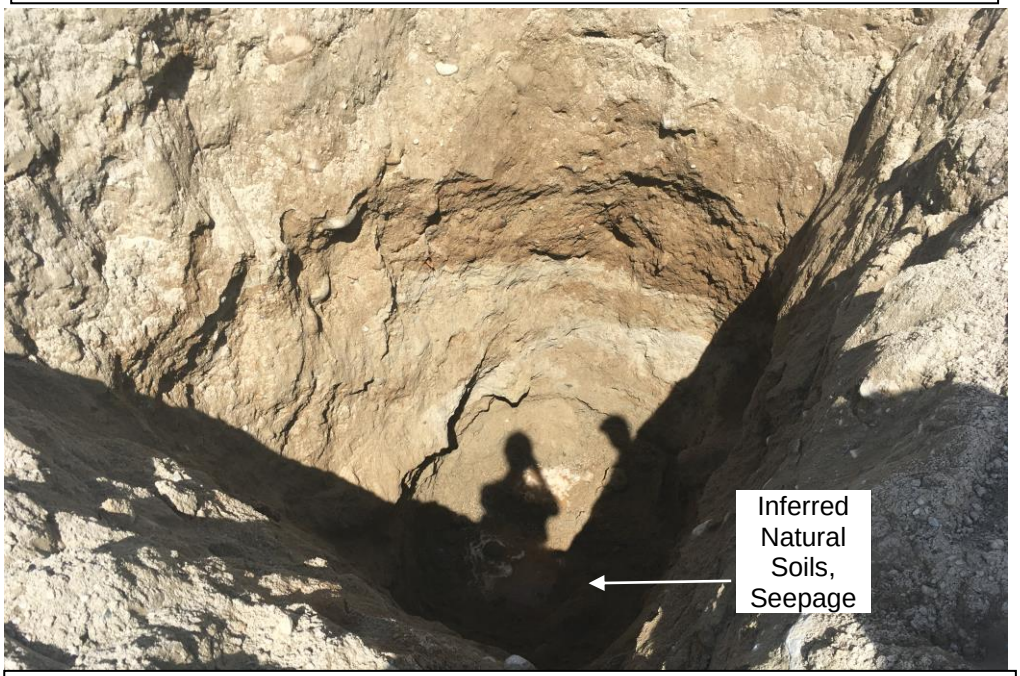


Photo 8: View of variable fill conditions at TP17-02. Note seepage, wet conditions and inferred natural soils at base of test pit at 3.8 m depth.

APPENDIX

1. TEST PIT LOGS

WSP Canada Inc.
1935 Bollinger Road
Nanaimo, B.C. V9S 5W9
Tel: +1 250-753-1077
Fax: +1 250-753-1203
www.wsp.com

New Search and Rescue Station, Powell River
Department of Fisheries and Oceans Pacific Region
Geotechnical Assessment

TP17-01
Pg 1 of 1
Project No: 171-06978-00

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Recovery	Water Level
		ASPHALT (50 mm)			G1		
		compact, light brown, gravelly, SAND (FILL), trace fines, poorly graded, maximum particle size encountered = 19 mm, sub angular, moist.					
	2	-below 0.4 m, red brown, subrounded, maximum particle size encountered = 90 mm, cobbles					
1	4	grey, BLAST ROCK FILL, some sand and gravel sizes, trace fines, poorly graded, angular, maximum particle size encountered = 600 mm, dry to moist.					
2	6						
	8	brown, gravelly, SAND (FILL?), trace fines, poorly graded, subrounded, maximum particle size encountered = 90 mm, moist, occasional cobbles.			G2		
3	10						
	12						
4		End of hole at 3.8 m due to sloughing. No seepage observed. Backfilled with bucket packed excavated material.					
	14						
	16						

10 20 30 40 50 60 70 80 90

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) — Liquid Limit (%)
Moisture Content (%)
Ground Water Level
Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
Shear strength in kPa (Unconfined)
Shear strength in kPa (Field vane)
Remolded strength in kPa
Percent Passing # 200 sieve

Drill Method: Excavator
Date Drilled: 6/7/2017
Logged by: LM
Checked by: DF

SOIL CLASSIFICATION IN ACCORDANCE WITH THE CANADIAN FOUNDATION ENGINEERING MANUAL 4TH EDITION 2006.

1 LOG PER PAGE 6/26/17

WSP Canada Inc.
1935 Bollinger Road
Nanaimo, B.C. V9S 5W9
Tel: +1 250-753-1077
Fax: +1 250-753-1203
www.wsp.com

New Search and Rescue Station, Powell River
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Geotechnical Assessment

TP17-02
Pg 1 of 1
Project No: 171-06978-00

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Recovery	Water Level
0	0	ASPHALT (50 mm)			G1		
		compact, light brown, gravelly, SAND (FILL), trace fines, poorly graded, maximum particle size encountered = 19 mm, sub angular, moist.					
		-below 0.3 m, red brown, subrounded, maximum particle size encountered = 90 mm, cobbles					
1	4						
2	6	brown, gravelly, SAND (FILL?), trace fines, poorly graded, subrounded, maximum particle size encountered = 90 mm, moist, occasional cobbles.					
3	10				G2		
4	12	brown, sandy, GRAVEL (INFERRED NATURAL), trace fines, poorly graded, coarse grained, subrounded, maximum particle size encountered = 60 mm, wet.			G3		
	14	End of hole at 4.1 m due to sloughing. Seepage at 3.8 m. Backfilled with bucket packed excavated material.					
	16						

10 20 30 40 50 60 70 80 90

Gradation Analysis #1

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) — Moisture Content (%) — Liquid Limit (%)
Ground Water Level
Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
Shear strength in kPa (Unconfined)
Shear strength in kPa (Field vane)
Remolded strength in kPa
Percent Passing # 200 sieve

Drill Method: Excavator
Date Drilled: 6/7/2017
Logged by: LM
Checked by: DF

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WSP Canada Inc.
1935 Bollinger Road
Nanaimo, B.C. V9S 5W9
Tel: +1 250-753-1077
Fax: +1 250-753-1203
www.wsp.com

New Search and Rescue Station, Powell River
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Geotechnical Assessment

TP17-03
Pg 1 of 1
Project No: 171-06978-00

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Recovery	Water Level
0	0	ASPHALT (65 mm)					
		compact, light brown, gravelly, SAND (FILL), trace fines, poorly graded, maximum particle size encountered = 19 mm, sub angular, moist.			G1		
	2	-below 0.3 m, red brown, subrounded, maximum particle size encountered = 90 mm, cobbles					
1					G2		
	4	grey, BLAST ROCK FILL, some sand and gravel sizes, trace fines, poorly graded, angular, maximum particle size encountered = 600 mm, dry to moist.					
					BULK1		
2	6						
	8						
3	10	brown, gravelly, SAND (FILL?), trace fines, poorly graded, subrounded, maximum particle size encountered = 90 mm, moist, occasional cobbles.			G3		
	12	End of hole at 3.6 m due to sloughing. No seepage observed. Backfilled with bucket packed excavated material.					
4	14						
	16						

10 20 30 40 50 60 70 80 90

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) — Liquid Limit (%)
Moisture Content (%)
Ground Water Level
Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
Shear strength in kPa (Unconfined)
Shear strength in kPa (Field vane)
Remolded strength in kPa
Percent Passing # 200 sieve

Drill Method: Excavator
Date Drilled: 6/7/2017
Logged by: LM
Checked by: DF

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WSP Canada Inc.
1935 Bollinger Road
Nanaimo, B.C. V9S 5W9
Tel: +1 250-753-1077
Fax: +1 250-753-1203
www.wsp.com

New Search and Rescue Station, Powell River
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Geotechnical Assessment

TP17-04
Pg 1 of 1
Project No: 171-06978-00

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Recovery	Water Level
		TOPSOIL/ORGANICS					
		brown, SAND AND GRAVEL (FILL), trace fines, poorly graded, subrounded, maximum particle size encountered = 200 mm, moist, cobbles.			G1		
	12	very dense, grey, SAND (TILL), some fines, some gravel, poorly graded, maximum particle size encountered = 30 mm, moist.			G2		
		End of hole at 3.9 m due to sloughing. No seepage observed. Backfilled with bucket packed excavated material.					

10 20 30 40 50 60 70 80 90

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) — Moisture Content (%) — Liquid Limit (%)
Ground Water Level
Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
Shear strength in kPa (Unconfined)
Shear strength in kPa (Field vane)
Remolded strength in kPa
Percent Passing # 200 sieve

Drill Method: Excavator
Date Drilled: 6/7/2017
Logged by: LM
Checked by: DF

SOIL CLASSIFICATION IN ACCORDANCE WITH THE CANADIAN FOUNDATION ENGINEERING MANUAL 4TH EDITION 2006.

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APPENDIX

2. TERMS OF REFERENCE FOR GEOTECHNICAL REPORTS

TERMS OF REFERENCE FOR GEOTECHNICAL REPORTS ISSUED BY WSP CANADA INC.

1. STANDARD OF CARE

WSP Canada Inc. ("WSP") prepared and issued this geotechnical report (the "Report") for its client (the "Client") in accordance with generally-accepted engineering consulting practices for the geotechnical discipline. No other warranty, expressed or implied, is made. Unless specifically stated in the Report, the Report does not address environmental issues.

The terms of reference for geotechnical reports issued by WSP (the "Terms of Reference") contained in the present document provide additional information and caution related to standard of care and the use of the Report. The Client should read and familiarize itself with these Terms of Reference.

2. COMPLETENESS OF THE REPORT

All documents, records, drawings, correspondence, data, files and deliverables, whether hard copy, electronic or otherwise, generated as part of the services for the Client are inherent components of the Report and, collectively, form the instruments of professional services (the "Instruments of Professional Services"). The Report is of a summary nature and is not intended to stand alone without reference to the instructions given to WSP by the Client, the communications between WSP and the Client, and to any other reports, writings, proposals or documents prepared by WSP for the Client relative to the specific site described in the Report, all of which constitute the Report.

TO PROPERLY UNDERSTAND THE INFORMATION, OBSERVATIONS, FINDINGS, SUGGESTIONS, RECOMMENDATIONS AND OPINIONS CONTAINED IN THE REPORT, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WSP CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT AND ITS VARIOUS COMPONENTS.

3. BASIS OF THE REPORT

WSP prepared the Report for the Client for the specific site, development, building, design or building assessment objectives and purpose that the Client described to WSP. The applicability and reliability of any of the information, observations, findings, suggestions, recommendations and opinions contained in the Report are only valid to the extent that there was no material alteration to or variation from any of the said descriptions provided by the Client to WSP unless the Client specifically requested WSP to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

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5. INTERPRETATION OF THE REPORT

a. **Nature and Exactness of Descriptions**: The classification and identification of soils, rocks and geological units, as well as engineering assessments and estimates have been based on investigations performed in accordance with the standards set out in Paragraph 1 above. The classification and identification of these items are judgmental in nature and even comprehensive sampling and testing programs, implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations or assessments utilizing the standards of Paragraph 1 involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and all persons making use of such documents or records should be aware of, and accept, this risk. Some conditions are subject to changes over time and the parties making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or when the Client has special considerations or requirements, the Client must disclose them to WSP so that additional or special investigations may be undertaken, which would not otherwise be within the scope of investigations made by WSP or the purposes of the Report.

b. **Reliance on information**: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site investigation and field review and on the basis of information provided to WSP. WSP has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, WSP cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the report as a result of misstatements, omissions, misrepresentations or fraudulent acts of persons providing information.

c. **Additional Involvement by WSP**: To avoid misunderstandings, WSP should be retained to assist other professionals to explain relevant engineering findings and to review the geotechnical aspects of the plans, drawings and specifications of other professionals relative to the engineering issues pertaining to the geotechnical consulting services provided by WSP. To ensure compliance and consistency with the applicable building codes, legislation, regulations, guidelines and generally-accepted practices, WSP should also be retained to provide field review services during the performance of any related work. Where applicable, it is understood that such field review services must meet or exceed the minimum necessary requirements to ascertain that the work being carried out is in general conformity with the recommendations made by WSP. Any reduction from the level of services recommended by WSP will result in WSP providing qualified opinions regarding adequacy of the work.

6. ALTERNATE REPORT FORMAT

When WSP submits both electronic and hard copy versions of the Instruments of Professional Services, the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding upon WSP. The hard copy versions submitted by WSP shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancy, the hard copy versions shall govern over the electronic versions; furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed and sealed versions of the Instruments of Professional Services maintained or retained, or both, by WSP shall be deemed to be the overall originals for the Project.

The Client agrees that the electronic file and hard copy versions of Instruments of Professional Services shall not, under any circumstances, no matter who owns or uses them, be altered by any party except WSP. The Client warrants that the Instruments of Professional Services will be used only and exactly as submitted by WSP.

The Client recognizes and agrees that WSP prepared and submitted electronic files using specific software or hardware systems, or both. WSP makes no representation about the compatibility of these files with the current or future software and hardware systems of the Client, the Approved Users or any other party. The Client further agrees that WSP is under no obligation, unless otherwise expressly specified, to provide the Client, the Approved Users and any other party, or any or all of them, with specific software and hardware systems that are compatible with any electronic submitted by WSP. The Client further agrees that should the Client, an Approved User or a third party require WSP to provide specific software or hardware systems, or both, compatible with the electronic files prepared and submitted by WSP, for any reason whatsoever included but not restricted to an order from a court, then the Client will pay WSP for all reasonable costs related to the provision of the specific software or hardware systems, or both. The Client further agrees to indemnify and hold harmless WSP, its officers, directors, employees, agents, representative or sub-consultant, or any or all of them, against any claim or any nature whatsoever brought against WSP, whether in contract or in tort, arising or related to the provision or use or any specific software or hardware provided by WSP.

APPENDIX B

WSP Supplementary Geotechnical Comment, New Search and Rescue Station Powell River, B.C.
July 17 2017

July 17, 2017
Project No: 171-06978

Real Property and Technical Support Division
Fisheries & Oceans Canada, Pacific Region
Suite 200 – 401 Burrard Street
Vancouver BC V6C 3S4

Attn: Don Storry, P.Eng., Senior Project Engineer

Re: Supplementary Geotechnical Comment
New Search and Rescue Station, Powell River, BC

Further to discussions last week with the project Structural Engineer regarding foundation design, WSP Canada Inc (WSP) provides the following supplementary geotechnical comments for the proposed new Search and Rescue (SAR) building at the former barge facility on Marine Drive in Powell River, BC. These comments should be read in conjunction with our Geotechnical Assessment Report dated 30 June 2017 (Reference Report).

We understand that a pre-fabricated modular building is proposed. We further understand that a below grade crawl space constructed over a buried raft slab foundation is proposed to facilitate service connections and maintain a main floor elevation near existing grade as shown on Architectural Drawings A4.01 and A4.02, provided by number TEN architectural group on 12 July 2017 (updated Revision A). The proposed underside of raft slab elevation is 0.75 m below grade.

The proposed raft slab foundation with a crawl space is geotechnically feasible provided that the recommendations presented herein are followed. Summary geotechnical discussion and recommendations are presented below:

- The lowered footing elevation will facilitate a net no load change or reduction in load relative to existing conditions recommended to reduce the potential for inducing new static settlement;

- There is some uncertainty in the depth and lateral extent of angular rock fill below 0.9 m depth (i.e. present at TP17-01 and not at TP17-02). A lower slab elevation will reduce the thickness of new engineered fill below the building and increase the influence of variable underlying soil conditions on building performance. Accordingly, the presence and thickness of rock fill should be verified. This could be completed early in the construction program, such as near the time of building demolition. Subject to actual conditions encountered, it may be necessary to replace sand fill (if present in some areas) with engineered fill to provide more uniform conditions below the building;

1935 Bollinger Road
Nanaimo, BC, Canada V9S 5W9

Tel.: +1 250 753-1077

Tel.: +1 250 753-1203
1935 Bollinger Road
Nanaaimo, BC V9S 5W9

wsp.com

- After further discussion with the Structural Engineer, we understand that the proposed sand layer below the slab is not required to reduce friction forces and use of 25 mm minus crushed sand and gravel (engineered fill) to underside of slab elevation is recommended to provide greater subgrade stiffness and slab support; and,
- We understand that there are no issues related to proposed elevation and the design flood level.

This memo has been prepared in accordance with the Terms or Reference for Geotechnical Reports attached to the Reference Report.

We trust that the information presented herein meets your current requirements.

Sincerely,
WSP Canada Inc.,

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D.W. FUREY
25783

Per: Darryl Furey, M.Eng., P.Eng.
Senior Geotechnical Engineer

Reviewed by:

Carl Miller, M.Sc., P.Eng.
Senior Geotechnical Engineer