

Fisheries and Oceans Canada
Real Property, Safety and Security

SPECIFICATIONS
for

Kitsilano CCG SAR –

Workshop Reconstruction

F521A-210639

Vancouver, B.C.

June 18, 2021

SPECIFICATION

Section Number	Section Title	Page Count
Division 00		
00 01 10	Table of Contents	04
Division 01 - General Requirements		
01 11 55	General Instructions	04
01 33 00	Submittal Procedures	04
01 35 30	Health and Safety	11
01 35 35	Fire Safety Requirements	04
01 35 43	Environmental Procedures	06
01 41 00	Regulatory Requirements	01
01 45 00	Quality Control	02
01 51 00	Temporary Utilities	01
01 52 00	Construction Facilities	02
01 56 00	Temporary Barriers and Enclosures	01
01 61 00	Common Product Requirements	04
01 74 11	Cleaning	02
01 74 19	Construction Waste Management and Disposal	04
01 77 00	Closeout Procedures	02
01 78 10	Closeout Submittals	03
Division 03 – Concrete		
03 10 00	Concrete Forming and Accessories	03
03 20 00	Concrete Reinforcing	04
03 30 00	Cast-in-place Concrete	08
03 54 00	Self Leveling Underlayment	03
Division 05 – Metals		
05 50 00	Metal Fabrications	04

Division 06 – Wood, Plastics and Composites

06 10 00	Rough Carpentry	05
06 41 11	Architectural Millwork and Finish Carpentry	02

Division 07 – Thermal and Moisture Protection

07 21 13	Board Insulation	05
07 21 16	Blanket Insulation	02
07 21 19	Foamed in Place Insulation	03
07 28 00	Air and Vapour Barriers	03
07 44 56	Mineral Fiber Reinforced Cementitious Panels	06
07 46 16	Preformed Metal Siding	03
07 52 00	Modified Bituminous Membrane Roofing	06
07 62 00	Sheet Metal Flashings and Trims	03
07 84 00	Firestopping	04
07 92 00	Joint Sealing	05

Division 8 – Openings

08 11 00	Metal Doors and Frames	03
08 53 13	Vinyl Windows	13
08 71 00	Door Hardware	06
08 80 50	Glazing	05

Division 9 – Finishes

09 21 16	Gypsum Board Assemblies	03
09 65 10	Resilient Flooring	05
09 90 00	Painting	06

Division 12 – Furnishings

12 21 13	Horizontal Louver Blinds	04
----------	--------------------------	----

Division 21 – Mechanical

21 01 00	Mechanical	18
----------	------------	----

Division 26 – Electrical

26 05 00	Common Work Results	18
26 05 05	Seismic Restraints	03
26 05 21	Wires, Cables and Connectors (0-1000 V)	04
26 05 28	Grounding – Secondary	03
26 05 29	Hangers and Supports for Electrical Systems	02
26 05 31	Splitters, Junction, Pullboxes	02
26 05 32	Outlet Boxes, Conduit Boxes and Fittings	03
26 05 34	Conduit, Conduit Fastenings and Fittings	04
26 12 17	Dry Type Transformers to 600V Primary	02
26 24 16	Panelboards - Breaker Type	03
26 27 26	Wiring Devices & Plates	03
26 28 16.02	Molded Case Circuit Breakers	02
26 50 00	Lighting General	04
26 52 00	Emergency Lighting Equipment	02
26 53 00	Exit Signs	02

Division 27 – Communications

27 05 26	Grounding and Bonding For Communications Systems	03
27 05 28	Pathways for Communications Systems	02

Division 28 - Electronic Safety and Security

28 31 00	Intrusion Detection	06
28 46 00	Fire Detection and Alarm	06

Appendix

Appendix A:	Kitsilano- Existing Wharf Drawings	15
-------------	------------------------------------	----

DRAWINGS

ARCHITECTURAL

- A0.00 COVER SHEET, DRAWING LIST, GENERAL NOTES, ASSEMBLIES, SCHEDULES & ABBREVIATIONS
- A1.01 SITE PLAN AND FLOOR PLANS
- A2.01 ELEVATIONS
- A3.01 SECTIONS
- A4.01 DETAILS
- A4.02 DETAILS

STRUCTURAL

- S1.01 GENERAL NOTES
- S2.01 FRAMING PLANS
- S4.01 TYPICAL DETAILS

MECHANICAL

- M0.01 DRAWING LIST LEGEND & SCHEDULES
- M1.01 PLUMBING - SITE, LEVEL 1 & LEVEL 2 PLANS AND SCHEMATICS
- M2.01 MECHANICAL - LEVEL 1 AND LEVEL 2 PLANS
- M3.01 FIRE PROTECTION - LEVEL 1, LEVEL 2 PLANS AND SCHEMATICS

ELECTRICAL

- E-001 ELECTRICAL SITE PLAN, LEGEND, DRAWING LIST AND GENERAL NOTES
- E-110 ELECTRICAL LIGHTING PLAN
- E-120 POWER AND SYSTEMS PLAN
- E-130 ELECTRICAL ELEVATION
- E-140 ELECTRICAL DETAILS

Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Mandatory Work Items

.1 The mandatory work of this contract comprises of the construction of a new 2 story structure containing a workshop and multipurpose room. The building is a wood- frame construction with a modified bituminous roof, and cementitious panel and corrugated metal cladding.

.2 Optional Work Items

.1 The following work shall be considered an optional addition to the tender package and will be part of the price evaluation. Any bid without the inclusion of the following will be considered non-compliant and therefore disqualified. The following items should be priced separately when submitting bids for this project. This work includes:

.1 Supply and installation of complete Fire Detection and Alarm System as outlined in the Electrical specification and drawings.

.2 Supply and installation of complete Fire Suppression System outline in the Mechanical specification and drawings. Include for all costs including engineering, supply and install.

1.2 LOCATION OF THE WORK

.1 The work is located at the Kitsilano Coast Guard Base, Vancouver B.C.

1.3 CONTRACT METHOD

.1 Construct Work under a stipulated price contract.

.1 Provide separate pricing for items indicated in Para 1.1

1.4 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.

1.5 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.

1.6 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.

1.7 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 January 31, 2022.
 - .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.

1.8 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.

1.9 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.

1.10 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 Areas for on-site storage of materials and equipment are very limited. Maintain areas used for storage of materials and equipment clean and free of construction related debris. Make good damages resulting from contractors use of storage areas at no cost to the contract.

1.11 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.

1.12 PERMITS, FEES AND NOTIFICATIONS

- .1 Obtain and pay for electrical permits and fees.

1.13 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.

1.14 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.

1.15 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.

1.16 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.

1.17 MATERIALS AND EQUIPMENT

- .1 Use new materials unless otherwise specified.

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.
 - .6 Submit shop drawings under the seal of an engineer licenced in the Province of British Columbia when indicated in individual specification sections.
- .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, and with each progress draw, 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

1 GENERAL

PWGSC Update on Asbestos Use

Effective April 1, 2016, all Public Works and Government Services of Canada (PWGSC) contracts for new construction and major rehabilitation will prohibit use of asbestos-containing materials.

COVID 19

All contractors shall follow Canadian Construction Association COVID-19 – Standardized Protocols for All Canadian Construction Sites. Contractors shall also follow all latest travel restrictions, quarantine guidelines and best management practices as prescribed by BC Health Authorities.

1.1 REFERENCES

- .1 Government of Canada.
 - .1 Canada Labour Code - Part II (as amended)
 - .2 Canada Occupational Health and Safety Regulations. (as amended)
- .2 National Building Code of Canada (NBC): (as amended)
 - .1 Part 8, Safety Measures at Construction and Demolition Sites.
- .3 The Canadian Electrical Code (as amended)
- .4 Canadian Standards Association (CSA) as amended:
 - .1 CSA Z797-2018 Code of Practice for Access Scaffold.
 - .2 CSA S269.1-2016 Falsework for Construction Purposes.
 - .3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.
 - .4 CSA Z1006-10 Management of Work in Confined Spaces.
 - .5 CSA Z462-18 Workplace Electrical Safety Standard
- .5 National Fire Code of Canada 2015 (as amended)
 - .1 Part 5 – Hazardous Processes and Operations and Division B as applicable and required.
- .6 American National Standards Institute (ANSI): (as amended)
 - .1 ANSI/ASSP A10.3-2013, Operations – Safety Requirements for Powder-Actuated Fastening Systems.

.7 Province of British Columbia:

- .1 Workers Compensation Act Part 3-Occupational Health and Safety. (as amended)
- .2 Occupational Health and Safety Regulation (as amended)

1.2 RELATED SECTIONS

- .1 Refer to the following current NMS sections as required:
 - .1 Section 01 11 55 – General Instructions.
 - .2 Section 01 35 35 - Fire Safety Requirements.

1.3 WORKERS' COMPENSATION BOARD COVERAGE

- .1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.
- .2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.4 COMPLIANCE WITH REGULATIONS

- .1 The Departmental Representative may terminate the Contract without liability to the Departmental Representative where the Contractor, in the opinion of The Departmental Representative, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.5 SUBMITTALS

- .1 Submit to Departmental Representative submittals listed for review in accordance with Section 01 33 00 Submittal Procedures.
- .2 Work affected by submittal shall not proceed until review is complete.
- .3 Submit the following:
 - .1 Organizations Health and Safety Plan.
 - .2 Site Specific Safety Plan or Health and Safety Plan (SSSP or HASP)
 - .3 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.

- .4 Copies of incident and accident reports.
- .5 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- .6 Emergency Response Procedures.
- .4 The Departmental Representative will review the Contractor's Site-Specific Safety Plan or Health and Safety Plan (SSSP/HASP) and emergency response procedures and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.
- .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.
- .6 Submission of the Site-Specific Safety Plan or Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:
 - .1 Be construed to imply approval by the Departmental Representative.
 - .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
 - .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.6 RESPONSIBILITY

- .1 Assume responsibility as the Prime Contractor for work under this contract.
- .2 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.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.7 HEALTH AND SAFETY COORDINATOR

- .1 Assign a competent and qualified Health and Safety Coordinator who shall:
 - .1 Be responsible for completing all health and safety training and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.

- .2 Be responsible for implementing, daily enforcing, and monitoring the Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP)
- .3 Be on site during execution of work.
- .4 Have minimum two (2) years' site-related working experience
- .5 Have working knowledge of the applicable occupational safety and health regulations.

1.8 GENERAL CONDITIONS

- .1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- .2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.
 - .1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
 - .2 Secure site at night time as deemed necessary to protect site against entry.

1.9 PROJECT/SITE CONDITIONS

- .1 Work at site will involve contact with:
 - .1 Federal employees and general public.
 - .2 Energized electrical services.
 - .3 Working from heights.
 - .4 Working at a remote site.

1.10 UTILITY CLEARANCES

- .1 The Contractor is solely responsible for all utility detection and clearances prior to starting the work.
- .2 The Contractor will not rely solely upon the Reference Drawings or other information provided for Utility locations.

1.11 REGULATORY REQUIREMENTS

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

- .2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.12 WORK PERMITS

- .1 Obtain specialty permit(s) related to project before start of work.

1.13 FILING OF NOTICE

- .1 The General Contractor is to file Notice of Project with Provincial authorities prior to commencement of work. (All construction projects require a Notice of Work.
- .2 Provide copies of all notices to the Departmental Representative.

1.14 SITE SPECIFIC HEALTH AND SAFETY PLAN

- .1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.
- .2 Prepare and comply with the Site-Specific Safety Plan (SSSP) or Health and Safety Plan (HASP) based on the required hazard assessment, including, but not limited to, the following:
 - .1 Primary requirements:
 - .1 Contractor's safety policy.
 - .2 Identification of applicable compliance obligations.
 - .3 Definition of responsibilities for project safety/organization chart for project.
 - .4 General safety rules for project.
 - .5 Job-specific safe work, procedures.
 - .6 Inspection policy and procedures.
 - .7 Incident reporting and investigation policy and procedures.
 - .8 Occupational Health and Safety Committee/Representative procedures.
 - .9 Occupational Health and Safety meetings.

- .10 Occupational Health and Safety communications and record keeping procedures.
- .11 COVID 19 Protocols and Procedures.
- .2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.
- .3 List hazardous materials to be brought on site as required by work. MSDS required for all products.
- .4 Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
- .5 Identify personal protective equipment (PPE) to be used by workers.
- .6 Identify personnel and alternates responsible for site safety and health.
- .7 Identify personnel training requirements and training plan, including site orientation for new workers.
- .3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.
- .4 Revise and update Site Specific Safety Plan (SSSP) and/or Health and Safety Plan (HASP) as required, and re-submit to the Departmental Representative.
- .5 Departmental Representative's review: the review of Site Specific Safety Plan and/or Health and Safety Plan by Public Works and Government Services Canada (PWGSC) shall not relieve the Contractor of responsibility for errors or omissions in final Site Specific Safety Plan and/or Health and Safety Plan of responsibility for meeting all requirements of construction and Contract documents and legislated requirements.

1.15 EMERGENCY PROCEDURES

- .1 List standard operating procedures and measures to be taken in emergency situations. Include an emergency response and emergency evacuation plan and emergency contacts (i.e.names/telephone numbers) of:
 - .1 Designated personnel from own company.
 - .2 Regulatory agencies applicable to work and as per legislated regulations.
 - .3 Local emergency resources.
 - .4 Departmental Representative.

- .5 A route map with written directions to the nearest hospital or medical clinic.
- .2 Include the following provisions in the emergency procedures:
 - .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
 - .2 Evacuate all workers safely.
 - .3 Check and confirm the safe evacuation of all workers.
 - .4 Notify the fire department or other emergency responders.
 - .5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
 - .6 Notify Departmental Representative.
- .3 Provide written rescue/evacuation procedures as required for, but not limited to:
 - .1 Work at high angles.
 - .2 Work in confined spaces or where there is a risk of entrapment.
 - .3 Work with hazardous substances.
 - .4 Work on, over, under and adjacent to water.
- .4 Design and mark emergency exit routes to provide quick and unimpeded exit.
- .5 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.
- .6 Contractors must not rely solely upon 911 for emergency rescue in a confined space, working at heights, etc.

1.16 HAZARDOUS PRODUCTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS 2015) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
- .2 Where use of hazardous and toxic products cannot be avoided:
 - .1 Advise Departmental Representative beforehand of the product(s)

intended for use. Submit applicable MSDS and WHMIS 2015 documents as per Section 01 33 00 Submittal Procedures.

- .2 In conjunction with Departmental Representative schedule to carry out work during "off hours" when tenants have left the building.
- .3 Provide adequate means of ventilation in accordance with Section 01 51 00.
- .4 The contractor shall ensure that the product is applied as per manufacturers recommendations.
- .5 The contractor shall ensure that only pre-approved products are bought onto the work site in an adequate quantity to complete the work.

1.17 ELECTRICAL SAFETY REQUIREMENTS (Reference: Worksafe BC OHS Regulation Part 19 – Electrical Safety)

- .1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.
 - .1 Before undertaking any work, coordinate arc flash protection, required energizing and de-energizing of new and existing circuits with Departmental Representative.
 - .2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

1.18 ELECTRICAL LOCKOUT

- .1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.
- .2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.
- .3 Keep the documents and lockout tags at the site and list in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.

1.19 OVERLOADING

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

1.20 FALSEWORK

- .1 Design and construct falsework in accordance with CSA S269.1-1975 (R2003) (as amended)

1.21 SCAFFOLDING

- .1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797-2009 (as amended) and B.C. Occupational Health and Safety Regulations. (as amended)

1.22 CONFINED SPACES

- .1 Carry out work in compliance with current Provincial / Territorial regulations.

1.23 POWDER-ACTUATED DEVICES

- .1 Use powder-actuated devices in accordance with ANSI A10.3 (as amended) only after receipt of written permission from the Departmental Representative.

1.24 FIRE SAFETY AND HOT WORK

- .1 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.
- .2 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

1.25 FIRE SAFETY REQUIREMENTS

- .1 Store oily/paint-soaked rags, waste products, empty containers 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 flammable and combustible materials in accordance with the National Fire Code of Canada. (as amended)
- .3 Approval from the Departmental Representative is required prior to any gas or diesel tank being brought onto the work site.

1.26 UNFORESEEN HAZARDS

- .1 Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and immediately advise the Departmental Representative verbally and in writing.

1.27 POSTED DOCUMENTS

- .1 Post legible versions of the following documents on site:
 - .1 Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP)
 - .2 Sequence of work.
 - .3 Emergency procedures.
 - .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
 - .5 Notice of Project.
 - .6 Floor plans or site plans.
 - .7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.
 - .8 Workplace Hazardous Materials Information System (WHMIS 2015) documents.
 - .9 Material Safety Data Sheets (SDS).
 - .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
 - .11 All Hazardous Material and Substance Reports including Lab Analysis
- .2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.
- .3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

1.32 MEETINGS

- .1 Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.

1.33 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.

- .2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.
- .3 The Departmental Representative may issue a "stop work order" if noncompliance of health and safety regulations is not corrected immediately or within posted time. The General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".

2 PRODUCTS

- .1 Not used.

3 EXECUTION

- .1 Not used.

END OF SECTION

Part 1 General

1.1 CONSTRUCTION FIRE SAFETY

- .1 The Contractor shall provide construction fire safety in accordance with the National Fire Code of Canada.

1.2 REPORTING FIRES

- .1 The Contractor shall inform the Departmental Representative of all fire incidents at the construction site, regardless of size.
- .2 Know location of nearest fire alarm pull station and telephone, including emergency phone number.
- .3 Report immediately fire incidents to Fire Department as follows:
 - .1 Call 911.
- .4 Person activating fire alarm pull station or phoning will remain on site to direct Fire Department to scene of fire.
- .5 When reporting fire by telephone, give location of fire, name or number of building and be prepared to verify location.

1.3 FIRE SAFETY PLAN

- .1 Submit a fire safety plan for the construction site prior to commencement of construction work. The fire safety plan shall conform to the National Fire Code of Canada.
- .2 The fire safety plan shall be submitted to the Departmental Representative for review by local fire department. Any comments by local fire department shall be implemented by the Contractor.
- .3 The fire safety plan shall be limited to the area of construction only.
- .4 Post the fire safety plan at the entrance to the construction site or near the construction site's health and safety board.
- .5 The fire safety plan shall conform to the National Fire Code of Canada, and shall contain, at minimum:
 - .1 Emergency procedures to be used in case of fire, including:
 - .1 Sounding the fire alarm;
 - .2 Notifying the fire department;
 - .3 Instructing occupants on procedures to be followed when the fire alarm sounds;
 - .4 Evacuating occupants, including special provisions for persons requiring assistance and;
 - .5 Confining, controlling and extinguishing fires.
 - .2 The appointment and organization of designated supervisory staff to carry out fire safety duties.
 - .3 The training of supervisory staff and other occupants in their responsibilities for fire safety.

- .4 Documents including diagrams, showing the type, location and operation of building fire emergency systems.
- .5 The holding of fire drills (where applicable).
- .6 The control of fire hazards in the building.
- .7 The inspection and maintenance of building facilities provided for the safety of occupants.

1.4 FIRE WARNING SYSTEM

- .1 A fire warning shall be provided to notify construction personnel of a fire emergency in the construction area.
- .2 The system used shall be capable of being heard throughout the construction site.

1.5 EXTERIOR FIRE PROTECTION SYSTEMS

- .1 Do not use Fire hydrants, standpipes or hose systems for other than fire-fighting purposes unless authorized by the Departmental Representative.

1.6 FIRE EXTINGUISHERS

- .1 In addition to other requirements of this specification, supply fire extinguishers necessary to protect work in progress and contractor's physical plant on site.
- .2 Fire extinguishers may be required in the following areas:
 - .1 Adjacent to hot works;
 - .2 In areas where combustibles are stored;
 - .3 Near or on any internal combustion engines;
 - .4 Adjacent to areas where flammable liquids or gases are stored or handled;
 - .5 Adjacent to temporary oil fired or gas fired equipment and;
 - .6 Adjacent to bitumen heating equipment.
- .3 Extinguishers shall be sized as 4-A:40-B:C (20 lbs) unless otherwise directed by the Departmental Representative.
- .4 Extinguishers shall be of the dry chemical type unless otherwise required by the hazard being protected.
- .5 The Contractor may assume the quantity of extinguishers based on a maximum travel distance between extinguishers of 75 feet.

1.7 ACCESS FOR FIRE FIGHTING

- .1 Access for firefighting shall be provided in accordance with the National Fire Code of Canada.

1.8 SMOKING PRECAUTIONS

- .1 Smoking is prohibited in all buildings. Observe posted smoking restrictions on entire site. Smoking only in designated areas. Contractor to provide designated smoking area for the project.

1.9 RUBBISH AND WASTE MATERIALS

- .1 Keep rubbish and waste materials at minimum quantities.

- .2 Burning of rubbish is prohibited.
- .3 Remove rubbish from work site at end of work day or shift or as directed.
- .4 Storage:
 - .1 Store oily waste in approved receptacles to ensure maximum cleanliness and safety.
 - .2 Deposit greasy or oily rags and materials subject to spontaneous combustion in approved receptacles and remove specified.

1.10 FLAMMABLE AND COMBUSTIBLE LIQUIDS

- .1 Handle, store and use of flammable and combustible liquids in accordance with the National Fire Code of Canada.
- .2 Keep flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing Underwriters' Laboratory of Canada or Factory Mutual seal of approval. Obtain written authorization from Tahsis Fire Chief for storage of quantities of flammable and combustible liquids exceeding 45 litres.
- .3 Do not transfer flammable or combustible liquids inside buildings.
- .4 Do not transfer flammable or combustible liquids in vicinity of open flames or any type of heat-producing devices.
- .5 Do not use flammable liquids having flash point below 38 degrees C such as naphtha or gasoline as solvents or cleaning agents.
- .6 Store flammable and combustible waste liquids, for disposal, in approved containers located in safe ventilated area. Keep quantities to a minimum and notify Departmental Representative when disposal is required.

1.11 HOT WORKS

- .1 The Contractor shall implement a hot works program in accordance with the National Fire Code of Canada and NFPA 51 Standard for Fire Prevention during Welding, Cutting and Other Hot Work.
- .2 Area of hot works:
 - .1 Hot works shall be carried out in an area free of combustible and flammable content.
 - .1 All flammable and combustible materials within 15m of the hot works shall be protected in accordance with the National Fire Code of Canada;
 - .2 A fire watch shall be provided during the hot work and for a period of not less than 60 minutes afterwards.
 - .2 Where there is a possibility of sparks leaking onto combustible materials in areas adjacent to the areas where the hot work is carried out.
 - .1 Openings in walls, floors or ceilings shall be covered or closed to prevent the passage of sparks to such adjacent areas, or
- .3 Protection of flammable and combustible materials.
 - .1 Any combustible or flammable material, dust or residue shall be:
 - .1 Removed from the area where hot works is carried out; or

.2 Protected from ignition by non combustible materials.

.4 Fire extinguisher:

.1 A fire extinguisher shall be provided within 3 m of all hot works. Minimum size shall be 20lbs.

1.12 HAZARDOUS SUBSTANCES

.1 Work entailing use of toxic or hazardous materials, chemicals and/or explosives, or otherwise creating hazard to life, safety or health, shall be in accordance with National Fire Code of Canada.

.2 Provide ventilation where flammable liquids, such as lacquers or urethanes are used. Eliminate all sources of ignition. Inform the Hartley Bay Fire Chief prior to and at completion of such work.

1.13 QUESTIONS AND/OR CLARIFICATION

.1 Direct questions or clarification on Fire Safety in addition to above requirements to the Departmental Representative.

1.14 FIRE INSPECTION

.1 Co-ordinate site inspections by the Fire Chief through 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

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 74 11 – Cleaning
- .3 Section 01 74 19 – Construction Waste Management and Disposal
- .4 Section 03 10 00 – Concrete Forming and Accessories
- .5 Section 03 30 00 – Cast-In-Place Concrete

1.2 REFERENCES

- .1 Canadian Environmental Protection Act (CEPA), 1999
- .2 British Columbia Environmental Management Act (EMA), 2004
- .3 Canadian Council of Ministers of the Environment (CCME) – Canadian Environmental Quality Guidelines

1.3 DEFINITIONS

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.
- .3 Deleterious Substance: any substance that, if added to water, makes the water deleterious to fish or fish habitat or any water containing a substance in such quantity or concentration or has been changed by heat or other means, that if added to water makes that water deleterious to fish or fish habitat.

1.4 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prior to commencing construction activities or delivery of materials to site, submit a site-specific Environmental Protection Plan for review by the Departmental Representative.

- .3 The Departmental Representative will review the Contractor's Environmental Protection Plan and provide comments to the Contractor within 14 days of receipt of each plan. Revise plans as appropriate and resubmit plans to Departmental Representative within 7 days after receipt of comments from Departmental Representative.
- .4 Departmental Representative's review of Contractor's Environmental Protection Plan shall not be construed as approval and does not reduce the Contractor's overall responsibility for construction environmental protection.
- .5 The Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction. Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .6 Project-specific **Environmental Protection Plan (EPP)**. Include:
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Names and qualifications of persons responsible for training site personnel.
 - .3 Descriptions of environmental protection personnel training program.
 - .4 Drawings showing locations of proposed material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
 - .5 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.
 - .6 Spill Prevention and Emergency Response Plan: including procedures, instructions, reports and equipment to be used in event of unforeseen spill of regulated substance. Refer to section on Spills or Releases of Deleterious Substances.
 - .7 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
 - .8 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.
 - .9 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage, handling, transportation and disposal of these materials.
 - .10 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of potentially contaminated ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

1.5 FIRES

- .1 Fires and burning of rubbish on site not permitted.

1.6 NOISE CONTROL

- .1 Work activities shall be limited to normal business hours to minimize noise disturbance to wildlife and humans.
- .2 Equipment and machinery shall be properly maintained to minimize unnecessary noise pollution. Where possible, noise control technology shall be applied on heavy machinery and equipment.
- .3 Work shall be completed in accordance with local municipal noise bylaws.

1.7 DISPOSAL OF WASTES

- .1 Do not discard or dispose of rubbish and waste materials on site unless approved by Departmental Representative.
- .2 Construction wastes must be stored securely and disposed of properly at an approved off-site location. Contractor is not permitted to use the Municipal waste collection system.
- .3 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .4 Provide on-site containers for collection of waste and recyclable materials. Divert recyclable materials from landfill. Departmental may request documented proof of proper disposal and recycling.
- .5 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.
- .6 Handle and transport hazardous and toxic waste in accordance with Transportation and Dangerous Goods Act, 1999.
- .7 Dispose of hazardous and toxic waste using facilities licensed to receive hazardous and toxic waste. Do not co-mingle hazardous and toxic waste with regular wastes or recyclable materials.
- .8 Provide the Departmental Representative with the name and certification of such facilities.
- .9 Provide the Departmental Representative with shipping manifests and bills of lading to verify legal disposal of hazardous and toxic waste materials.

1.8 DRAINAGE, EROSION AND SEDIMENTATION

- .1 Do not pump water containing deleterious substances into waterways, sewer or drainage systems.
- .2 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.9 WORK ADJACENT TO WATERWAYS

- .1 Do not operate construction equipment in waterways.
- .2 Do not dump excavated fill, waste material or debris in waterways.

1.10 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this contract.
- .2 Control emissions from equipment and plant to local authorities' emission requirements.
- .3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
- .4 Protect the roadways from tracking mud, soil and debris throughout the work.

1.11 SPILLS OR RELEASE OF DELETERIOUS SUBSTANCES

- .1 Spills can happen at any time during construction, and there are specific times when the risk is higher such as during the use of paints, corrosive protective coatings, wood preservatives and while working with concrete. Sawdust and wood shavings can potentially enter the marine environment from cutting and drilling during repairs. Potential spills of deleterious substances could result in contamination of the local marine environment, which is a potential violation under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act.
- .2 Measures to be implemented to prevent, control, or mitigate spills or release of deleterious substances:
 - .1 Emergency response procedure for spills of deleterious substances must be in place. In the event of a Level I spill (easily contained and cleaned) the contractor will provide spill response and notify the Departmental Representative that a spill has occurred.
 - .2 Notify Departmental Representative of all spills, regardless of severity. Submit within 24 hours of the spill, a written spill report containing the following minimum information:
 - .1 Date, time, location of spill;
 - .2 Substance spilled;
 - .3 Approximate volume spilled;
 - .4 Approximate area of spill;
 - .5 Type of surface at spill site;
 - .6 Circumstances resulting in the spill;
 - .7 Actions taken;
 - .8 Affected receptors; and
 - .9 Weather conditions at the time of the spill.

- .3 Response equipment is to be on site at all times (i.e. spill kits) and workers trained in their location and use. The resources on hand must be sufficient to respond effectively and expediently to any spill that could occur onsite.
- .4 All construction equipment brought onto the site will be clean and properly maintained.
- .5 Equipment refueling or lubricating shall occur in a designated area > 30m from the marine environment with proper controls to prevent the release of deleterious substances and shall be conducted away from any surface water drains or collection points.
- .6 Any equipment remaining on site overnight shall have appropriately placed drip pans.
- .7 The Contractor shall take due care to ensure no deleterious materials including sediment-laden runoff leave the worksite, or enter any surface water or storm water or sanitary sewer at or near the worksite.
- .8 Concrete wash water from cast-in-place concrete works (within the first 72 hours) shall not enter any surface water or storm water or sanitary sewer at or near the worksite. Concrete pouring should not be performed if significant precipitation events are expected within 72 hours.
- .9 The Contractor shall ensure that no sawdust or shavings enter the marine environment. In the event that sawdust and shavings enter the marine environment, they shall be collected promptly and disposed of appropriately.
- .10 The rinse, cleaning water or solvents for glues, paints, wood preservatives and other potentially harmful or toxic substances shall be controlled so as to prevent leakage, loss of discharge into the storm drain system or into the marine environment.
- .11 Prevent discharges containing asphalt, grout, concrete or other waste materials from reaching storm drains or the marine environment. This includes, but is not limited to:
 - .1 Minimizing the washing of sand or gravel from new asphalt, debris from drilling or cutting or other materials into storm drains and the marine environment by sweeping.
 - .2 Application of fog seals, tack coats or other coatings, if required, during periods when rainfall is unlikely to occur during application.
 - .3 Cleaning equipment off site.
 - .4 Protection of drainage structures with sediment controls as required.

1.12 HAZARDOUS MATERIALS

- .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
- .2 Store hazardous or toxic substances in a designated area.
- .3 Manage transport and dispose of hazardous materials in an approved legal manner in accordance with hazardous waste regulations.

- .4 Provide Departmental Representative with waste manifest for disposal of hazardous materials.

1.13 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection Plan, Erosion and Sediment Control Plan or Soil Management Plan.
- .2 Contractor: After receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

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 AND CODES

- .1 Perform Work in accordance with National Building Code of Canada (NBC) 2015 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 Comply with applicable local bylaws rules and regulations enforced at the location concerned.
- .3 Provide inspection authorities having jurisdiction with plans and information required for issue of acceptance certificates.
- .4 Pay fees and obtain certificates and permits required.
- .5 Furnish inspection certificates in evidence that the work installed conforms to the requirements of the authority having jurisdiction.
- .6 Conform to the Canada Labour Code II, Canada Occupational Safety and Health regulations.
- .7 FCC, Fire Commissioner of Canada.
 - .1 Standard No. 301, "Construction Operations, June 1982.
- .8 WCB, Worker's Compensation Act, B.C., Reg. 185/99.
- .9 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.2 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions and local by-laws.

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 INSPECTION

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

1.2 PROCEDURES

- .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.3 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If ,in the opinion of Departmental Representative, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents the Departmental Representative will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents.
- .4 In case of dispute, decisions as to standard or quality of work rests solely with the Departmental Representative.

1.4 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies are to be engaged by the contractor to inspect portions of the work, as indicated in individual specification sections.
- .2 Contractor is to allow for the costs of these inspections.
- .3 Provide equipment required for executing inspection and testing by appointed agencies.
- .4 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

- .5 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and reinspection.

1.5 TESTS AND MIX DESIGNS

- .1 Furnish test results and mix designs as requested.

1.6 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Departmental Representative, as specified in specific Section.
- .3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups 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.
- .5 Departmental Representative may allow Mock-ups to remain as part of the work.

1.7 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.
- .2 Refer to individual specification sections for definitive requirements.

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 INSTALLATION AND REMOVAL

- .1 Provide temporary utilities controls in order to execute work expeditiously.
- .2 Remove from site all such work after use.

1.2 WATER SUPPLY

- .1 Departmental Representative will provide continuous supply of potable water for construction use.
- .2 Exercise conservation. Turn off water when not in use.
- .3 Provide all equipment and temporary hoses to bring water supply to site, at no additional cost to the contract.
 - .1 Temporary water will be available on site.

1.3 TEMPORARY POWER AND LIGHT

- .1 Electrical power is available for construction purposes at no cost for construction use.
- .2 Departmental Representative will determine delivery points and quantitative limits. Connect to existing power supply in accordance with Canadian Electrical Code.
- .3 Provide all equipment and temporary lines to bring these services to the work, at no additional cost to the contract.
- .4 Exercise conservation whenever using temporary electrical power supply.

1.4 FIRE PROTECTION

- .1 Burning rubbish and construction waste materials is not permitted on site.

Part 2 Products

2.1 NOT USED

Part 3 EXECUTION

- .1 NOT USED

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

- .1 Provide construction facilities in order to execute work expeditiously.
- .2 Remove from site all such work after use.

1.2 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain any scaffolding, ladders, shoring and platforms necessary for the performance of the work.
- .3 Provide scaffolding and support structures as detailed in individual specification sections.

1.3 HOISTING

- .1 Provide, operate and maintain hoists required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
- .2 Hoists to be operated by B.C. certified personnel.
- .3 Notify Departmental Representative not less than 5 working days prior to any cranes or lifting devices coming on site.

1.4 SITE STORAGE/LOADING

- .1 Confine work and operations of employees to areas as directed by Departmental Representative unless otherwise identified in Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.5 SITE OFFICE

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

1.6 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities where directed by Departmental Representative.
- .3 Laydown area on this site is very limited.

1.7 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.8 CONSTRUCTION SIGNAGE

- .1 No project identification signage allowed.
- .2 No other signs or advertisements, other than warning signs, are permitted on site.
- .3 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .4 Maintain approved signs and notices in good condition for duration of project. Dispose of off-site on completion of project or earlier if directed by Departmental Representative.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 Not Used

END OF SECTION

General

1.1 INSTALLATION AND REMOVAL

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.

1.2 HOARDING and BARRIERS

- .1 Provide minimum 1,828.8mm high construction fencing around perimeter of the area of work.
 - .1 Extent of fencing to prevent unsafe entry of work area's for persons not engaged by contractor.

1.3 ACCESS TO SITE

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.4 FIRE ROUTES

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.5 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.
- .3 Be responsible for damage incurred due to lack of or improper protection.

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

END OF SECTION

Part 1 General

1.1 WASTE MANAGEMENT AND DISPOSAL

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

1.2 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .2 Maintain public areas adjacent to the worksite in a tidy condition.
- .3 Remove waste materials from site at daily and as directed by the Departmental Representative.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site dump containers for collection of waste materials and debris.
- .6 Dispose of waste materials and debris.
 - .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
 - .2 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
 - .3 Remove hazardous materials away from public areas as they are exposed.
- .7 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
- .8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

1.3 DAILY CLEANING

- .1 Conduct cleaning and disposal operations daily. Comply with local ordinances and anti-pollution laws.
- .2 Remove waste products and debris other than that caused by others, leave Work area clean.
- .3 Maintain cleanliness of adjacent areas during the demolition phase.

1.4 FINAL CLEANING

- .1 When all of the Work has been Substantially Performed, 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 Remove waste products and debris.
- .5 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .6 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .7 Sweep and wash clean paved areas.
- .8 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical 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 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 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 submitted for 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.

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 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.
- .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 01 35 43 – Environmental Procedures.
- .2 Section 01 56 00 – Temporary Barriers and Enclosures.
- .3 Section 01 74 11 – Cleaning.

REFERENCES

- .4 CSA International
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .5 Canadian Environmental Protection Act (CEPA), 1993, C.33.

1.2 REGULATORY REQUIREMENTS

- .1 Conform to applicable code for demolition of structures, safety of adjacent structures, and disposal.
- .2 Obtain required permits from authorities.

1.3 SITE CONDITIONS

- .1 Take precautions to protect environment and undertake works in conformance with Contract Documents for siltation control and pollution prevention.
- .2 If material resembling spray or trowel-applied asbestos or other designated substance not listed in the hazardous materials report is encountered, stop work, take preventative measures, and notify Departmental Representative immediately.
 - .1 Proceed only after receipt of written instructions have been received from Departmental Representative.
- .3 Notify Departmental Representative before disrupting building access or services.

PART 2 Products

2.1 NOT USED

- .1 Not used.

PART 3 Execution

3.1 EXAMINATION

- .1 Inspect site and verify extent and location of items designated for removal, disposal, alternative disposal or recycling.
- .2 Locate and protect utilities.

3.2 PREPARATION

- .1 Protection of In-Place Conditions:

- .1 Prevent movement, settlement, or damage to adjacent structures, utilities, and parts of building to remain in place. Provide bracing and shoring required.
- .2 Keep noise, dust, and inconvenience to site occupants to a minimum.
- .3 Do Work in accordance with Section 01 35 30 - Health and Safety.
- .4 Conduct demolition in accordance with requirements of Section 01 35 43 Environmental Procedures.

3.2 DEMOLITION/REMOVAL:

- .1 Do demolition work in accordance with CSA S350.
- .2 Remove existing metal stair/ handrail/ guardrail assembly.
 - .1 Remove glass panels in guardrail assembly, protect and store until reassembly.
 - .2 Remove entire stair assembly, protect and store until reassembly.
 - .3 Remove guardrail portions on existing walkway as required to install new walkway sections.
- .3 Remove 25mm concrete deck surface at roll up door entrance in preparation for concrete ramp installation.
 - .1 Refer to drawings for extent of concrete removal.

3.3 CLEANING

- .1 Restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas or to conditions that existed prior to beginning of Work.
- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work areas clean at end of each day.
- .1 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Transport material designated for alternate disposal using approved facilities listed in Waste Reduction Workplan and in accordance with applicable regulations.
 - .1 Disposal facilities must be those approved of and listed in Waste Reduction Workplan.
- .3 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 20 00 – Concrete Reinforcing
- .2 Section 03 30 00 – Cast-in-Place Concrete

1.2 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA A23.1-14 /A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA O86-14, Engineering Design in Wood.
 - .3 CSA O121-08 (R2013), Douglas Fir Plywood.
 - .4 CAN/CSA O325.0-16, Construction Sheathing.
 - .5 CSA S269.1-16, Falsework and Formwork.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation Meetings convene for a pre-installation meeting one week prior to beginning concrete works.
 - .1 Ensure key personnel, site supervisor, Departmental Representative, concrete producer speciality contractor - finishing, forming attend.
 - .1 Verify project requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit copy of WHMIS SDS in accordance with Section 01 35 43 - Environmental Procedures and 01 35 30 - Health and Safety Requirements.

1.5 QUALITY ASSURANCE

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

1.6 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 and in accordance with manufacturer’s recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect formwork from damages.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

- .1 Formwork materials:
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CAN/CSA O86 and CSA O121.
 - .2 For concrete with special architectural features, use formwork materials to CSA A23.1/A23.2.
- .2 Tubular column forms: spirally wound, polyethylene impregnated virgin kraft interior layer and a waxed exterior, internally treated with release material.
- .3 Form ties:
 - .1 For concrete not designated Architectural: removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes minimum 25 mm diameter in concrete surface.
 - .2 For Architectural concrete; snap ties complete with plastic cones and light grey concrete plugs.
- .4 Form liner:
 - .1 Plywood: Douglas Fir to CSA O121
- .5 Form release agent: Proprietary, non- volatile material not to stain concrete or impair subsequent application of finishes or coatings to surface of concrete, derived from agricultural sources, non- petroleum containing, non-toxic, biodegradable and low VOC.
- .6 Falsework materials: to CSA S269.1.
- .7 Sealant: to Section 07 92 00 - Joint Sealing.

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 approval for use of earth forms framing openings not indicated on drawings.
- .3 Do not close wall forms before reinforcing steel has been reviewed by the Departmental Representative.
- .4 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .5 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.
- .6 Align form joints and make watertight.

- .1 Keep form joints to minimum.
- .7 Use 25 mm chamfer strips on external corners and 25 mm fillets at interior corners, joints, unless specified otherwise.
- .8 Apply a form coating and release agent uniformly to the contact surface of formwork panels before reuse.
- .9 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .10 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.
- .11 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 2 days for walls and sides of beams.
 - .2 2 days for footings.
- .2 Remove formwork when concrete has reached 70 % of its 28 day design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .3 Re-use formwork and falsework subject to requirements of CSA A23.1/A23.2.

3.3 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 10 00 – Concrete Forming and Accessories
- .2 Section 03 30 00 – Cast-in-Place Concrete

1.2 PRICE AND PAYMENT PROCEDURES

- .1 Measurement and Payment:
 - .1 No measurement made under this Section.
 - .1 Include reinforcement costs in items of concrete work in Section 03 30 00 - Cast-In-Place Concrete.

1.3 REFERENCE STANDARDS

- .1 American Concrete Institute (ACI)
 - .1 SP-66-04, ACI Detailing Manual 2004.
- .2 ASTM International (ASTM)
 - .1 ASTM A641/A641M-09a(2014), Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - .2 ASTM A1064/A1064M-17, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- .3 CSA Group (CSA)
 - .1 CSA A23.1-14 /A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA A23.3-14, Design of Concrete Structures.
 - .3 CSA G30.18-09 (R2014), Carbon Steel Bars for Concrete Reinforcement.
 - .4 CSA G40.20/G40.21-13 (R2014), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .5 CSA W186-M1990 (R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .4 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation Meetings: Convene for a pre-installation meeting one week prior to beginning concrete works.
 - .1 Ensure site supervisor, departmental representative, concrete producer and speciality contractor - finishing, forming attend.
 - .1 Verify project requirements.

1.5 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 proprietary materials used in Cast-In-Place Concrete and additives. Include product characteristics, performance criteria, physical size, finish, and limitations.
 - .2 Submit copy of WHMIS Safety Data Sheet (SDS) in accordance with Section 1 35 30 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.
- .3 Shop Drawings:
 - .1 Submission of shop drawings is not required.
 - .1 If required for installation prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and SP-66.
 - .2 Indicate placing of reinforcement and:
 - .1 Bar bending details.
 - .2 Lists.
 - .3 Quantities of reinforcement.
 - .4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
 - .5 Indicate sizes, spacings and locations of chairs, spacers and hangers.
 - .3 Detail lap lengths and bar development lengths to CAN/CSA A23.3, unless otherwise indicated.
 - .1 Provide Class B unless otherwise indicated.
 - .4 Indicate position and size of openings in slabs and walls. Coordinate with trades requiring openings.
 - .4 Sustainable Design Submittals:
 - .1 Construction Waste Management:
 - .1 Submit project Waste Management Plan and Waste Reduction Workplan highlighting recycling and salvage requirements.
 - .5 Quality Assurance Submittals:
 - .1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and 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 Replace defective or damaged materials with new.

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 A1064/A1064M.
- .5 Deformed steel wire for concrete reinforcement: to ASTM A1064/A1064M.
- .6 Welded steel wire fabric:
 - .1 Plain in accordance ASTM A1064/A1064M, fabricated from as drawn steel wire into flat sheets; sizes as indicated on Drawings.
 - .2 Provide in flat sheets only.
- .7 Chairs, bolsters, bar supports, spacers: to CSA A23.1/A23.2.
- .8 Tie wire: 1.5 mm diameter annealed wire
- .9 Mechanical splices: subject to approval of Departmental Representative
- .10 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 and SP-66.
- .2 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
- .3 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
- .4 Provide standard hooks at the ends of all hooked bars
- .5 Substitute different size bars only if permitted in writing by the Departmental Representative

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 2 weeks prior to beginning reinforcing work.
- .2 Upon request inform Departmental Representative of proposed source of supplied material.

Part 3 Execution

3.1 PREPARATION

- .1 Galvanizing to include chromate treatment.
 - .1 Duration of treatment 1 hour per 25 mm of bar diameter.
- .2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

3.2 FIELD BENDING

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.

3.3 PLACING REINFORCEMENT

- .1 Cutting or puncturing vapour retarder is not permitted; repair damage and reseal vapour retarder before placing concrete.
- .2 Place reinforcing steel as indicated on placing drawings in accordance with CSA A23.1/A23.2.
- .3 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 Apply thick even film of mineral lubricating grease when paint is dry.
- .4 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .5 Maintain cover to reinforcement during concrete pour.
- .6 Remove all loose scale, dirt, oil or other coating which would reduce bond prior to concrete pour.

3.4 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 10 00 – Concrete Forming Accessories
- .2 Section 03 20 00 – Concrete Reinforcing.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM C260/C260M-10a(2016), Standard Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C494/C494M-16, Standard Specification for Chemical Admixtures for Concrete.
 - .4 ASTM C 881/C881M-15, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - .5 ASTM C1017/C1017M-13e1, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - .6 ASTM C C1059/C1059M-13, Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete.
 - .7 ASTM D412-16, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
 - .8 ASTM D624-2012, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
 - .9 ASTM D1751-04 (2013)e1, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - .10 ASTM D1752-04a(2013), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .3 CSA Group
 - .1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA A283-06-R2016, Qualification Code for Concrete Testing Laboratories.
 - .3 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005),

1.3 ABBREVIATIONS AND ACRONYMS

- .1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement types:
 - .1 GU, GUb and GUL - General use cement.
 - .2 MS and MSb - Moderate sulphate-resistant cement.
 - .3 MH, MHb and MHL - Moderate heat of hydration cement.
 - .4 HE, HEb and HEL - High early-strength cement.
 - .5 LH, LHb and LHL - Low heat of hydration cement.
 - .6 HS and HSb - High sulphate-resistant cement.
- .2 Fly ash types:
 - .1 F - with CaO content maximum 8%.
 - .2 CI - with CaO content 15 to 20%.
 - .3 CH - with CaO minimum 20%.
- .3 GGBFS - Ground, granulated blast-furnace slag.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation meetings convene for a pre-installation meeting one week prior to beginning concrete works.
 - .1 Ensure site supervisor, concrete producer, speciality contractor - finishing, forming, key personnel and Departmental Representative attend.
 - .1 Verify project requirements.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in Cast-In-Place Concrete and additives and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit copies of WHMIS SDS in accordance with Section 01 35 30 - Health and Safety Requirements and 01 35 43 - Environmental Procedures
- .3 Site Quality Control Submittals:
 - .1 Provide test reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters found.
 - .2 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.
 - .3 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete delivered to site of Work and discharged after batching.

- .4 Sustainable Design Submittals:
 - .1 Construction Waste Management:
 - .1 Submit project Waste Reduction Workplan and Waste Management Plan highlighting recycling and salvage requirements.

1.6 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 meet specified requirements.
- .3 At least 2 weeks prior to beginning Work, inform Departmental Representative of source of fly ash.
 - .1 Changing source of fly ash without written approval of Departmental Representative is prohibited.
- .4 Minimum 2 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
 - .1 Falsework erection.
 - .2 Cold weather concrete.
 - .3 Curing.
 - .4 Finishes.
 - .5 Formwork removal.
 - .6 Joints.
- .5 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.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements:
- .2 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
 - .1 Modifying maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2. is prohibited.
 - .2 Deviations submitted for review by Departmental Representative.
 - .3 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2

1.8 SITE CONDITIONS

- .1 Placing concrete during rain or weather events that could damage concrete is prohibited.

- .2 Protect newly placed concrete from rain or weather events in accordance with CSA A23.1/A23.2.
- .3 Cold weather protection:
 - .1 Maintain protection equipment, in readiness on Site.
 - .2 Use such equipment when ambient temperature below 5°C, or when temperature may fall below 5°C before concrete cured.
 - .3 Placing concrete upon or against surface at temperature below 5°C is prohibited.
- .4 Hot weather protection:
 - .1 Protect concrete from direct sunlight when ambient temperature above 27°C.
 - .2 Prevent forms of getting too hot before concrete placed. Apply accepted methods of cooling not to affect concrete adversely.
- .5 Protect from drying.

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: GU.
 - .1 Reduction in cement from Base Mix to Actual Supplementary Cementing Materials (SCMs) Mix, as percentage.
- .2 Blended hydraulic cement: Type GUb to CSA A3001.
- .3 Portland-limestone cement: Type GUL to CSA A3001.
- .4 Supplementary cementing materials: with minimum 20% fly ash replacement, by mass of total cementitious materials to CSA A3001.
- .5 Water: to CSA A23.1.
- .6 Aggregates: to CSA A23.1/A23.2.
- .7 Admixtures:
 - .1 Air entraining admixture: to ASTM C260.
 - .2 Chemical admixture: to ASTM C494. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
 - .3 Corrosion-inhibiting admixture: to
 - .4 Lithium-based admixture: to
 - .5 Shrinkage-reducing admixture (SRA): to

- .6 Viscosity-modifying agent (VMA): to
- .8 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: 40 MPa at 28 days.
- .9 Curing compound: to CSA A23.1/A23.2 and ASTM C309, Type 1-chlorinated rubber.

2.4 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to 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 plastic state requirements:
 - .1 Uniformity: uniform density, air content, and slump.
 - .2 Workability: free of segregation, surface blemishes, loss of mortar, and colour variations..
 - .3 Finishability: to CSA A23.1/A23.2.
 - .3 Provide concrete mix to meet the Alternative 1 as per CSA A23.1/A23.2. Concrete mixes shall be provided as shown in the structural drawings.
 - .4 Provide quality management plan to ensure verification of concrete quality to specified performance.
 - .5 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 Provide 5 days notice for coordination of inspection of reinforcing as required by the Departmental Representative's
- .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 facilitate 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 Disturbing reinforcement and inserts during concrete placement is prohibited.
- .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, workability, air content, temperature and test samples taken.
- .10 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 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.
 - .4 Confirm locations and sizes of sleeves and openings shown on drawings.
 - .5 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 coordination 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 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 used, remove them after concrete has set.
 - .2 Install weep hole tubes and drains as indicated.
- .5 Grout under base plates and machinery 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 and as indicated on the architectural drawings
 - .2 Use procedures as reviewed by Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface not damaged.
 - .3 Use curing compounds compatible with applied finish on concrete surfaces.
 - .4 Finish concrete floor to CSA A23.1/A23.2. Class A.
 - .5 Concrete floor to have finish hardness minimum to CSA A23.1/A23.2
 - .6 Provide steel trowel finish unless otherwise indicated.
 - .7 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.

- .7 Toppings:
 - .1 Topping mixture to meet minimum requirements as follows: Bonded overlay
 - .2 Make allowance for bonded overlay topping thickness when pouring base course.
 - .3 Apply latex bonding agent modified cement/sand grout to base course to CSA A23.1/A23.2.
 - .4 Place bonded topping to CSA A23.1/A23.2 and topping manufacturers recommendations.
 - .5 Ensure joints in topping of same material as those in base course. Ensure their locations precisely match those in base course. Provide reinforcing mesh and edge strips dividers as indicated.
- .8 Joint fillers:
 - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.
 - .2 When more than one piece required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
 - .3 Locate and form expansion and construction joints as indicated.
 - .4 Install joint filler.
- .9 Dampproof membrane:
 - .1 Install dampproof membrane under concrete slabs-on-grade inside building.
 - .2 Do not place on surface between Slab on Grade and Grade Beams.
 - .3 Install in conformance with architectural drawings.
 - .4 Lap dampproof membrane minimum 150 mm at joints and seal.
 - .5 Seal punctures in dampproof membrane before placing concrete.
 - .6 Use patching material minimum 150 mm larger than puncture and seal.

3.3 SURFACE TOLERANCE

- .1 Concrete tolerance to CSA A23.1 Straightedge Method to tolerance of 8mm in 3000mm

3.4 FIELD QUALITY CONTROL

- .1 Site tests: conduct tests as follows 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.
 - .5 Air and concrete temperature.
- .2 Inspection and testing of concrete and concrete materials carried out testing laboratory designated by Contractor for review to CSA A23.1/A23.2.
 - .1 Ensure testing laboratory certified to CSA A283.
 - .2 Provide the Departmental Representative with a copy of all concrete test results

- .3 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.
- .4 Inspection or testing by Consultant not to augment or replace Contractor quality control nor relieve Contractor of contractual responsibility.

3.5 CLEANING

- .1 Progress Cleaning – Leave work area clean at end of each day.
- .2 Waste Management: separate waste materials for recycling and reuse in accordance with 01 74 19 - Waste Management and Disposal.
 - .1 Divert unused concrete materials from landfill to local facility and/or quarry 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 Departmental Representative.
 - .4 Disposal of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location to pose health or environmental hazard is prohibited.
 - .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 SECTION INCLUDES

- .1 Liquid applied cementitious self-leveling floor underlayment.

1.2 RELATED SECTIONS

- .1 Section 06 10 00 - Rough Carpentry.
- .2 Section 07 21 13 - Board Insulation.

1.3 REFERENCES

- .1 ASTM C109/C109M Standard Test Method for Compressive Strength of Hydraulic Cement Mortars Using 50-mm Cube Specimens.
- .2 ASTM C348 Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
- .3 ASTM C1708 Standard Test Methods for Self-leveling Mortars Containing Hydraulic Cements

1.4 SUBMITTALS FOR REVIEW

- .1 Section 01 33 00: Submission procedures.
- .2 Product Data: Provide physical characteristics and product limitations.

1.5 SUBMITTALS FOR INFORMATION

- .1 Section 01 33 00: Submission procedures.
- .2 Manufacturer's Instructions: Indicate application and mix instructions.

1.6 QUALITY ASSURANCE

- .1 Applicator Qualifications: Company specializing in performing the work of this section.

1.7 ENVIRONMENTAL REQUIREMENTS

- .1 Section 01 35 43: Environmental conditions affecting products on site:
 - .1 Cementitious materials must not enter waterways.
 - .2 Do not install underlayment until floor penetrations and peripheral work are complete.
 - .3 Maintain minimum ambient temperatures to manufacturer's recommendations during and after installation.
 - .4 During the curing process, ventilate spaces to remove excess moisture.

Part 2 Products

2.1 MATERIALS

- .1 Underlayment: Self finishing floor topping mixture formulated to work without troweling.
 - .1 Cementitious based mix.
 - .2 Materials to ASTM C1708.
 - .3 Compressive strength to ASTM C109. 13.7 MPa @ 28 days
 - .4 Flexural Strength to ASTM C348 4.1MPa @28 days.
- .2 Water: Potable and not detrimental to underlayment mix materials.
- .3 Primer: Manufacturer's recommended type.

2.2 MIXING

- .1 Site mix materials in accordance with manufacturer's written instructions.
- .2 Mix to self-leveling consistency.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum bi-products, or other compounds detrimental to underlayment material bond to substrate.

3.2 PREPARATION

- .1 Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.
- .2 Vacuum clean surfaces.
- .3 Prime substrate to manufacturer's written instructions. Allow to dry.
- .4 Close floor openings.

3.3 APPLICATION

- .1 Install underlayment to manufacturer's instructions.
- .2 Place to thickness as required to produce a level floor surface, suitable for installation of insulation and plywood as indicated in the work of other sections.
 - .1 Coordinate with the work of other trades.

3.4 CURING

- .1 Air cure to manufacturer's written instructions.

3.5 PROTECTION OF FINISHED WORK

- .1 Section 01 78 40: Protecting installed work.

- .2 Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 06 10 00 - Rough Carpentry.
- .2 Section 07 62 00 - Sheet Metal Flashing and Trim.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM A53/A53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A269-08, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 CSA International
 - .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA S16-09, Design of Steel Structures.
 - .3 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .4 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.

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 sections, plates, pipe, tubing and bolts and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit copies of WHMIS MSDS in accordance with Section 01 35 30 - Health and Safety Requirements
 - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.

- .3 Shop Drawings:
 - .1 Submit drawings for hand rails and guardrails stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Leave protective coverings in place until final cleaning of the building.

Part 2 Products

2.1 MATERIALS

- .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 300W.
- .2 Steel pipe: to ASTM A53/A53M standard weight black galvanized finish.
- .3 Welding materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.
- .5 Bolts and anchor bolts: to ASTM A307. Stainless steel alloy at exposed-to-view exterior applications, galvanized at concealed exterior applications
- .6 Screws, lag bolts: purpose-made to suit applications, stainless steel alloy at exposed-to-view exterior applications, galvanized at concealed exterior applications.
- .7 Nuts, washers: stainless steel alloy for exterior exposed-to-view applications, galvanized at concealed exterior applications.
- .8 Shop coat primer: to CAN/CGSB-1.40.

2.2 FABRICATION

- .1 Fabricate in accordance with approved shop drawings.
- .2 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .3 Where possible, fit and shop assemble work, ready for erection.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

- .5 Remove welding slag and spatter. Grind smooth all sharp edges and welds.
- .6 Unless otherwise detailed, fabricate pipe railing assemblies generally as follows:
 - .1 Fit round steel caps, full welded in place, at exposed ends and terminations.
 - .2 Allow minimum 38 mm to maximum 50 mm clearance between railings and wall surfaces.
 - .3 Use pipe inserts to join railing sections together at joints.
 - .4 Fabricate railing assemblies in as large a size as possible.
- .7 Remove all rust, scale, oil and other foreign substances by wire brush, sand blasting or any other means which provides clean steel surfaces for first class smooth permanent paint finishes.

2.3 FINISHES

- .1 Prime railings prior to installation. Primer to be compatible with railing paint system. Refer to Section 09 90 00 - Painting

2.4 PIPE RAILINGS AND GUARDS

- .1 Fabricate handrail rail sections for staircases as indicated.
- .2 Steel pipe: 38 mm nominal outside diameter, formed to shapes and sizes as indicated.

2.5 MISCELLENEOUS

- .1 Ledge and Shelf Angles, Channels and Plates Not Attached to Structural Framing: For support of metal decking, joists, and curtain wall framing; hot dipped galvanized finish.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles. Refer to details.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.

- .5 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CSA S16.
- .7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .8 Touch-up rivets, bolts and burnt or scratched surfaces with primer after completion of installation.
- .9 All field connections to be made with specified fasteners. No field welding allowed without specific permission by Departmental Representative.

3.3 INSTALLATION

- .1 Install pipe railings on new stairway as detailed and in accordance with engineered shop drawings.
- .2 Install items plumb and level, accurately fitted, free from distortion or defects.
- .3 Perform field welding in accordance with AWS D1.1.

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 recycling in accordance with Section 01 74 19 - Construction Waste Management and Disposal.

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

PART 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 06 41 11 - Architectural Woodwork and 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 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 handrails, millwork, and washroom accessories.

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 to the species and grade indicated on the structural drawings.
- .4 Wood I-Joists in accordance with Prefabricated Wood I-Joists ASTM D5055
- .5 Structural Composite Lumber SCL in accordance with ASTM D5456
- .6 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.
- .7 Plywood, OSB and wood based composite panels: to CSA O325.
- .8 Douglas Fir plywood (DFP): to CSA O121, standard construction and in accordance with structural drawings. Tongue and groove format where indicated.

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: 15.5 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 Wood Preservative:
 - .1 Preservative: in accordance with manufacturer's recommendations for surface conditions

- .10 Fastener Finishes:
 - .1 Galvanizing: to ASTM A153/A153M, use galvanized fasteners for exterior work, and interior highly humid areas.
 - .2 All fasteners used with pressure treated materials must be compatible with preservative used.

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 D fir plywood, as specified in Structural drawings.
- .2 Wall sheathing:
 - .1 D fir plywood, as specified in Structural drawings.
- .3 Floor sheathing:
 - .1 D fir plywood, as specified in Structural drawings.
 - .2 Tongue and groove format.
- .4 Strapping for cladding system.
 - .1 Pressure treated plywood, thickness as detailed.
- .5 Interior wall protection
 - .1 Plywood, DFP G1S grade, or, square edge 13 mm thick

3.3 INSTALLATION

- .1 Install wood framing, joists, and wall and roof sheathing as indicated in Structural and Architectural details.
- .2 Install main floor sheathing over XPS insulation with construction adhesive, as indicated.
- .3 Install rough bucks, nailers and linings to rough openings as required to provide backing for windows, door frames and other work.
- .4 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.
- .5 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .6 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.

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 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 work performed under this section.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Interior window sills.

1.2 RELATED SECTIONS

- .1 Section 06 10 00 – Rough Carpentry.
- .2 Section 09 90 00 - 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 ANSI A135.5 R2020 – Prefinished Hardboard Paneling.
- .5 CAN/CSA O141-91(R1999), Softwood Lumber.
- .6 NEMA LD3-2005 - High Pressure Decorative Laminates (HPDL).
- .7 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
- .8 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.

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 WINDOW SILL AND MISCELLANEOUS TRIM MATERIALS

- .1 Window Sill- Pre primed finger joint pine.

2.2 FINISHES

- .1 Refer to Section 09 90 00 Painting.

Part 3 Execution

3.1 INSTALLATION

- .1 Install Work to AWMAC Custom Grade.

3.2 WINDOW SILLS

- .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.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Storage cabinets.
- .2 Cabinet hardware.
- .3 Work bench.
- .4 Interior window sills.

1.2 RELATED SECTIONS

- .1 Section 06 10 00 – Rough Carpentry.
- .2 Section 09 90 00 - 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 ANSI A135.5 R2020 – Prefinished Hardboard Paneling.
- .5 CAN/CSA O141-91(R1999), Softwood Lumber.
- .6 NEMA LD3-2005 - High Pressure Decorative Laminates (HPDL).
- .7 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
- .8 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 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: Douglas Fir, to the requirements of AWMAC, Custom grade.

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 Hardboard panel to ANSI A135.5 R2020.

2.3 WINDOW SILL AND MISCELLANEOUS TRIM MATERIALS

- .1 Window Sill- Pre primed finger joint pine.

2.4 LAMINATE MATERIALS

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

2.5 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.

2.6 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 Hinges: European type, satin finish.

2.7 PLASTIC LAMINATE CASEWORK

- .1 Cabinet Construction: Flush overlay, adjustable shelving plywood core.
- .2 Exposed Surfaces:
 - .1 Doors: High pressure laminate over MDF.
 - .2 Edges: PVC.
- .3 Semi-exposed Surfaces (Cabinet interiors):
 - .1 Surfaces (other than drawer bodies) High pressure laminate over plywood.
 - .2 Shelves: High pressure laminate over plywood.
 - .3 Edges: PVC.

2.8 WORKBENCH

- .1 19mm DFP construction, hardboard facing.
- .2 Solid fir legs and trims

2.9 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.

2.10 FINISHES

- .1 Refer to Section 09 90 00 Painting.

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 wall using appropriate angles and anchorages.

3.2 WINDOW SILLS

- .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.

3.3 ADJUSTING

- .1 Test installed work for rigidity and ability to support loads.
- .2 Adjust moving or operating parts to function smoothly and correctly.

3.4 CLEANING

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 54 00 - Self Leveling Underlayment.
- .2 Section 07 28 00 – Air and Vapour Barriers.
- .3 Section 07 44 56 - Mineral Fiber Reinforced Cementitious Panels.
- .4 Section 07 46 16 - Preformed Metal Siding
- .5 Section 07 52 00 - Modified Bituminous Membrane Roofing.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C411 - 2011, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - .2 ASTM C518 - 2010, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - .3 ASTM C578 – 18, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - .4 ASTM C612 - 2010, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - .5 ASTM A653 / A653M - 17 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .6 ASTM C665 - 2011, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - .7 ASTM C795 - 2013, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 - .8 ASTM C1338 - 2008, Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
 - .9 ASTM C1289-05a, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
- .2 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
 - .2 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
 - .3 CAN/ULC S114-2005, Standard Method of Test for Determination of Non-Combustibility in Building Materials.
 - .4 CAN/ULC-S704-03, Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.
- .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.
 - .3 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, indicating attachment requirements for:
 - .1 Strapping, rain screen strapping and rigid insulation to building sheathing. Refer to Section 07 42 43 Cementitious Wall Panels.
 - .2 Attachment of roof insulation to roof. Refer to Section 07 52 00 Modified Bituminous Membrane Roofing.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Construction 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 Semi Rigid Mineral fibre board: to CAN/ULC-S702
 - .1 Board insulation for exterior of cavity wall: Non-combustible, lightweight, water repellent, rigid insulation board with rigid upper surface to ASTM C612 Type IVB.
 - .1 Fire performance:
 - .1 Non-combustibility: To CAN/ULC S114.
 - .2 Maximum use temperature: 650 °C.
 - .3 Surface Burning Characteristics: To CAN/ULC S102.
 - .1 Flame spread: 0.
 - .2 Smoke developed: 5.
 - .2 Thermal resistance (RSI value/25.4 mm at 24 ° C: 0.76 m²K/W to ASTM C518.
 - .3 Water vapour permeance: 1555 ng/Pa.s.m² minimum.
 - .4 Moisture absorption: 1 % maximum to ASTM C1104/C1104M.
 - .5 Fungi resistance: Zero mould growth to ASTM C1338.
 - .6 Corrosive resistance:
 - .1 Steel to ASTM C665: Pass.

- .2 Stainless steel to ASTM C795: Conforms.
- .7 Recycled content: 40 % minimum.
- .8 Acoustical performance sound absorption co-efficients to ASTM C423.
- .2 Density:
 - .1 Outer layer: 100 kg/m³ to ASTM C612.
 - .2 Inner layer: 60 kg/m³ to ASTM C612.
- .3 Surfaces:
 - .1 High density, water repellent outer layer.
 - .2 Lower density high performance thermal inner layer.
- .4 Thickness: as indicated.
- .5 Size: as detailed.
- .2 Roof Deck Insulation:
 - .1 Mineral Fiber insulation
 - .1 Rigid surface
 - .2 Impregnated with bitumen on surface of insulation.
 - .3 Thermal resistance to ASTM 518.
 - .1 R 7.6.
 - .4 50mm thick.
 - .2 Polyisocyanurate to CAN/ULC-S704, factory finished both sides with impermeable facers to retard thermal drift of insulation material, glass fibre reinforced core, flat format, square edges.
 - .1 100 mm thickness.
 - .2 R 24 minimum.
 - .3 Polystyrene sloped insulation.
 - .1 R6 average.
 - .2 2% slope, format as indicated.
 - .3 To CAN/ULC-S701-05.
 - .4 Concrete slab/floor and foundation perimeter insulation.
 - .1 Insulation Board: Extruded polystyrene (XPS) insulation to ASTM C578 – 15b and CAN/ULC-S701, Type IV, thickness as indicated, square edges.
 - .2 Thermal resistance as indicated.

2.2 ACCESSORIES

- .1 Fasteners:
 - .1 Semi Rigid Mineral fibre board- Wall assemblies:
 - .1 In accordance with engineered shop drawings provided under Section 07 44 56 - Mineral Fiber Reinforced Cementitious Panels.

- .2 Roof assembly:
 - .1 Insulation board and overlayment board fasteners: proprietary flat head countersunk self-drilling roof screws each with companion locking plastic plate or locking stamped sheet steel plate, screw threads designed for use on wooden decks, corrosion-resistant coated, screw length to suit roof decks without projecting more than 25 mm beyond visible underside of deck surfaces, all in accordance with RCABC requirements, Section 07 52 00 - Modified Bituminous Membrane Roofing, and roofing material manufacturer requirements whichever more stringent.
 - .2 Provide assemblies that will withstand 25% greater than wind uplift conditions listed in NBC for building location, unless more stringent values are identified on drawings.

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 WORKMANSHIP

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .4 Offset both vertical and horizontal joints in multiple layer applications.
- .5 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.3 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.

3.4 EXTERIOR SEMI RIGID INSULATON

- .1 Install over self-adhered membrane and fitted tightly. Fasten with screws and washers through pressure treated strapping and in accordance with engineered shop drawings. Fasten through wall sheathing into studs where possible.
- .2 Install in conjunction with rain screen system and the requirements of Section 07 44 56 - Mineral Fiber Reinforced Cementitious Panels.

3.5 ROOF DECK INSULATION

- .1 Tapered polystyrene insulation boards.
 - .1 Install insulation board over self-adhered membrane to produce continuous thermal insulated roof plane.
 - .2 Trim insulation for tight fit to obstructions, projections and around roof perimeter.
 - .3 Install tapered insulation boards to provide slopes as indicated.
 - .4 Fix board in place to vapour barrier and other laminated insulation boards using approved fasteners and washers.
- .2 Faced Polyisocyanurate insulation boards;
 - .1 Install over polystyrene boards for tight fit to obstructions, projections and around roof perimeter.
 - .2 Fix board in place to other laminated insulation boards using approved fasteners and washers.
- .3 Mineral Fiber Insulation Board:
 - .1 Install insulation board over Polyisocyanurate insulation board to create a laminated assembly.
 - .1 Offset 2nd layer from 1st layer by 1/2 board each direction to stagger board joints between layers where using 2-layer installation technique.
 - .2 Laminated boards must be in full contact with each other free of interlayer air passages.
 - .3 Fix board in place to other laminated insulation boards using approved fasteners and washers.

3.6 FLOOR SLAB AND EXTERIOR PERIMETER INSULATION

- .1 Install XPS installation over previously leveled floor slab area, prior to plywood installation.
 - .1 Install using construction adhesive approved by the manufacturer.
- .2 Install at exterior junction of foundation and existing dock surface prior to flashing installation.

3.7 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 Section 03 54 00 - Self Leveling Underlayment.
- .2 Section 07 28 00 – Air and Vapour Barriers.
- .3 Section 07 42 43 - Composite Wall Panels.
- .4 Section 07 46 16 - Preformed Metal Siding
- .5 Section 07 52 00 - Modified Bituminous Membrane Roofing.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C411 - 2011, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - .2 ASTM C518 - 2010, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - .3 ASTM C578 – 18, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - .4 ASTM C612 - 2010, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - .5 ASTM A653 / A653M - 17 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .6 ASTM C665 - 2011, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - .7 ASTM C795 - 2013, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 - .8 ASTM C1338 - 2008, Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
 - .9 ASTM C1289-05a, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
- .2 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
 - .2 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
 - .3 CAN/ULC S114-2005, Standard Method of Test for Determination of Non-Combustibility in Building Materials.
 - .4 CAN/ULC-S704-03, Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.
- .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.
 - .3 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, indicating attachment requirements for:
 - .1 Strapping, rain screen strapping and rigid insulation to building sheathing. Refer to Section 07 42 43 Composite Wall Panels.
 - .2 Attachment of roof insulation to roof. Refer to Section 07 52 00 Modified Bituminous Membrane Roofing.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Construction 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 Semi Rigid Mineral fibre board: to CAN/ULC-S702
 - .1 Board insulation for exterior of cavity wall: Non-combustible, lightweight, water repellent, rigid insulation board with rigid upper surface to ASTM C612 Type IVB.
 - .1 Fire performance:
 - .1 Non-combustibility: To CAN/ULC S114.
 - .2 Maximum use temperature: 650 °C.
 - .3 Surface Burning Characteristics: To CAN/ULC S102.
 - .1 Flame spread: 0.
 - .2 Smoke developed: 5.
 - .2 Thermal resistance (RSI value/25.4 mm at 24 ° C: 0.76 m²K/W to ASTM C518.
 - .3 Water vapour permeance: 1555 ng/Pa.s.m² minimum.
 - .4 Moisture absorption: 1 % maximum to ASTM C1104/C1104M.
 - .5 Fungi resistance: Zero mould growth to ASTM C1338.
 - .6 Corrosive resistance:
 - .1 Steel to ASTM C665: Pass.

- .2 Stainless steel to ASTM C795: Conforms.
- .7 Recycled content: 40 % minimum.
- .8 Acoustical performance sound absorption co-efficients to ASTM C423.
- .2 Density:
 - .1 Outer layer: 100 kg/m³ to ASTM C612.
 - .2 Inner layer: 60 kg/m³ to ASTM C612.
- .3 Surfaces:
 - .1 High density, water repellent outer layer.
 - .2 Lower density high performance thermal inner layer.
- .4 Thickness: as indicated.
- .5 Size: as detailed.
- .2 Roof Deck Insulation:
 - .1 Mineral Fiber insulation
 - .1 Rigid surface
 - .2 Impregnated with bitumen on surface of insulation.
 - .3 Thermal resistance to ASTM 518.
 - .1 R 7.6.
 - .4 50mm thick.
 - .2 Polyisocyanurate to CAN/ULC-S704, factory finished both sides with impermeable facers to retard thermal drift of insulation material, glass fibre reinforced core, flat format, square edges.
 - .1 100 mm thickness.
 - .2 R 24 minimum.
 - .3 Polystyrene sloped insulation.
 - .1 R6 average.
 - .2 2% slope, format as indicated.
 - .3 To CAN/ULC-S701-05.
 - .4 Concrete slab/floor and foundation perimeter insulation.
 - .1 Insulation Board: Extruded polystyrene (XPS) insulation to ASTM C578 – 15b and CAN/ULC-S701, Type IV, thickness as indicated, square edges.
 - .2 Thermal resistance as indicated.

2.2 ACCESSORIES

- .1 Fasteners:
 - .1 Semi Rigid Mineral fibre board- Wall assemblies:
 - .1 In accordance with engineered shop drawings provided under Section 07 42 43 - Composite Wall Panels.
 - .2 Roof assembly:

- .1 Insulation board and overlayment board fasteners: proprietary flat head countersunk self-drilling roof screws each with companion locking plastic plate or locking stamped sheet steel plate, screw threads designed for use on wooden decks, corrosion-resistant coated, screw length to suit roof decks without projecting more than 25 mm beyond visible underside of deck surfaces, all in accordance with RCABC requirements, Section 07 52 00 - Modified Bituminous Membrane Roofing, and roofing material manufacturer requirements whichever more stringent.
- .2 Provide assemblies that will withstand 25% greater than wind uplift conditions listed in NBC for building location, unless more stringent values are identified on drawings.

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 WORKMANSHIP

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .4 Offset both vertical and horizontal joints in multiple layer applications.
- .5 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.3 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.

3.4 EXTERIOR SEMI RIGID INSULATON

- .1 Install over self-adhered membrane and fitted tightly. Fasten with screws and washers through pressure treated strapping and in accordance with engineered shop drawings. Fasten through wall sheathing into studs where possible.
- .2 Install in conjunction with rain screen system and the requirements of Section 07 42 43 - Composite Wall Panels.

3.5 ROOF DECK INSULATION

- .1 Tapered polystyrene insulation boards.
 - .1 Install insulation board over self-adhered membrane to produce continuous thermal insulated roof plane.
 - .2 Trim insulation for tight fit to obstructions, projections and around roof perimeter.
 - .3 Install tapered insulation boards to provide slopes as indicated.
 - .4 Fix board in place to vapour barrier and other laminated insulation boards using approved fasteners and washers.
- .2 Faced Polyisocyanurate insulation boards;
 - .1 Install over polystyrene boards for tight fit to obstructions, projections and around roof perimeter.
 - .2 Fix board in place to other laminated insulation boards using approved fasteners and washers.
- .3 Mineral Fiber Insulation Board:
 - .1 Install insulation board over Polyisocyanurate insulation board to create a laminated assembly.
 - .1 Offset 2nd layer from 1st layer by 1/2 board each direction to stagger board joints between layers where using 2-layer installation technique.
 - .2 Laminated boards must be in full contact with each other free of interlayer air passages.
 - .3 Fix board in place to other laminated insulation boards using approved fasteners and washers.

3.6 FLOOR SLAB AND EXTERIOR PERIMETER INSULATION

- .1 Install XPS installation over previously leveled floor slab area, prior to plywood installation.
 - .1 Install using construction adhesive approved by the manufacturer.
- .2 Install at exterior junction of foundation and existing dock surface prior to flashing installation.

3.7 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM).
- .2 ASTM C665-12 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

1.2 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 copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Construction 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 Pre-formed semi rigid Mineral Wool insulation in batt form, unfaced, friction fit, to ASTM C665.
 - .1 Thermal resistance and sizes as indicated.

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 INSULATION INSTALLATION

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces.

- .2 Install insulation in continuous contact with interior side of wall sheathing or underside of second floor assembly.
- .3 Cut flat on table, do not trim in place
- .4 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .5 Fit insulation tight to windows and doors and other penetrations.
- .6 Do not compress insulation to fit into spaces.
- .7 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.3 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 Foamed-in-place insulation in exterior framed walls and at exterior wall crevices requiring a thermal seal.

1.2 RELATED SECTIONS

- .1 Section 07 21 13 – Board Insulation.
- .2 Section 07 21 16 – Blanket Insulation.
- .3 Section 07 28 00 - Air and Vapour Barriers

1.3 REFERENCES

- .1 CAN/ULC-S705.1-01 - Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density - Material - Specification (including Amendment 3).
- .2 CAN/ULC-S705.2-05 - Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density - Application.
- .3 CUFCA (The Canadian Urethane Foam Contractors Association).

1.4 SUBMITTALS

- .1 Section 01 33 00: Submission procedures.
- .2 Product Data: Provide product description, insulation properties and preparation requirements for products proposed for use in the work.
- .3 Submit Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).
 - .1 Indicate precautions for workers during handling of sprayed insulation products.
- .4 Submit documentation confirming that installers are CUFCA certified.

1.5 ENVIRONMENTAL REQUIREMENTS

- .1 Ventilate area during sprayed insulation installation by introducing fresh air and exhausting air continuously during and for 24 hours after application to maintain non-toxic, unpolluted and safe working conditions.
- .2 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.
- .3 Protect adjacent surfaces and equipment from damage by overspray, fall-out and dusting of insulation materials.
- .4 Apply insulation only when surfaces and ambient temperatures are within insulation manufacturer prescribed limits.

Part 2 Products

2.1 MATERIALS

- .1 Insulation: CAN/ULC-S705.1, spray-applied rigid cellular polyurethane insulation, medium density.
 - .1 Maximum VOC limit: 100 g/L.
 - .2 Minimum 5 year "aged" thermal resistance value of RSI 0.6 per 25 mm thickness.
- .2 Primer: As required by insulation manufacturer.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify existing conditions before starting work.
- .2 Verify work within construction spaces or crevices is complete prior to insulation application.
- .3 Verify that surfaces are clean, dry, and free of matter that may inhibit insulation adhesion.

3.2 PREPARATION

- .1 Mask and protect adjacent surfaces from over spray or dusting.
- .2 Apply primer in accordance with manufacturer's written instructions.

3.3 INSTALLATION

- .1 Apply insulation to CAN/ULC-S705.2 and manufacturer's written instructions whichever is more stringent.
- .2 Fill spaces completely to produce continuous thermal protection sealed against air exfiltration/infiltration.
- .3 Use primer where recommended by insulation manufacturer.
- .4 Apply insulation to thickness detailed/indicated.
- .5 Trim excess and protruding insulation so as not to interfere with application of subsequent construction.

3.4 PROTECTION OF FINISHED WORK

- .1 Do not permit subsequent construction work to disturb applied insulation.

3.5 INSPECTION

- .1 Notify Consultant at least 2 working days in advance for inspection of completed installations.
- .2 Do not permit installations to be concealed or enclosed without inspection.
- .3 Installation to be completed to CUFCA review standards.

3.6 CLEANING

- .1 Do cleaning in accordance with Section 01 74 11 Cleaning.
- .2 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.
 - .1 Film vapour barriers.
 - .2 Self-adhesive air and vapour barriers.
 - .3 Self-adhesive vapour permeable membranes.

1.2 RELATED SECTIONS

- .1 Section 06 10 00 - Rough Carpentry.
- .2 Section 07 21 13 - Board Insulation.
- .3 Section 07 21 16 - Blanket Insulation.
- .4 Section 07 52 00 - Modified Bituminous Membrane Roofing.
- .5 Section 07 42 43 - Composite Wall Panels
- .6 Section 07 92 00 - Joint Sealing.
- .7 Section 08 16 13 - Fiberglass Doors
- .8 Section 08 53 13 - Fiberglass Windows.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM E 96/E96M-16 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 handling 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 Vapour barrier: Polyethylene vapour barrier manufactured from virgin materials with a permeance of less than 0.01 perms.
 - .1 Permeance tested in accordance with ASTM E1745.
 - .2 Strength to ASTM E1745 Class A.
 - .3 Thickness: 6 mils minimum.

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; .6 mm thick. To CAN/CGSB 37-GP-56M.

2.3 VAPOUR PERMEABLE MEMBRANE

- .1 Self-adhered, vapour permeable water resistive air barrier.
 - .1 Composed of tri layer laminated polypropylene facer.
 - .2 .6mm thickness.
 - .3 Water Vapour transmission 972 ng/Pa•s•m² (17 perm) to ASTM E 96/E96M-16.

2.4 SEALANTS

- .1 In accordance with Section 07 92 00 -Joint Sealing

2.5 ACCESSORIES

- .1 Primer: Water based surface conditioner as recommended by self-adhesive membrane manufacturer.
- .2 Seam tape- proprietary moisture resistant pressure sensitive adhesive tape.
- .3 Staples: corrosion-resistant alloy or plated, lengths required to penetrate sheathing for secure attachment of building/sheathing paper.
- .4 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

- .1 Install on interior walls after installation of insulation.
- .2 Install preformed polyethylene vapour barrier box behind all electrical boxes in exterior wall. Staple and seal flanges to film vapour barrier.
- .3 Attach a 600 mm wide vertical strip of poly film on exterior wall at all locations where interior partitions will intersect.
- .4 Install vapour barrier using as large a sheet as possible to minimize seams.
- .5 Attach with staples.
- .6 Prior to installing vapour barrier, provide a continuous bead of acoustical sealant to perimeter of opening being covered and bed vapour barrier in sealant.
- .7 Provide a bead of sealant:
 - .1 Between all laps in vapour barrier.
 - .1 All laps must occur over solid blocking.
 - .2 At all penetrations of vapour barrier.
 - .3 At perimeter of vapour barrier.
- .8 Use of tape as a primary seal for vapour barrier is not acceptable.

3.4 SELF ADHESIVE MEMBRANES

- .1 Apply primer as recommended by membrane manufacturer.
- .2 Install membranes on dry surface.
- .3 Apply vapour permeable membrane at exterior of wall sheathing, as detailed and in accordance with manufacturer's requirements.
- .4 Apply self-adhesive air and water barrier to roof deck.
- .5 Apply air and water barrier membrane at window and door openings as detailed.
- .6 Install membranes in accordance with manufacturer's instructions.
- .7 Roll out membrane. Minimize wrinkles and bubbles.
- .8 Remove release paper layer. Roll out on substrate with a mechanical roller to encourage full contact bond.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 07 28 00 Air and Vapour Barriers.
- .2 Section 07 21 13 Board Insulation.
- .3 Section 07 62 00 Sheet Metal Flashing and Trims.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM E330 / E330M – 14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - .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 D790 – 07, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 - .4 ASTM A792/A792M-06a, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .5 ASTM C1186-08, Standard Specification for Flat Fiber-Cement Sheets.
 - .6 ASTM D5420-16, Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1168-[05], Adhesives and Sealants Applications.

1.3 DESIGN REQUIREMENTS

- .1 Design mineral fiber reinforced cementitious panel cladding system to allow for thermal movement of component materials caused by variation in ambient temperature range of 80 degrees C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.
- .2 Maximum deviation from vertical and horizontal alignment of erected panels: 1 to 1000.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for cladding system materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 30 Health and Safety Requirements.
- .3 Shop Drawings:
 - .1 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia for wind load, seismic designs and fastening methods. Design for attachment of entire cladding system, including attachment of strapping, rain screen strapping and rigid insulation to building sheathing.
 - .2 Indicate dimensions and thickness of panels, fastening and anchoring methods, detail and location of joints and gaskets, thermal movement provision, wall openings, head, jamb and sill details, materials and finish, compliance with design criteria and requirements of related work.
 - .3 Accessories: Include details of the flashing, trim and anchorage.
- .4 Samples:
 - .1 Submit duplicate 100 x 100 mm samples of cementitious wall panel, representative of materials, finishes and colours.
 - .1 Submit samples of manufacturers standard and premium colour range for Departmental Representative's approval.
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Certificates: submit certificates signed by manufacturer certifying that cementitious wall panels comply with specified performance characteristics and physical properties.
 - .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.5 QUALIFICATIONS

- .1 Manufacturer: company specializing in producing cementitious wall panels with 5 years experience with sufficient capacity to produce and deliver required units without causing delay in work.
- .2 Installer: Company specializing in composite wall panel installations.
- .3 Mock-ups: construct mock-ups in accordance with Section 01 45 00 - Quality Control and to requirements supplemented as follows:
 - .1 Provide mock-up for evaluation of surface finishes and workmanship.
 - .2 Co-ordinate type and location of mock-ups with Departmental Representative.
 - .3 Mock-up will be reviewed by Departmental Representative.
 - .4 If required, revise mock-up area as required to produce acceptable work.

- .5 When accepted, mock-up will demonstrate minimum standard of quality required for this work.
 - .1 Approved mock-up may remain as part of finished work.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver, store and protect material in accordance with panel manufacturer's recommendations.
- .3 Do not expose panels with strippable film to direct sunlight or extreme heat.
- .4 Waste Management and Disposal:
 - .1 Separate waste materials for reuse or recycling in accordance with Section 01 74 19 - Construction Waste Management and Disposal.

1.7 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.

Part 2 Products

2.1 PERFORMANCE REQUIREMENTS

- .1 Structural Performance: Provide complete panel attachment system capable of withstanding the effects of the following loads, based on testing according to ASTM E 330:
 - .1 Wind Loads: Provide as assembly designed to withstand wind loads and seismic conditions listed in TBCBC for building location.
 - .2 Deflection Limits: For wind loads, no greater than 1/100 for frame elements and 1/60 for panel materials.

2.2 MATERIALS

- .1 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: 11 mm.
 - .3 Exposed face: smooth finish.
 - .4 Finish: pre-finished factory-applied 3 coat baked on paint system in colour approved by Departmental Representative. Each panel factory protected with plastic film prior to shipping.

- .5 Wall panel system shall be designed for positive drainage of water leakage and condensation to exterior of wall panel system.
- .2 Miscellaneous Materials
 - .1 Insulation: Section 07 21 13 - Board Insulation, and details.
 - .2 Panel Fasteners:
 - .1 Panels: Self-tapping screws designed to withstand design loads, and in accordance with engineered shop drawings. Provide exposed fasteners with heads matching color of composite material panels by means of factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
 - .3 Panel Sealants: ASTM C 920; elastomeric silicone sealant; of type, grade, class, and use classifications required to seal joints in cementitious material panels and remain weathertight; and as recommended in writing by composite material panel manufacturer.
 - .4 EPDM Gasket tape.
 - .1 Black, for use in panel reveals.

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 datasheets.

3.2 EXAMINATION

- .1 Before installation examine alignment of substrate and notify Departmental Representative in writing if substrate does not comply with requirements of panel installer.
- .2 Installer is to create an accurate cut list of all required panels prior to ordering materials from manufacturer.

3.3 PREPARATION

- .1 Panel support assembly: Install Panels over previously installed pressure treated strapping system and exterior insulation in accordance with engineered shop drawings.
 - .1 Refer to Section 06 10 00 - Rough Carpentry for pressure treated materials.
 - .2 Refer to Section 07 21 13 - Board Insulation for exterior insulation requirements.

3.4 ON SITE ALTERATION OF CEMENTITIOUS PANELS

- .1 Panels are to be factory cut to finished dimensions.
- .2 If field cutting is required, cuts are to be made in strict accordance with manufacturer's instructions.
 - .1 Field cuts must be finished to exactly match the appearance of factory cut edges.

3.5 INSTALLATION

- .1 General: Install cementitious panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels over previously installed PT strapping. Anchor cementitious panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - .1 Shim or otherwise plumb substrates receiving v panels.
 - .2 Flash and seal cementitious panels at perimeter of all openings. Fasten with self-tapping screws in accordance with engineered shop drawings. Do not begin installation until water-resistive barriers, insulation and flashings that will be concealed by composite panels are installed.
 - .3 Evenly space screw fasteners.
 - .4 Install screw fasteners in predrilled holes.
 - .5 Locate and space fastenings in uniform vertical and horizontal alignment.
 - .6 Install flashing and trim as composite panel installation proceeds.
 - .7 Locate panel connections over PT strapping. Refer to elevation drawings for panel layout.
 - .8 Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- .2 Fasteners:
 - .1 Use fasteners approved by the manufacturer of the composite panel system and in accordance with engineered shop drawings.
 - .2 Fastener heads to match panel colour.
- .3 Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- .4 Flashing and Trim: Install flashing in accordance with the requirements of Section 07 62 00 - Sheet Metal Flashing and Trims
 - .1 Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
 - .2 Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 3 m with no joints allowed within 605 mm of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 25 mm deep, filled with mastic sealant (concealed within joints).

3.6 ERECTION TOLERANCES

- .1 Installation Tolerances: Shim and align composite material wall panel units within installed tolerance of 6 mm in 6 m, non-accumulative, on level, plumb, and location lines as indicated, and within 3-mm offset of adjoining faces and of alignment of matching profiles.

3.7 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Remove temporary protective coverings and strippable films, if any, as cementitious material panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of cementitious material panel installation, clean finished surfaces as recommended by composite material panel manufacturer. Maintain in a clean condition during construction.
- .3 After cementitious material panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- .4 Replace cementitious material panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- .5 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .6 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Preformed metal siding system for walls, related flashings and accessory components.

1.2 RELATED SECTIONS

- .1 Section 07 21 13 - Board Insulation.
- .2 Section 07 44 56 - Mineral Fiber Reinforced Cementitious Panels.
- .3 Section 07 62 00 - Sheet Metal Flashing and Trim.

1.3 REFERENCES

- .1 ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A755/A755M - Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process For Exterior Exposed Building Products.

1.4 SYSTEM DESCRIPTION

- .1 System: Preformed and prefinished metal siding system of vertical profile; site assembled.

1.5 DESIGN REQUIREMENTS

- .1 Components: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall.
- .2 Maximum Allowable Deflection of Panel: 1/90 of span.
- .3 Movement: Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; deflection of structural support framing.
- .4 Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.

1.6 SUBMITTALS FOR REVIEW

- .1 Section 01 33 00: Submission procedures.
- .2 Shop Drawings: Indicate dimensions, layout, joints, construction details, methods of anchorage.
 - .1 Use qualified professional structural engineer registered in British Columbia for wind load, seismic designs and fastening methods. Design for attachment of entire cladding system, including attachment of strapping, rain screen strapping and rigid insulation to building sheathing.
 - .2 Submit shop drawings under seal of the same professional engineer responsible for wind load and seismic design and fastening methods.
- .3 Samples: Submit two samples of siding, 8 x 8 inch in size illustrating finish sheen, and texture.

1.7 QUALITY ASSURANCE

- .1 Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- .2 Installer: Company specializing in performing the work of this section with minimum three years documented experience.

1.8 DELIVERY, STORAGE, AND PROTECTION

- .1 Section 01 61 00: Common Product Requirements.
- .2 Store prefinished material off ground protected from weather, 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.

1.9 COORDINATION

- .1 Coordinate the Work with installation of adjacent finishing materials.

Part 2 Products

2.1 EXTERIOR SHEET MATERIALS

- .1 Galvanized Steel: ASTM A653/A653M, Coating Designation G90 (Z275); shop precoated with silicone modified polyester (SMP) coating on exposed surfaces. Colour to be selected from manufacturer's premium range.

2.2 ACCESSORIES

- .1 Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized; fastener cap same colour as exterior panel. Exposed fasteners same finish as panel system.
- .2 Field Touch-up Paint: As recommended by panel manufacturer.

2.3 COMPONENTS

- .1 Exterior Sheet: Minimum 24 gauge thick precoated steel stock profile as indicated; 38 inch wide panel; lapped edges.
- .2 Trim, Closure Pieces, Caps, Flashings, Facias, and Infills: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- .3 Anchors: Galvanized steel.

2.4 FABRICATION

- .1 Form sections true to shape, accurate in size, square, and free from distortion or defects.
- .2 Form pieces in longest practicable lengths.
- .3 Panel Profile:
 - .1 Corrugated, horizontally mounted.
 - .2 Refer to details

Part 3 Execution

3.1 EXAMINATION

- .1 Verify that insulation and strapping system is ready to receive metal panels.

3.2 INSTALLATION

- .1 Install metal siding system on walls in accordance with manufacturer's instructions and detail drawings.
- .2 Fasten siding to strapping; aligned, level, and plumb.
- .3 Locate joints over supports. Lap panel ends minimum 2 inches.
- .4 Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.3 TOLERANCES

- .1 Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.
- .2 Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.4 CLEANING

- .1 Remove site cuttings from finish surfaces.
- .2 Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 07 21 13 - Board Insulation.
- .2 Section 07 28 00 - Air and Vapour Barriers
- .3 Section 07 62 00 - Sheet Metal Flashing and Trim.

1.2 REFERENCES

- .1 ASTM International Inc.
 - .1 ASTM D6163-00(2008), Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA B272-93(R2000), Prefabricated Self-Sealing Roof Vent Flashings.
- .4 NBC, National Building Code of Canada (issue date listed in Section 01 41 00 - Regulatory Requirements).
- .5 Roofing Contractors Association of British Columbia (RCABC).
 - .1 RGC, RCABC Guarantee Corporation. ^{[[L]]}_{[[SEP]]}
 - .2 RGC Manual, RGC Roofing Practices Manual published by RCABC. ^{[[L]]}_{[[SEP]]}
- .6 Underwriters Laboratories' of Canada (ULC)
 - .1 CAN/ULC-S102-10, Standard Method of Test for Surface Burning ^{[[L]]}_{[[SEP]]}Characteristics of Building Materials and Assemblies. ^{[[L]]}_{[[SEP]]}
 - .2 CAN/ULC-S102-10, Standard Method of Test for Surface Burning ^{[[L]]}_{[[SEP]]}Characteristics of Building Materials and Assemblies. ^{[[L]]}_{[[SEP]]}
 - .3 CAN/ULC-S102-10, Standard Method of Test for Surface Burning ^{[[L]]}_{[[SEP]]}Characteristics of Building Materials and Assemblies. ^{[[L]]}_{[[SEP]]}

1.3 QUALITY ASSURANCE

- .1 Do Work in accordance with latest standards published in RCABC Manual.
- .2 Follow respective membrane manufacturer installation requirements in order to provide required product guarantees wherever such requirements are more stringent than those published in RCABC Manual.
- .3 Health and safety requirements: do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

1.4 WIND UPLIFT REQUIREMENTS

- .1 Provide membrane roofing assemblies that will withstand 25% greater than wind uplift conditions listed in NBC for building location, unless more stringent values are identified on drawings.

1.5 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Provide copies of WHMIS MSDS in accordance with Section 01 35 30 - Health and Safety Requirements and indicate VOC content for all products used in the work.
 - .1 Indicate precautions for workers when handling roofing materials, sealants and mastics.
- .3 Samples: submit samples of accessories proposed for use in Work upon Departmental Representatives request.

1.6 FIRE PROTECTION

- .1 Comply with Section 01 35 35 Fire Safety Requirements.
- .2 Provide and maintain approved ABC dry chemical-type fire extinguishers in ready and accessible condition with at least one extinguisher always within 6 metres of each torching operation.
- .3 Provide "fire watch" for minimum of one hour after termination of torching operations to check for hot spots and signs of smouldering.
- .4 Permit only experienced and trained personnel to operate torch equipment.
- .5 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions and the requirements of Section 01 61 00 Common Product Requirements.
- .2 Storage and Handling Requirements:
 - .1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
 - .2 Provide and maintain dry, off-ground weatherproof storage.
 - .3 Store membrane rolls in heated enclosures prior to use where climatic conditions necessitate and as recommended by membrane manufacturer; bring only enough rolls for immediate use to work area.
 - .4 Remove only in quantities required for same day use.
 - .5 Store sealants at +5 degrees C minimum.

- .6 Lay out base and cap sheets and allow to flatten uncurl before attempting installation.
- .7 Avoid prolonged exposure of light and heat sensitive materials to sunlight.
- .8 Store combustible materials away from heat and open flame.
- .9 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
- .10 Fold up metal banding, flatten and place in designated area for recycling.

1.8 WHMIS

- .1 Comply with WHMIS requirements when handling primers and mastics.

1.9 SITE CONDITIONS

- .1 Do not perform work during inclement weather.
- .2 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.
- .3 Do not expose material vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
- .4 Consult membrane manufacturer minimum ambient application temperature for cold weather applications and do not carry out roofing work when ambient temperature is less than 0 degrees C.

1.10 PROJECT REQUIREMENTS

- .1 Protect surrounding surfaces from damage during roofing work. Where hoisting is necessary, hang tarpaulins to protect walls during delivery of materials from ground to roof level. Protect existing roofing from traffic damage by installing temporary mats or plywood.
- .2 Where work must continue over new installed roofing, protect surfaces with plywood sheets. Arrange sheets to avoid tripping hazards. Weigh down sheets to prevent dislocation by wind uplift.
- .3 Remove bituminous markings from finished surfaces. In areas where finished surfaces are soiled by bitumen or any other source of soiling caused by roofing work consult manufacturer of surfaces as to recommended cleaning methods and conform to their advice.
- .4 Do not store materials on roof in concentrations which exceed roof design live load.
- .5 Locate equipment and roofing materials to provide minimum interference and maximum useable space around job site.

1.11 WASTE MANAGEMENT

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

1.12 WARRANTY

- .1 For Work of this Section 07 52 00 - Modified Bituminous Membrane Roofing, 12 months warranty period is extended to:
 - .1 60 months for membrane roofing and membrane flashing^[L]_[SEP] installations remaining in place and maintaining leakproof assemblies.^[L]_[SEP]
 - .2 120 months for membrane materials being free from manufacturing defects. Defective products to be corrected, replaced or maintained without cost to Canada as necessary to enable such products to perform as warranted.
 - .3 240 months for pre-manufactured vent pipe flashings/roof jacks to be free of leaks, condensation and defects in materials.
 - .4 Warranty to be in form of manufacturer's warranty.
- .2 Start warranties at date of Final Certificate of Completion.

1.13 CLOSEOUT SUBMITTALS

- .1 Provide following in accordance with Section 01 78 00 - Closeout Submittals.
 - .1 Warranty certificates.^[L]_[SEP]

Part 2 Products

2.1 VAPOUR BARRIERS

- .1 Self-adhesive type: to ASTM D6163, containing minimum 15% Styrene-Butadiene-Styrene (SBS) elastomeric polymer, glass grid reinforcement, minimum 0.6 mm sheet thickness, self-adhesive bottom surface protected by silicone release sheet, sanded top surface, sheet formulation suitable for ambient air temperature at time of installation.
- .2 Refer to Section 07 28 00 Air and Vapour Barriers.

2.2 INSULATION

- .1 Laminated assembly consisting of sloped polystyrene insulation, faced polystyrene insulation, and bitumen impregnated miner fiber insulation.
- .2 Refer to Section 07 21 13 Board Insulation.

2.3 MATERIALS

- .1 Roofing membrane sheets, membrane flashing sheets: containing not less than 15% Styrene-Butadiene-Styrene (SBS) elastomeric polymer, non-woven polyester plus glass grid reinforcement.
 - .1 Roofing membrane sheet 1 (base sheet): to ASTM D6162, minimum 2.5 mm sheet thickness, non-woven polyester plus glass grid reinforcement thermofusibile polypropylene top surface, Self adhesive bottom face.^[L]_[SEP]
 - .2 Base flashing sheet: to ASTM D6163, minimum 2.5 mm sheet^[L]_[SEP] thickness, glass grid reinforcement, self-adhesive underside protected by silicone release sheet, thermofusibile polypropylene top surface.^[L]_[SEP]

- .3 Roofing membrane sheet 2 (cap sheet), cap flashing sheet, roof edge warning strip: to ASTM D6162, minimum 4.0 mm sheet thickness, non-woven polyester plus glass grid reinforcement, thermofusible polypropylene underside, smooth top surface in colour selected by Departmental Representative. [L] [SEP]

2.4 ACCESSORIES

- .1 Plastic cement/mastic: to CAN/CGSB-37.5.

Part 3 Execution

3.1 PREPARATION

- .1 Ensure previously installed insulation system is clean, dry and properly prepared to receive roofing materials.

3.2 MANUFACTURER INSTRUCTIONS

- .1 Compliance: comply with manufacturer written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions and data sheets.

3.3 WORKMANSHIP

- .1 All materials must be dry (as manufactured) at time of application.
- .2 Complete roofing on same day started.
- .3 Perform moisture checks using an electronic moisture meter if work underway has become wet. Do not continue roofing until moisture content is reduced to acceptable levels.
- .4 Ensure that inspections have been completed and defects corrected before starting each subsequent stage of roofing.

3.4 INSTALLATION

- .1 Roof Membrane, membrane flashing:
 - .1 Install 2-ply modified bituminous roof membrane and membrane flashings (strippings) over previously installed insulation, to comply with RCABC requirements and roofing membrane manufacturers recommendations.
 - .2 Starting at low point of roof, perpendicular to slope, unroll sheets, align and re-roll from both ends. [L] [SEP]
 - .3 Each layer to be free of blisters, fishmouths and wrinkles. [L] [SEP]
 - .4 Offset joints in cap sheet not less than 300 mm from those in base sheet. [L] [SEP]
 - .5 Test laps for complete continuous sealing. [L] [SEP]
 - .6 For torch fixing to overlayment board: [L] [SEP]
 - .1 Torch apply roofing membrane sheet 1 (base sheet). [L] [SEP]
 - .2 Torch apply membrane sheet 2 (cap sheet) over inspected [L] [SEP] membrane sheet 1 (base sheet). [L] [SEP]

- .7 Membrane flashings:
 - .1 Install base sheet using self-adhesive properties.
 - .1 Provide 75 mm minimum side lap and seal.
 - .2 Install cap sheet using torch method. [1] [SEP]
 - .1 Provide 75 mm minimum side lap and seal.
 - .3 Install membrane flashings without sags, blisters, fishmouths or wrinkles. [1] [SEP]
 - .4 Re-finish all lap joints, bitumen overflows and runs of cap sheets. Lap and seal membrane to all components penetrating roof.

3.5 Cleaning

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
 - .1 Progress cleaning: leave Work area clean at end of each day. [1] [SEP]
 - .2 Final cleaning: on completion and verification of performance of [1] [SEP] installation, remove surplus materials, excess materials, rubbish, tools, equipment and barriers. [1] [SEP]

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 07 52 00 – Modified Bituminous Membrane Roofing.
- .2 Section 07 44 56 - Mineral Fiber Reinforced Cementitious Panels.

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 D523-89(1999), 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.
 - .5 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 Roofing Contractors Association of B.C. (RCABC)
 - .1 RGC Manual, RGC Roofing Practices Manual published by RCABC.
- .5 NBC, National Building Code of Canada (issue date listed in Section 01 41 00 Regulatory Requirements)

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 colour selection.

1.4 QUALITY CONTROL

- .1 Do Work in accordance with latest standards published in RCABC Manual.

1.5 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.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements unless more stringent care is required by respective material manufacturer.
- .2 Protect pre-finished materials from scratching
- .3 Stack pre-formed materials in manner to prevent twisting, bending and rubbing.

1.7 WASTE MANAGEMENT AND DISPOSAL:

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 – Construction Waste and Disposal.

Part 2 Products

- .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. Colours to match building
 - .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 nails: annular ringed, with integral rubber sealing washers.
 - .1 Stainless steel alloy where used at pressure treated wood.
 - .2 Hot dip galvanized steel where used in untreated wood
- .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 and to RCABC requirements for roofing requirements and SMACNA's "Architectural Sheet Metal Manual" for cladding requirements.
- .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.

2.3 INSTALLATION

- .1 Metal Flashings
 - .1 Install in accordance with detail drawings and requirements of related specification sections.
 - .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.

2.4 CLEANING

- .1 Clean flashings to remove handling marks and smudges.
- .2 Proceed in accordance with Section 01 74 11 - Cleaning.
 - .1 Progress cleaning: leave Work area clean at end of each day.
 - .2 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 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .2 Underwriter's Laboratories of Canada (ULC).
 - .1 ULC-S115-1995, Fire Tests of Fire stop Systems.
- .3 Green Seal Environmental Standards.
 - .1 Standard GS-36-00, Commercial Adhesives.
- .4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards.
 - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.2 DEFINITIONS

- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- .2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.
- .4 Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.
 - .1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

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, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit product manufacturer's ULC result cut sheets for each fire stopping condition.
 - .3 Submit electronic copies of WHMIS MSDS - Material Safety Data Sheets (MSDS).
 - .1 Indicate precautions for workers using fire stopping products.

- .3 Shop Drawings:
 - .1 Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation.
 - .2 Construction details should accurately reflect actual job conditions.
- .4 Samples:
 - .1 Submit samples showing actual fire stop material proposed for project on Departmental Representative's request.
 - .2 Submit manufacturer installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company specializing in fire stopping installations and experienced in good trade practices.
 - .2 Overall Project quality control:
 - .1 Employ one applicator firm to install all firestopping throughout project, using personnel that meet installer qualifications stated above.
 - .2 Do not permit separate trades to firestop their own service penetrations.
 - .3 Health and safety requirements: do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.
- .2 Storage and Protection:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Construction Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.

- .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended.
- .2 Fire stop system rating: Refer to drawings for assembly ratings
- .2 Service penetration assemblies: systems tested to CAN-ULC-S115.
- .3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.
- .4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .6 Fire stopping 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.
 - .7 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
 - .8 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
 - .9 Sealants for vertical joints: non-sagging.

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 datasheets.

3.2 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
 - .1 Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

3.4 FIELD QUALITY CONTROL

- .1 Inspections: notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
- .2 Installed firestopping will be examined to determine if assemblies have been installed in accordance with respective ULC listings.
 - .1 Allow for destructive testing of installed firestopping during examination including re-instatement of damaged firestopping during inspection, at no additional cost to Contract.
 - .2 Deviation from ULC listed systems will be considered grounds for rejection and will require replacement of firestopping to conform with respective ULC listings, at no additional cost to Contract.

3.5 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 07 28 00 - Air and Vapour Barriers.
- .2 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .3 Section 08 53 13 – Fiberglass Windows.
- .4 Section 09 90 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 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 interfering with sealant bonding have been removed.
- .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 Acrylic latex: one part, non sag siliconized acrylic polymer to CAN/CGSB-19.17.
- .5 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/m³ 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 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.
- .2 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.
- .3 Gypsum board control joints: to make joints suitable for subsequent "painting out" with interior wall finishes.
 - .1 Acrylic latex.
- .4 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.
- .5 Under-slab 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 thermally insulated steel frames.
- .2 Non-rated thermally insulated steel doors.

1.2 RELATED SECTIONS

- .1 Section 08 71 00 - Door Hardware: Hardware, silencers, and weather-stripping.
- .2 Section 09 90 00 - Painting: Field painting of doors and 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 NFPA 252 - Fire Tests for Door Assemblies.
- .5 SDI-100 - Standard Steel Doors and Frames.
- .6 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/FT².
- .2 Insulated Core Doors: minimum, 1.2 mm surface sheets, and top and bottom end channels; cores filled with insulation.

- .3 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.

2.2 FABRICATION DOOR FRAMES

- .1 Fabricate frames in accordance with CSDMA specifications and following requirements
- .2 Fabricate frames as welded unit.
- .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 Provide drywall returns on all frames.
- .7 Attach channel spreaders at bottom of frames for shipping.

2.3 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 Exterior doors to be insulated.
- .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 Glazing Stops: 0.9 mm rolled steel channel shape, butted corners; 16 mm high profile; prepared for countersink screws.
- .5 Reinforce and prepare doors to receive hardware. Refer to Section 08 71 00 for hardware requirements.
- .6 Undercut doors where indicated.

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, construction for anchor placement.
- .3 Coordinate installation of doors and frames with installation of hardware specified in Section 08 71 00.
- .4 After installation, touch up all scratched or damaged surface and prime.
- .5 Insulate all frames exposed to the exterior.
- .6 Install glazing in exterior doors where indicated.

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

Part 1 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 than 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 for the continuity of the air seal from the inside face of the sealed unit to the surrounding frame.
- .6 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.
- .7 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.
- .8 Design assembly to accommodate structure movements due to wind, seismic, creep and live loads where applicable and/or as noted.

- .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 Departmental Representative.
 - .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 -18°C to 35°C and a possible solar heating range to 70°C, and an interior temperature range of 0°C to 30°C 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 Departmental Representative 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 Departmental Representative's review of the Contractor's submittals and the work is of the benefit only of the Departmental Representative. 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 from an independent testing agency acceptable to the Departmental Representative, 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. 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 Representatives 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 Departmental Representative.
- .6 Samples: If requested, make the following samples available for Departmental Representative's 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 Maintenance Data: Provide in accordance with Section 01 78 23 – 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.
- .8 Warranties:
 - .1 Provide a written warranty signed and issued in the name of the Departmental Representative 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.
- .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 Departmental Representative.

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.
- .4 In-Plant Testing: Manufacturer to test 5% of windows prior to shipments to site. Verification letter shall accompany shipment.

Part 2 Products

2.1 SINGLE UNIT WINDOWS

- .1 Meet or exceed requirements of selected Performance Class and Performance Grade as per AAMA/WDMA/CSA101/1.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 **1.424 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.

2.2 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 mullied 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 mullied frames shall not exceed **L/175** of span when subjected to loading equivalent to wind load resistance of the adjacent single unit window.

2.3 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.

2.4 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.

2.5 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.
- .2 Clear Float Glass: to CAN/CGSB-12.3, glazing quality, for inner and outer lite.
- .3 Provide low-E coating on No. 2 surface of double glazed insulating glass units.
- .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.
- .6 Provide Glazing panel meeting the above specification for installation in exterior metal door.

2.6 HARDWARE

- .1 Exposed Hardware Components: cast metal, in finish selected by Departmental Representative 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.

2.7 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: minimum 1.6 mm thick SBS membrane sheet reinforced with non-woven polyester or glass fleece. Stripping to be a minimum 150mm wide. Refer to details.
- .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.

2.8 FRAME AND SASH FINISHES

- .1 Vinyl: Colour as selected by the Departmental Representative from the manufacturer's colour range.

2.9 AIR/VAPOUR RETARDER

- .1 Ensure continuity of air/vapour retarder and seal from walls to window frame.

Part 3 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.
- .7 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 sealant, in accordance with Section 07 92 10, and related materials as indicated on drawings.
- .12 Adjust operable sash and hardware to operate smoothly.
- .13 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.
- .14 Install glazing provided under this section in exterior door.

3.4 SILL INSTALLATION

- .1 Install sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one-piece lengths at each location.
- .2 Secure metal sills in place with anchoring devices at upturn (end dam) located at ends and evenly spaced 600 mm o/c in between. Do not fasten through bottom of sill. If sill requires fastening along sloped portion, use dabs of mastic or sealant compatible with materials which are being adhered to.

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 – Joint Sealing. Conceal sealant within window units except where exposed use is permitted by the Departmental Representative.

3.6 PROTECTION AND CLEANING

- .1 Protect windows/doors from damage/staining during and after installation.
- .2 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.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Hardware for hollow and insulated steel doors.
- .2 Thresholds

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 Preambled 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.

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 Other wall and floor stops: CBH, Gallery, Ives
 - .4 Thresholds and weatherstrip: Draft Seal, Pemko, National

2.2 HARDWARE - GENERAL

- .1 General: Refer to paragraph. **3.7 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 Cylinders: keyed into keying system directed by Departmental Representative.
 - .6 Finishes: finished to 626
- .3 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.
- .4 Architectural door trim: to ANSI/BHMA A156.6, designated by letter J and as scheduled.
 - .1 Door protection plates: Kick plate type 1.27 mm thick stainless steel finish to 630
- .5 Thresholds: 127 mm wide x 6mm maximum x full width of door opening, extruded aluminum mill finish, serrated surface.

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 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.

- .3 B3- Passage set ANSI F75 626
- .3 Auxilliary hardware
 - .1 D1 - Kick Plate 1.27 mm thickness x 254 mm height x width less 38 mm X 630
 - .2 D2 - Wall stop Cast concealed mount, concave bumper with back plate x 626
 - .3 D3-Floor mount door stop, SS construction, Suitable for exterior use.
- .4 Thresholds, seals door bottoms, astragal:
 - .1 E1- Thresholds: as scheduled, one length per door opening without joins or splices. Max height 6.0 mm.
 - .2 E2-Astragal: overlapping, extruded aluminum, neoprene weather seal, Finished to match doors.
 - .3 E3- Flush bolts.
- .5 Weatherstripping:
 - .1 F1-Head and Jamb seal:
 - .1 Extruded aluminum frame and solid closed cell neoprene insert, clear anodized finish.
 - .2 Adhesive backed neoprene material
 - .2 F2-Door bottom seal:
 - Extruded aluminum frame with closed cell neoprene, vinyl sweep, clear anodized finish.

Hardware Schedule

- .6 Hardware Set 01 for Exterior single door 01
 - 3 Hinges A1
 - 1 Ea. Deadbolt B1
 - 1 Ea. Office Lock set B2
 - 2 Ea. Kick Plate D1
 - 1 Ea. Threshold E1
 - 1 Ea. Weatherstripping F1, F2
 - 1Ea. Floor Stop D3
- .7 Hardware Set 02 Exterior double doors 02
 - 6 Hinges A1
 - 1 Ea. Office Lock set B2
 - 1 Deadbolt B1
 - Cylinder on active door
 - 1 Ea. Closer C1
 - 1 Ea. Kick Plate D1
 - 1 Threshold E1
 - 1 Ea. Weatherstripping E2
 - 1 Astrigal E3
 - 2 Flush bolts E4

.8	Hardware Set 03	Storage room door 03
	3 Hinges	A1
	1 Ea. Passage set	B3
	1 Deadbolt	B1
	1 Ea. Kick Plate	D1
	1 Threshold	E1
	1 Ea. Weatherstripping	E2

End of Section

Part 1 General

1.1 REFERENCES

- .1 ASTM International
 - .1 ASTM D2240-05, Standard Test Method for Rubber Property - Durometer Hardness.
 - .2 ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - .3 ASTM F1233-08, Standard Test Method for Security Glazing Materials and Systems.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
 - .2 CAN/CGSB-12.8-9, Insulating Glass Units.
- .3 AAMA/WDMA/CSA101/I.S.2/A440-08-NAFS- North American Fenestration Standard/ Specification for windows, doors, and skylights
- .4 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”
- .5 British Columbia Energy Efficiency Act – Energy Efficiency Standards Regulation (BCEEA)

1.2 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 Glazing materials and sealants. Include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS - Material Safety Data Sheets.
 - .1 Indicate VOC for glazing materials during application and curing.
- .3 Samples
 - .1 Submit minimum 305 x 305 mm size samples of glass requested by Departmental Representative.
 - .2 Manufacturers instructions
 - .1 Submit installation instructions.

1.3 QUALITY ASSURANCE

- .1 Installer qualifications: company specializing in performing work of this section and approved by manufacturer. Provide such evidence upon Departmental Representative request.

1.4 DESIGN CRITERIA

- .1 Provide continuity of building enclosure vapour and air barrier using glass and glazing materials as follows:
 - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
 - .2 Size glass to withstand local positive and negative wind loads listed in NBC for location of building or identified on structural drawings, whichever more severe.
 - .3 Size glass to withstand seismic conditions for building location listed in NBC.

1.5 DELIVERY, STORAGE AND HANDLING

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

1.6 WASTE MANAGEMENT AND DISPOSAL

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

1.7 WHMIS

- .1 Comply with WHMIS requirements regarding use, handling and storage of glazing materials.

1.8 WARRANTY

- .1 For Work of this Section 08 80 50 - Glazing, 12 months warranty period is extended to:
 - .1 120 months for insulating glass units of this Section to be free from manufacturing defects.
 - .2 Manufacturing defects will be deemed to occur if any of following conditions are noted.
 - .1 Appearance of condensation between panes.
 - .2 Obstruction of vision within unit perimeter.
 - .3 Measurable deterioration (more than 10%) of specified thermal transmission or shading coefficient performance ratings.
 - .4 Chipping, cracking or breakage of glass panes occurring due to manufacturing defects or under specified service conditions.
 - .5 Migration of edge spacer.
- .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 MATERIALS

- .1 Flat Glass:

- .1 Safety glass: to CAN/CGSB-12.1,
 - .1 Type 2-tempered.
 - .2 Class B-float.
 - .3 Transparent.
 - .4 Compatible with existing and new guardrail system.
- .2 Wired glass: to CAN/CGSB-12.11
 - .1 Type 1-polished both sides (transparent)
 - .2 Wire mesh styles 3-square
- .2 Insulating Glass Units:
 - .1 Refer to Section 08 53 13 Fiberglass Windows for sealed unit requirements.

2.2 ACCESSORIES

- .1 Setting blocks: neoprene, EPDM or silicone, 80-90 durometer hardness to ASTM D2240, to suit each application.
- .2 Spacer shims: neoprene, EDPM or silicone, 50-60 durometer hardness to ASTM D2240, Sized to suit each application
- .3 Glazing tape: Glazing tapes: pre-formed macro-polyisobutylene tape with continuous integral neoprene shim (to prevent "pumping out" of tape under glass load conditions), paper release, black colour, width x thickness to suit installations.
- .4 Primers, sealers, cleaners: to glass manufacturer standards and compatible with framing system material/finish.
- .5 Glazing sealant: purpose-made for glazing use, compatible with insulating glass units.
- .6 Weather sealant: polyurethane, non-sag, 1-part formulation, colours selected by Departmental Representative.
- .7 Insulation: to ASTM C612 Type IVB, non-combustible, 70 kg/m³ density mineral wool fibre board, zero flame spread and smoke development in accordance with CAN/ULC-S102, maximum water absorption of 0.03% in accordance with ASTM C1104/C1104M, minimum 5 year "aged" thermal resistance value RSI 0.74 per 25 mm thickness, of thicknesses or total RSI values detailed/indicated.
- .8 Stainless steel glazing clips for handrail system.
 - .1 Screw attachment to HSS sections in guardrail system'
 - .2 To match appearance of existing handrail system.
 - .3 Complete with associated gaskets and fasteners required for installation.

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 GENERAL GLAZING REQUIREMENTS

- .1 Clean sealing surfaces at perimeter of glass and sealing surfaces of rabbets before applying glazing tapes and sealant. Use solvent and cleaning agents recommended by manufacturer of sealing materials. Wipe dry.
- .2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- .3 Install glazing tapes uniformly with accurately formed corners and bevels. Ensure that proper contact is made with glass and rabbet interfaces.
- .4 Set glass on setting blocks, spaced as recommended by glass manufacturer. Place at least one block at quarter points from each corner.
- .5 Centre glass in glazing rabbet to maintain required clearances at perimeter on all 4 sides.
- .6 Use glazing sealant for heel beads to seal glazing vapour tight to frames.
- .7 Install wired glass with wire parallel to sash members and aligned in adjacent panels.
- .8 Make door glass installations rattle-free.

3.3 INSTALLATION

- .1 Install glass and insulating glass units to metal doors and frames:
 - .1 Use glazing tape, on both sides. Butt tape tight at corners. Use full length pieces of glazing tape, from corner to corner.
 - .2 Install removable stops without displacing glazing tape.
 - .3 For interior exposure applications:
 - .4 Set glazing tape flush with glass sight line.
 - .5 Trim off glazing tape protruding above top of stops.
 - .6 For exterior exposure applications:
 - .1 Set glazing tape approximately 2 mm below glass sight line to allow cap bead of sealant.
 - .2 Place cap bead of weather sealant to exterior side full perimeter of glass.
 - .3 Apply sealant to uniform and level line, flush with sight line.
 - .4 Tool sealant to a smooth concave appearance.
- .2 Install tempered glass in new railing system components in accordance with engineered shop drawings and manufacturer's requirements.

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.
 - .1 Remove traces of primer, caulking.
 - .2 Remove glazing materials from finish surfaces.
 - .3 Remove labels.
 - .4 Clean glass and mirrors using approved non-abrasive cleaner in accordance with manufacturer's instructions.

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

3.5 PROTECTION

- .1 After installation, mark each light with an "X" by using removable plastic tape or paste.
- .2 Remove markings when directed by Departmental Representative.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Gypsum board and joint treatment.

1.2 RELATED SECTIONS

- .1 Section 06 10 00 - Rough Carpentry.
- .2 Section 07 92 00 - Joint Sealing.
- .3 Section 07 84 00 - Firestopping.
- .4 Section 09 90 00 – Painting.

1.3 REFERENCES

- .1 ASTM C36 - Standard Specification for Gypsum Wallboard.
- .2 ASTM C475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .3 ASTM C514 - Standard Specification for Nails for the Application of Gypsum Wallboard.
- .4 ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
- .5 ASTM C630 - Standard Specification for Water-Resistant Gypsum Backing Board.
- .6 ASTM C840-04a - Standard Specification for Application and Finishing of Gypsum Board.
- .7 ASTM C1002-01 - Steel Self-Piercing, Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- .8 ASTM C1396/C1396M-04 - Standard Specification for Gypsum Board.
- .9 ASTM C 1177 - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
- .10 ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- .11 Association of the Wall and Ceilings Industries International (AWCI).

1.4 REGULATORY REQUIREMENTS

- .1 Conform to applicable code for fire rated assemblies.
 - .1 Fire Rated Partitions: Listed assembly by ULC .

□

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
- .2 Divert unused gypsum from landfill to gypsum recycling facility for disposal.

Part 2 PRODUCTS

2.1 GYPSUM BOARD MATERIALS

- .1 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 Steel drill screws: to ASTM C1002, designed for use with wood framing.
- .3 Resilient Chanel : 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.
- .4 Casing beads/j-beads, corner beads: to ASTM C1047, all metal construction without paper flanges, zinc-coated by hot-dip process or zinc-coated by electrolytic process 0.5 mm base thickness, perforated flanges, one piece length per location.
- .5 Joint compound: to ASTM C475, asbestos-free.
- .6 Tape:
 - .1 Paper face gypsum board applications: spark perforated paper tape.

Part 3 EXECUTION

3.1 GYPSUM BOARD INSTALLATION

- .1 Ensure that insulation is installed and inspected prior to installation of gypsum board.
- .2 Install resilient chanel to the underside of the upper floor assembly, perpendicular to the joists @400mm centers.
- .3 Install gypsum board in accordance with ASTM C840.
- .4 Erect single layer fire rated gypsum board horizontally, with edges and ends occurring over firm bearing.
- .5 Use screws when fastening gypsum board to wooden furring or framing.
- .6 Double Layer Applications: Secure second layer to first with adhesive and sufficient support to hold in place. Apply adhesive in accordance with manufacturer's instructions.
- .7 Place second layer parallel to first layer. Offset joints of second layer from joints of first.

- .8 Place control joints consistent with lines of building spaces as directed, but not more than 10 m o.c.

3.2 ACCESSORY INSTALLATION

- .1 Install straight and ridged with joints butted tight. Use longest practical length.
- .2 Place corner beads at external corners Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials and at openings where board edge is not obscured by building trim.

3.3 JOINT TREATMENT

- .1 Finish gypsum board surfaces to following levels in accordance with AWCI Recommended Specification on Levels of Gypsum Board Finish.
- .2 Levels of finish:
 - .1 Level 1: embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable.
 - .1 Use: where assembly will be completely concealed from view such as in attic spaces and behind solid wall finishes.
 - .2 Level 4: embed tape for joints and interior angles in joint compound and apply 3 separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.
 - .1 Use: where assembly will receive paint finish

3.4 CLEANING

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

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 ASTM F2034 – 18 - Standard Specification for Sheet Linoleum Floor Covering.
- .5 CAN/ULC-S102.2-10 - Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.
- .6 Green Guard Environmental Institute.
 - .1 Greenguard Certification..
- .7 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 10: 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 10: 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 experienced in good trade practice.

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-LINOLEUM

- .1 Linoleum sheet flooring to ASTM F 2034.
- .2 To be installed on second floor areas.
- .3 Description: Homogeneous floor covering made from natural ingredients including linseed oil, rosin binders, wood flour, limestone and dry pigments which are mixed and then calendared onto a natural jute backing.
 - .1 Proprietary high performance UV cured top coat finish that creates a ready to use finish that can be refreshed or repaired.
- .4 2.5mm thickness.
- .5 Jute backing.
- .6 Colour- selected from manufacturers standard colour range.

2.2 MATERIALS- WORKSHOP FLOORING.

- .1 100% Polyvinyl composition sheet material.
- .2 Raised diamond pattern.
- .3 2.54 mm thickness.
- .4 Adhered to subfloor.

2.3 MATERIALS-STAIR TREADS

- .1 Stair treads: to ASTM F2169.
 - .1 Material: purpose-made sheet rubber profiles with integral tread, nosing, and riser. Approx. 3 mm material thickness.
 - .2 Pattern: marbled or plain colour selected by Departmental Representative.
 - .3 Texture: Raised square pattern.
 - .4 Integral nosing: approx. 38 mm high x profile to suit stair construction.
 - .1 Nosing to be angled to match angle of tread to riser.
 - .5 Visual stripe: approx. 50 mm wide solid colour insert recessed into a flat or design surface tread supplying contrast for visually impaired users.
 - .6 Resilient stair stringer.
 - .1 Pre moulded rubber.
 - .2 Heights: to suit risers.
 - .3 Thickness: Approx 3mm.
 - .7 Resilient landing mat.
 - .1 Tactile strips.
 - .2 Compatible with stair tread and riser assembly.
 - .8 Size: full width x depth each tread, full width x height each riser.
 - .9 Colours:
 - .1 Treads: selected by Consultant.
 - .2 Visual stripe: selected by Consultant for best contrasting safety colour.
 - .10 Standard of acceptance Johnsonite Rubber stair treads with integrated riser.

2.4

2.5 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.

2.6 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, 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-STAIR TREADS and LANDING MAT:

- .1 Install integral treads and risers in accordance with manufacturers written instructions.
- .2 Roll with a j-hand roller after installation to ensure proper bonding.

3.5 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.

3.6 CLEANING

- .1 Do cleaning in accordance with Section 01 74 11 - Cleaning.
- .2 Clean installed work.
- .3 Remove excess adhesive from floor, base, and wall surfaces without damage.
- .4 Clean and seal floor in accordance with manufacturers written instructions.

3.7 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 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.

1.2 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 10 - Closeout Submittals include following:
 - .1 Product name, type and use.
 - .2 Manufacturer's product number.
 - .3 Colour numbers.

1.3 MAINTENANCE

- .1 Extra Materials:
 - .1 Deliver to extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 10 - Closeout Submittals.
 - .2 Quantity: provide one four litre can of each type and colour of finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
 - .3 Delivery, storage and protection: comply with Departmental Representative requirements for delivery and storage of extra materials.

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 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 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 Window sills:
- .1 INT 6.3A - High Performance Architectural Latex, gloss level 4.
- .2 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
- .1 INT 9.2A - Latex –gloss level 3 finish (over latex sealer).
- .3 Plywood wall protection:
- .1 INT 6.3A - High Performance Architectural Latex, gloss level 4.
- .4 Galvanized metal: Exterior doors and frames
- .1 INT 5.3M - High performance architectural latex G4 gloss level finish.

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 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
 - .2 Apply wood filler to nail holes and cracks.
 - .3 Tint filler to match stains for stained woodwork.
- .4 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.
- .5 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 RELATED REQUIREMENTS

- .1 Section 06 10 00- Rough Carpentry: Wood blocking.

1.2 REFERENCES

- .1 ASTM International:
 - .1 ASTM D1784-11, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.

1.3 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 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature and data sheets for horizontal louver blinds and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Indicate on drawings 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 louver blind, if requested by Departmental Representative.
 - .2 Submit duplicate samples of manufacturer's standard colours for selection by Departmental Representative.
 - .3 Samples will be returned after approval if requested.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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 Packaging Waste Management: remove for recycling as specified in Section 01 74 19 – Construction Waste Management and Disposal.

Part 2 Products

2.1 DESIGN CRITERIA

- .1 Design horizontal louvre blinds to following requirements:
 - .1 Allow wear susceptible parts to be replaceable by either user or manufacturer.
 - .2 Guarantee of at least five-years of available replacement parts following discontinue of products manufacture.
 - .3 Include instructions for replacing or repairing worn parts, including inventory numbers for parts and procedures for ordering replacement parts.
 - .4 Allow for refurbishing or return of used vertical louvre blinds.
 - .5 Permit effective disassembly of components in for recycling of materials.
 - .6 Include stamps on major plastic components indicating composition code to facilitate recycling efforts.

2.2 MATERIALS AND FABRICATION

- .1 Slats: 25 mm wide with rounded corners and rough edges removed.
 - .1 Aluminum construction.
 - .2 Colour and finish: as selected by Departmental Representative.
- .2 Ladders:
 - .1 Braided polyester yarn designed for full tilting action while retaining same level and position of each slat.
 - .2 Ladders spaced not more than 150 mm from end of slats and 550 mm on centre.
- .3 Headrails:
 - .1 One piece steel channel with rolled edges, formed to provide sufficient strength to support blind without sagging, twisting or distorting.
 - .2 Metal minimum 0.50 mm thick.
- .4 Bottom rails:
 - .1 Lock seam tubular steel section.
 - .2 0.36 mm thick.
- .5 Bottom rail end caps:
 - .1 Soft moulded plastic fitted snugly over ends of rails.

- .2 Colour to match slats.
- .6 Tilt rods: solid steel.
- .7 Tassels:
 - .1 Soft moulded plastic.
 - .2 Colour to match slats.
- .8 Pulleys: designed to permit ease of operation with minimum wear to cord.
- .9 Valance: sufficient width the conceal headrail, same material colour and finish as slats.
- .10 Tilters:
 - .1 Fully enclosed and lubricated, with positively locked to drum to prevent slippage and ensure accurate timing.
 - .2 Use anti-friction materials for worm and gear.
- .11 Cord locks: designed to provide smooth operation with feature to prevent accidental dropping of blinds.
- .12 Ladder cap: designed to provide sufficient retention when snapped onto bottom rail to hold ladders in proper position.
- .13 Installation brackets: end and centre if recommended by manufacturer type complete with safety locking caps to secure headrail and valance.
- .14 Lift cords: 1.98 mm diameter, minimum tensile strength 689 kPa, with tassels.
- .15 Hold down clips: jamb mountings, to engage bottom rail end caps.
- .16 Tilter controls: transparent wand, minimum 8 mm diameter.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates and surfaces to receive horizontal louvre blinds previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to horizontal louvre blinds installation.
 - .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 INSTALLATION

- .1 Install blinds on exterior windows.
- .2 Include centre brackets where necessary to prevent deflection of headrail.
- .3 Adjust to provide for operation without binding.
- .4 Use non corrosive metal fasteners for installation, concealed in final assembly.

3.3 ADJUSTING

- .1 Adjust horizontal louvre blinds components for correct function and operation in accordance with manufacturer's written instructions.
- .2 Lubricate moving parts to operate smoothly and fit accurately.

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.

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by horizontal louvre blinds installation.

END OF SECTION

Part 1 General

1.1 DEFINITIONS

- .1 Provide means supply and install.
- .2 Work means material and labour.

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 Mechanical work shall conform to the following Codes, Regulations and Standards, and all other Codes in effect at the time of award of Contract, and any others having jurisdiction. The revision of each Code and Standard and their amendments which are adopted by the Authority Having Jurisdiction shall apply unless otherwise specified in the Contract Documents:
 - .1 Bylaws
 - .1 Local Building Bylaws.
 - .2 Canadian Standards Association
 - .1 CSA Standard B52 Mechanical Refrigeration Code.
 - .3 National Fire Codes
 - .1 NFPA 10 Portable Fire Extinguishers.
 - .2 NFPA 13 Sprinkler System Installation.
 - .4 National Research Council of Canada
 - .1 National Building Code of Canada - 2015.
 - .2 National Plumbing Code of Canada - 2015.
 - .3 National Fire Code of Canada.
 - .5 Province of British Columbia
 - .1 BC Industrial Health & Safety Regulations, WorkSafeBC.
 - .6 SMACNA Publications
 - .1 HVAC Duct Construction Standards.
 - .2 Guidelines for seismic restraints of mechanical systems.
- .2 All specification references to the Building Code refer to the National Building Code.

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 Departmental Representative.
- .2 Consult the Architectural drawings for exact locations of fixtures and equipment.

1.7 SITE VISIT

- .1 Visit the site before tendering and examine all local and existing conditions on which the work is dependent. No consideration will be granted for any misunderstanding of work to be done where the necessary information could have reasonably been obtained by an examination of the site.

1.8 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.

1.9 WORKMANSHIP

- .1 Workmanship shall be in accordance with well-established practice and with standards accepted and recognized by the Departmental Representative and the Trade.
- .2 The Departmental Representative 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.

1.10 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 of shop drawings of all equipment on the drawings and specifications to the Departmental Representative 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.

1.11 ASBESTOS

- .1 All material/products provided shall be free of asbestos.
- .2 If existing asbestos is discovered which will be affected by the work of the Contract, immediately notify the Departmental Representative. All work related to existing asbestos shall be handled in accordance with the requirements of WorkSafeBC.

1.12 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 Schedules for the seismic restraint to the Departmental Representative.
- .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.

1.13 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.

1.14 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, guiding 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.

1.15 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 Departmental Representative'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, CANNING AND CORING

- .1 Lay out all cutting, patching, digging, canning and coring required to accommodate the mechanical services.
- .2 Coordinate with other Divisions.
- .3 Be responsible for correct location and sizing of all openings required under this Section. Allow oversized openings for firestopping, pipe penetrations where continuous insulation is specified.
- .4 Verify the location of existing service runs and structural components within existing concrete prior to core drilling and/or cutting. The Contractor is responsible to repair existing services and structural components damaged as a result of core drilling and cutting.
- .5 Openings through structural members of the building shall not be made without the approval of the Departmental Representative.

1.18 SERVICE PENETRATIONS IN RATED FIRE SEPARATIONS

- .1 Scope: All new piping, tubing, ducts, wiring, conduits, etc. installed under this Section
- .2 Service penetrations through rated fire separations shall be firestopped with ULC approved materials. Only tested firestop systems shall be used. The firestop system installation must be in accordance with the requirements of CAN4-S115-M or ULC S-115-M tested assemblies that provide the required rating.

- .3 Notify the Departmental Representative and allow for review before firestopping is concealed.
- .4 A qualified Contractor applicator shall submit a letter certifying that all work is complete and in accordance with this specification.

1.19 SERVICE PENETRATIONS OF NON-RATED SEPARATIONS

- .1 All piping, tubing, ducts, wiring, conduits, etc. shall be tightly fitted and sealed with silicon sealant on both sides of non-rated walls and floors to resist the passage of smoke and sound.

1.20 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.

1.21 EXISTING SERVICES

- .1 Arrange work to avoid shutdowns of existing services. Where shutdowns are unavoidable, obtain the Owner's approval of the schedule of shutdowns.
- .2 Shutdowns of existing services will be carried out by the Owner's maintenance staff.
- .3 To avoid interrupting of existing services, temporary relocations and/or bypasses of piping may be required.
- .4 Before interrupting any services complete all preparatory work as far as reasonably possible and have all necessary materials on site and prefabricated (where practical) and work continuously to keep the length of interruption to a minimum.

1.22 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 Make good any damage to factory finishes on equipment supplied under this Section.
- .4 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.

1.23 OPERATION AND MAINTENANCE MANUALS

- .1 Provide maintenance data for incorporation into Operational and Maintenance manual.
- .2 Employ the Balancing Agency to prepare the manuals.
- .3 Allow sufficient time to provide the final reviewed manuals to the Departmental Representative before Substantial Performance.

- .4 Provide one draft copy of the manuals to the Departmental Representative for review. Make all required changes and resubmit to the Departmental Representative. Repeat until accepted. Then submit the following, identical to the accepted copy, to the Owner:
 - .1 Three (3) hard copies - organized in binders, refer to below.
 - .2 Two (2) PDF electronic copies (minimum of 600 DPI scanning quality) of full binder contents on CD, DVD, or flash drive.
- .5 Obtain a receipt and send a copy to the Departmental Representative. Allow ten days for the first submittal review by the Departmental Representative and seven days for each subsequent review.
- .6 The binders shall be 3-ring binder. The maximum overall thickness of the filled binder shall be 100 mm [4"]. Provide multiple binders for each manual as required.
- .7 Each binder shall have large clear lettering in a clear label insert on the front cover indicating the name of the project and "OPERATING AND MAINTENANCE MANUAL - MECHANICAL".
- .8 Provide an index and tab each section.
- .9 The manual shall include:
 - .1 Description of the operation of each system.
 - .2 Air balance report.
 - .3 Commissioning report.
 - .4 Copy of any required approvals, certifications and acceptance by Authorities Having Jurisdiction.
 - .5 List of local source of supply.
 - .6 Manufacturer's operating and maintenance literature and wiring and control diagrams.
 - .7 All shop drawings.

1.24 RECORD DRAWINGS

- .1 Site Records:
 - .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 services, including sketches for Change Orders and Site Instructions shall be kept on this set of drawings.
 - .3 Services shall not be concealed until the Site Records are up-to-date for the services.
 - .4 All inaccessible concealed services shall be accurately located.
 - .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 Departmental Representative. Make any additional changes identified by the Departmental Representative including returning to the site if necessary to make measurements and/or to confirm installation locations and details. Resubmit to the Departmental Representative.

- .2 Record Drawings:
 - .1 Upon completion of the Departmental Representative's review final Record Drawings to be provided the Departmental Representative based on Contractor's red-lined markup.

1.25 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.
- .2 Provide adjustments of mechanical equipment and any changes or modification in equipment made under terms of guarantee.
- .3 Finalize demonstration and instructions by obtaining a signed statement from the Owner that the demonstration and instructions have been given satisfactorily.

1.26 BALANCING AND COMMISSIONING

- .1 Employ Flotech Mechanical Systems Specialists, KD Engineering Co., Scott Technical Service Ltd. or Western Mechanical Services as the 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 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 and exhaust air system quantities.
 - .4 Permanently mark the final balance position on all balance dampers.
 - .5 Submit a report to the Departmental Representative indicating:
 - .1 Air Side: final fan speed, motor operating amperages, system static pressure, filter static pressure, design air quantities and final air quantities obtained.

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 around the base of thermometer wells, pressure gauges, flow switches and pressure and control sensors 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 Tape: self-adhesive, aluminum, reinforced, 50 mm [2"] wide
 - .5 PVC Jacket and Fitting Covers and PVC self-adhesive tape, plastic pop rivets, staples
 - .6 Aluminum Jacket:
 - .1 To ASTM B209.
 - .2 Thickness: 22 ga.
 - .3 Finish: Corrugated or smooth.
 - .4 Joining: longitudinal and circumferential slip joints with 50 mm [2"] laps.
 - .5 Fittings: die-shaped fitting covers with factory-attached protective liner.
 - .6 Securement: Sheet metal screws, pop rivets, bands.
- .2 Scope: Cold Piping
 - .1 Fire sprinkler water main installed outdoors below wharf:
 - .1 Exterior piping and heat traced piping: 50 mm [2"] thickness.
 - .2 All condensate drain piping - 25 mm [1"] thickness.
 - .3 Mineral fibre - low and medium temperature with continuous vapour barrier.
 - .4 Installation:
 - .1 The insulation shall include provision of a continuous vapour barrier.
 - .2 Spreading staples at 75 mm [3"] centres.
 - .3 Tape over all joints and secure with staples.
 - .4 Fittings - tightly wrapped flexible insulation to full thickness with PVC fitting cover.
 - .5 Valves, Strainers - fitted pipe insulation with drains and caps uninsulated.
- .3 Scope: Refrigerant Piping
 - .1 25 mm [1"] thick flexible foamed elastomeric or flexible closed cell preformed piping insulation.
 - .2 Secure longitudinal and butt joints with adhesive. Insulate all fittings and components.
 - .3 Finish with flexible elastomeric or flexible closed cell insulation coating. Maintain continuous vapour-barrier for suction and mixed phase piping.
- .4 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 PVC jacket.
 - .2 Over insulating fittings provide PVC fitting covers.
- .3 "Exposed" outdoor insulation and below wharf 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. Secure the jacket using necessary fastenings on approximately 150 mm [6"] centres.
 - .3 Over insulated fittings, valve bodies, valve bonnets, strainers and flanges apply aluminum jacket and preformed aluminum fittings to provide a complete jacket system. Secure with necessary fastenings.
 - .4 Locate seams on underside and seal all outdoor jacketing watertight.

Part 3 Fire Protection

3.1 MULTI-PURPOSE DRY CHEMICAL EXTINGUISHERS (FE1)

- .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.

3.2 FIRE EXTINGUISHER 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.

3.3 SPRINKLER DESIGN ENGINEER

- .1 Retain the services of a Fire Protection Engineer to provide services as described in Division C, Appendix A, Scenario 2 of the current Building Code for the Sprinkler Design Engineer for the scope of the new fire protection system as shown on the Drawings.
- .2 The Sprinkler Design Engineer shall:
 - .1 Produce the working fire protection drawings to NFPA 13 for Sprinkler Systems.
 - .2 Perform hydraulic calculations. Software shall meet NFPA calculation requirements.
 - .3 Seal all documents submitted for construction and permits.
 - .4 Assume full responsibility for the sprinkler system design and submit Schedules to the Municipality.
 - .5 Submit a copy of the Schedules, calculations, working drawings and all relevant shop drawings to the Departmental Representative for review prior to start of construction.
 - .6 Provide assistance to the fire suppression contractor as required.
 - .7 Witness sprinkler and standpipe testing.
 - .8 Inspect the completed installation.

- .9 On project completion, submit a sealed statutory declaration to the Departmental Representative stating that the fire protection system is installed in accordance with the Sprinkler Design Engineer drawings, instructions and the regulatory requirements.

3.4 SPRINKLER SYSTEM

- .1 The sprinkler design criteria shall be:
 - .1 Light hazard occupancy with a density of 4.1 (L/min)/m² [0.10 gpm/ft²] for the most remote 139m² [1500 ft²].
 - .2 Ordinary Hazard Group 1 occupancy with a density of 6.1 (L/min)/m² [0.15 gpm/ft²] for the most remote 139 m² [1500 ft²].
 - .3 Ordinary Hazard Group 2 occupancy with a density of 8.2 (L/min)/m² [0.2 gpm/ft²] for the most remote 139 m² [1500 ft²].
 - .4 Include allowance in hydraulic calculations for outside hose streams.
- .2 All sprinkler piping shall run concealed in walls, within the structure or above dropped ceilings.
- .3 Sprinkler deflector elevations for exposed sprinklers in the same room shall be within 12 mm [1/2"] of each other where under a common ceiling elevation.
- .4 Provide sheet metal shields where required to prevent cold soldering of sprinkler heads. Colour of shields as per Architects direction.
- .5 Hangers and Supports
 - .1 Inside the building: Cadmium plated hangers and rods.
 - .2 Outside the building and under wharf:
 - .1 316 stainless steel pipe clamps and holders.
 - .2 316 stainless steel Unistrut supports, fitting and screws/bolts.

3.5 SPRINKLER HEADS AND ESCUTCHEONS

- .1 Sprinkler heads shall be ULC listed and fusible links shall be temperature rated for use in occupancies and hazard type for which they are installed.
- .2 All sprinklers heads except where noted otherwise shall be satin chrome finish with polished chrome escutcheons except natural brass finish may be used in service rooms and concealed locations and concealed pendant heads shall have a T-bar white [custom colour painted] cover plate.
- .3 Provide escutcheons to suit the model of sprinkler and maintain the approvals.
- .4 Escutcheons shall allow ceiling panel removal without removing the sprinkler head.

Part 4 HEAT TRACING FOR PIPING

- .1 Provide complete, CSA approved system of heat tracing on piping exposed to outdoors, as indicated.
- .2 Controls
 - .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 Thermostat: Line voltage remote bulb type thermostat with:
 - .1 120 Volt.
 - .2 3 m copper capillary tube.
 - .3 Moisture and dust-resistant enclosure.
- .3 Manufacturer's Instructions
 - .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.
 - .2 Install heating cables in accordance with manufacturer's instructions.
- .4 Installation
 - .1 The entire design and installation of the system shall comply with the Canadian Electrical Code and the requirements of the local inspection authority.
 - .2 Comply with all manufacturer's instructions/recommendations regarding the installations. Provide all necessary materials to provide a complete system.
 - .3 Prior to installing heating cables, ensure the pipe systems are complete and have passed all necessary tests.
 - .4 Cables to be secured to pipes using tape at 300 mm [12"] intervals on pipe.
 - .5 Ensure that heating cables do not touch or cross each other.
 - .6 Coordinate cable installation with insulation application. Loop additional cable at fittings, valves, and flanges.
 - .7 Run only cold leads in conduit and ensure sensing bulb does not touch cable. Ground shield to building ground.
 - .8 Make power and control connections.
 - .9 After pipes are traced test all lengths prior to installation of pipe insulation.
 - .10 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".
- .5 Standard of Acceptance:
 - .1 Raychem Chemelex Auto Trace self-regulating, shielded, jacketed cable type XL-TRACE with Chemelex Automatrix Thermostat #AMC-F5 and using Raychem Type G554 glass cloth tape.

Part 5 Condensate Drains

5.1 PIPING AND FITTINGS

- .1 Piping
 - .1 Inside buildings:
 - .1 DWV copper pipe and fittings.
 - .2 Outside buildings:
 - .1 PVC drain and waste pipe and fittings.

Part 6 HVAC systems

6.1 REFRIGERANT PIPING AND FITTINGS

- .1 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.
- .2 Hangers and Supports:
 - .1 Cadmium plated hangers and rods.
 - .2 Outside the building: Galvanized hangers and rods.
 - .3 For copper pipe: Copper plated or epoxy coated.
- .3 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.

6.2 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 During construction, protect ductwork openings from the entry of dirt, dust and debris with suitable covers.
 - .5 Provide flashing and counter flashing on ducts through exterior walls.

- .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, terminal boxes 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 and plenums. Duct sealing to meet ASHRAE 90.1 2010 requirements.
- .5 Ductwork Pressure Testing
 - .1 It is the intent that all ductwork systems be well sealed. Any leaks that can be felt or heard shall be resealed.

6.3 CABINET FANS

- .1 Steel cabinet arranged for ducted inlet and outlet connections with duct collars (where shown) or ceiling exhaust opening complete with aluminum exhaust grille (where scheduled).
- .2 Acoustically insulated cabinet.
- .3 Centrifugal fan on rubber isolators.
- .4 Access panel.
- .5 Integral motor thermal overload protection.
- .6 Motor disconnect plug and integral receptacle.
- .7 Accessories:
 - .1 Solid state speed control - where scheduled.
 - .2 Motorized control damper - as scheduled.
 - .3 Backdraft damper - as scheduled.

Part 7 Controls

7.1 GENERAL

- .1 Provide control system complete with all necessary components and connections to achieve the specified functions and to permit the HVAC systems to perform properly in the manner described and as hereinafter specified.
- .2 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.
- .3 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 the installation details or components.

- .4 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.

7.2 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

7.3 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 Departmental Representative and the Owner.

7.4 PRODUCTS

.1 Room Thermostat:

- .1 User adjustable, suitable for wall mounting, with or without protective guard, to suit equipment control and interlocks.

- .2 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.

7.5 CONTROL DAMPERS

- .1 Control Dampers
 - .1 Opposed type blade for all modulating dampers unless otherwise indicated.
 - .2 Parallel type blade for all two position dampers unless otherwise indicated.
 - .3 Extruded aluminum or formed galvanized steel blades, frames, gussets and blade stops.
 - .4 Shafts - galvanized steel with keyways for securing blades to shafts.
 - .5 Hardware - keyed to prevent blade slippage and to provide smooth blade movement.
 - .6 Bearings - oil impregnated sintered bronze. Provide additional thrust bearings for vertical blades. Confirm in advance with Engineer any vertical blade dampers.
 - .7 Assemblies - rigid and adequately braced with corner gussets.
 - .8 Maximum frame dimensions - 1220 mm [48"] wide and 1220 mm [48"] high, unless otherwise indicated. Multiple sections to have stiffening mullions.
 - .9 Bearings and seals - suitable for exposure to a minimum of -30°C [-22°F] and a maximum of 100°C [212°F].
 - .10 Maximum blade width - 200 mm [8"].
 - .11 Low leakage type with blade and frame seals.
 - .12 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. For smoke control purposes dampers to be labelled to ULC Standard S112.1 (UL-555S) level 1 leakage.
 - .13 Galvanized coating on all sheared edges of galvanized steel frames and blades exposed to outside atmosphere.
 - .14 Indicated size is outside frame dimension. Confirm with installer before fabrication.
 - .15 Blades to be horizontal in vertical mounted dampers. Refer to drawings for orientation of dampers.
 - .16 Provide an additional drive shaft bearing if the drive shaft is longer than 75 mm [3"].
 - .17 Dampers shall be adequate for the maximum system pressure. Refer to the appropriate section of the specification.
- .2 Damper Actuators
 - .1 Damper actuators for all control dampers shall be supplied by this trade.
 - .2 Spring return for "fail-safe" in Normally Open or Normally Closed position where required.

- .3 Size actuators to control dampers against maximum pressure or dynamic closing pressure whichever is greater.
- .4 Size damper actuators so that they will provide smooth and full travel of the dampers while stroking in both directions.
- .5 Electric/Electronic Damper Actuators:
 - .1 Provide 120 or 24 volt damper actuators.
 - .2 Actuators shall be direct coupled enabling it to be mounted directly to the damper shaft without the need for connecting linkage.
 - .3 The actuators shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator.
 - .4 Proportional actuators shall accept a 2 to 10 VAC or 4 to 20 mA signal and provide a 2 to 10 VDC position feedback signal.

7.6 SEQUENCE OF OPERATION

- .1 Workshop Room Temperature Control (Room 126)
 - .1 The system consists of:
 - .1 Unit heater (UH-100).
 - .2 Room thermostat.
 - .3 Door switch.
 - .2 Provide a room thermostat for Room 100. Coordinate the exact location of the sensors on site with the Departmental Representative.
 - .3 Monitor the operation (OPEN/CLOSED) of the bay door.
 - .4 Provide a relay in the unit heaters.
 - .5 Cycle the unit heater (UH-100) to satisfy the thermostat.
 - .6 When the bay door is OPEN for more than 10 minutes (adjustable) then disable the unit heaters.
- .2 Exhaust Fans (Room 100, 200)
 - .1 The system consists of:
 - .1 Exhaust fan (EF-xxx).
 - .2 Wall mounted timer switch.
 - .2 Electrical Division shall provide a manual wall mounted timer switch to control the operation of the exhaust fan.
- .3 Exhaust Fans (EF-300)
 - .1 The system consists of:
 - .1 Exhaust fan (EF-300).
 - .2 Motorized damper.
 - .3 Thermostat – heat-cool.
 - .2 If the room temperature is below 13°C then enable the electric baseboard heater.
 - .3 If the room temperature is above 25°C then open the outdoor air motorized damper and enable exhaust fan EF-300.
 - .4 Damper shall fail open.

- .4 Heat Pump Unit Control (HP-200/CU-200)
 - .1 Mount the wall-mounted controller provided with the air conditioning unit.
 - .2 Provide all required wiring between the wall-mounted controller, the AC unit and the condensing unit.
 - .3 The air conditioning unit's wall mounted controller shall control the operation of the air conditioning unit.

Part 8 Equipment Schedules

8.1 HEAT PUMP UNITS (HP-200/CU-200)

- .1 Ductless split heat pump unit. Indoor units shall be wall mounted complete with integral CSA approved condensate pump and wall mounted remote control unit.
- .2 The outdoor condensing unit shall be mounted on housekeeping pad.
- .3 HCFC refrigerants shall not be used.
- .4 Provide wind baffle suitable and the unit shall be suitable for low ambient operation.
- .5 Capacity as scheduled.
- .6 Provide all required wiring between outdoor unit and indoor unit.

8.2 FORCE FLOW UNITS - ELECTRIC

- .1 Steel cabinet with baked enamel finish. Inlet and outlet bar grilles on front face. Recessed mounting arrangement, provide all required hardware and trim.
- .2 CSA approved.
- .3 Two speed direct drive fan assembly.
- .4 Stainless steel sheathed heating elements, with corrosion protected steel fins.
- .5 Factory installed switching relays, fan delay switch, on-off switch, over-temperature protection and two position speed switch.
- .6 Accessories: Relays and controllers suitable for control through the building DDC system.
- .7 Capacity: Refer to schedules.

8.3 EXHAUST FAN (EF-xxx)

- .1 Ceiling exhaust fan complete with aluminum exhaust grille.
- .2 Acoustically insulated cabinet.
- .3 Centrifugal fan on rubber isolators.
- .4 Integral motor thermal overload protection.
- .5 Motor disconnect plug and integral receptacle.
- .6 Accessories:
 - .1 Solid state speed control.
 - .2 Backdraft damper.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS & SUMMARY

- .1 The General Conditions, Supplements and Amendments shall govern this Section (read in conjunction with Instructions to Tenderers / Bidders). This section covers items common to all Electrical sections and is intended only to supplement the requirements of Division 01.
- .2 Reference to "Electrical Divisions" shall mean all sections of Divisions 26 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 Provide materials, equipment and plant, of specified design, performance and quality; and, current models with published certified ratings for which replacement parts are readily available. Provide project management and on-site supervision to undertake administration, meet schedules, ensure timely performance, ensure coordination, and establish orderly completion and the delivery of a fully commissioned installation.
- .5 The most stringent requirements of this and other electrical sections shall govern.
- .6 All work shall be in accordance with the PROJECT Drawings and Specifications and their intent, complete with all necessary components, including those not normally shown or specified, but required for a complete installation.
- .7 Provide seismic restraints for all required fixtures, devices, equipment, pathway, and wiring systems as required by the BC Building Code.
- .8 Connect to equipment specified in other Sections and to equipment supplied and installed by other Contractors or by the Departmental Representative. Uncrate equipment, move in place and install complete; start-up and test. Include all field assembly of loosely/separately packaged accessories

1.2 CODES AND STANDARDS

- .1 Comply with all laws, ordinances, rules, regulations and codes of all authorities having jurisdiction relative to this project.
- .2 The project will be constructed to the current adopted edition of applicable standards, including:
 - .1 CSA C22.1, Canadian Electrical Code (CEC)
 - .2 British Columbia Building Code (BCBC)
 - .3 National Building Code (NBC)
 - .4 National Fire Code of Canada (NFCC)
 - .5 WorkSafe BC Regulations
 - .6 Applicable NFPA Regulations
 - .7 In no instance, however, shall the standards established by the Contract Documents be reduced by any of these Codes or Regulations.
 - .8 All materials shall bear the approval of the Canadian Standards Association and where applicable, the Underwriters' Laboratories of Canada or alternately shall bear local approval from the Electrical Inspection Department having

jurisdiction. Include in the Tender all costs associated with obtaining local approvals.

1.3 REFERENCES

- .1 Install in accordance with CSA C22.1 (current adopted edition) – except where specified otherwise.
- .2 Refer to CSA C22.1 Appendix A “Safety Standards for Electrical Equipment” for applicable codes and the related revisions
- .3 Refer to NBCC Table 1.3.1.2 for applicable codes and the related revisions.
- .4 Comply with Local Electrical Bulletins and by-laws relating to the Authority having Jurisdiction.
- .5 Install overhead and underground systems in accordance with CSA C22.3 No.1 (current adopted edition) – except where specified otherwise.
- .6 Preferred Voltage Levels for AC Systems, 0-50,000V in accordance with CAN3-C235 (current adopted edition)

1.4 PERMITS

- .1 Submit to the Electrical Inspection Authority having jurisdiction the necessary number of drawings and specifications for review and approval prior to commencement of the project.
- .2 Pay all associated fees and obtain all permits, licenses etc. to complete the project.
- .3 Obtain a Certificated of Acceptance from the Inspection Authority having jurisdiction upon completion of the project and include in the O&M manual.

1.5 SCOPE OF WORK

- .1 Electrical Services:
 - .1 To be provided as required by latest Canadian Electrical Code (CEC)
 - .2 Normal Power Distribution System:
 - .1 The normal power distribution system will be provided at 120/208/600V, 3-phase, 4-wire.
 - .2 Contractor to make sure it is a fully rated systems. Include the calculations on fault current in the report. Vendor to provide arc flash sticker on every single equipment upon confirmation of a fully rated systems.
 - .3 120/208V, 3-phase, 4-wire distribution boards and branch circuit panel boards will be provided as necessary for power distribution to equipment.
 - .4 120V power supply will be provided to receptacles and fractional horsepower motors.
 - .5 Power supply at the appropriate voltage and phase will be provided to Departmental Representative’s equipment as required.

- .6 A feeder cable will be installed from the Main Electrical Room of the existing building to the new 600:120/208V, 45kVA , Dry Type 1 transformer (T-WS) and new 120/208V, 3Phase Workshop panel per contract drawings.
- .7 Provide power, security, communication, fire alarm (empty conduits with pullcord) connections from the existing main building to the new workshop as indicated on the electrical drawings.
 - .1 Field verify the existing condition and provide x-ray scanning before coring the existing concrete wharf.
- .8 Provide temporary power as necessary for power distribution to equipment.
- .9 Provide grounding to the sea as per Section 26 05 28.
- .10 Provide security connection(s) from the existing building to the Workshop.
- .11 Provide security alarming system for the workshop as per Section 28 31 00 Intrusion Detection, and electrical drawings.
- .12 Provide Communication connection(s) from the existing building to all Workshop equipment as per contract drawings.
- .13 Provide main Fire Alarm conduit connection(s) from the existing building to all Workshop as per contract drawings.
 - .1 Fire alarm work within the building is an additional optional scope of work for the contractor to bid separately.**
- .2 Provide all necessary electrical wiring including conduit, wire, and cable. Refer to the drawings for details and the specifications.
- .3 Coordinate all new equipment in terms of layout and location before ordering.
- .4 Review all shop drawings of other divisions to ensure electrical services are properly provided.
- .5 Assure all works are in compliance with Canadian Electrical Code, BC Hydro standards and guidelines and other applicable codes and standards.
- .6 Provide all required fire stopping of penetrations through fire rated walls, ceilings and floor. Fire stopping shall be to cUL/UL approved assemblies and all fire stopping shall be labelled with the approved assembly used. Fire stopping to be verified by a third party and signed and sealed by a professional engineer to be provided.
- .7 Provide seismic anchoring of all new equipment and services. Engage the services of a registered B.C. Professional Engineer for this work.
- .8 Provide Record drawings and O&M manuals and spare parts.

- .9 Provide workshop grounding to the sea as per the electrical drawings and the Canadian Electrical Code.

- .1 Provide bonding

1.6 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235- current 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.
- .3 All electrical work to be installed with common work practices and methods.

1.7 SUBMITTALS

- .1 Submittals to be in accordance with Division 01.
- .2 Shop Drawings:
 - .1 The term “shop drawing” means drawings, diagrams, illustrations, schedules, performance characteristics, brochures and other data which are to be provided by the contractor to illustrate details of a portion of the work.
 - .2 Prior to submitting the shop drawings to the Departmental Representative, the contractor shall review the shop drawings to determine that the equipment complies with the requirements of the specifications and drawings.
 - .3 Submit shop drawings, product data and samples for all electrical equipment and materials in accordance with Division 01. The submission shall be reviewed, signed and processed as described in Division 01.
 - .4 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.
 - .5 Where applicable, include wiring, line and schematic diagrams. Include wiring drawings or diagrams showing interconnection with work of other Sections.
 - .6 Manufacturer of products shall conform to revised shop drawings.
- .3 Content
 - .1 Shop drawings submitted title sheet.
 - .2 Data shall be specific and technical.
 - .3 Identify each piece of equipment including specific options selected for each type to be included in the project.
 - .4 Information shall include all scheduled 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.
- .5 Copies of factory tests, where applicable.
- .4 Format
 - .1 Shop Drawings to be submitted in PDF format; larger submittals may be submitted on flash drives or uploaded to an FTP site set up by the contractor.
- .5 Coordination
 - .1 Where electrical equipment requires support or backing by other trades or mechanical connections, the shop drawings shall also be circulated through the other "services" contractor(s) prior to submission to the Departmental Representative.
- .6 Keep one [1] copy of shop drawings and product data, on site, available for reference.
- .7 Quality Control: in accordance with Division 01 - Quality Control
 - .1 Provide CSA certified equipment and material. Where CSA certified equipment and/or material is not available, submit such equipment and/or material to the authority having jurisdiction for special approval before delivery to site.
 - .2 Submit test results of installed electrical systems and instrumentation.
 - .3 Submit, upon completion of Work, the electrical "load balance" report.
- .8 Permits and Fees:
 - .1 Submit to Electrical Inspection Department, Local Fire Authorities and Supply Authority the necessary number of drawings and specifications for examination and approval prior to commencement of work. Obtain all required permits and pay all fees.
 - .2 Arrange for inspection of all Work by the authorities having jurisdiction. On completion of the Work, furnish final unconditional certificates of approval by the inspecting authorities.

1.8 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Division 01 - Quality Control
- .2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial and/or Territorial Act.
 - .1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
 - .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.
- .3 Site Meetings: in accordance with Division 01 - Construction Progress Schedule
 - .1 Site Meetings: as part of Manufacturer's Field Services: schedule site visits, to review Work, at stages listed below:
 - .1 At time of initial shop drawing submission to confirm any existing conditions and to coordinate with the project schedule and any cross discipline requirements.
 - .2 After delivery and storage of products, and when preparatory Work is complete but before installation begins.

- .3 During progress of Work at key schedule points as determined.
 - .4 At commissioning.
 - .5 Upon completion of Work, after cleaning is carried out.
- .4 Health and Safety Requirements: do construction occupational health and safety in accordance with Division 01 - Health and Safety Requirements.

1.9 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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:
- .4 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .5 Store and protect equipment and materials from nicks, scratches, and damage. Protect from dust where applicable.
- .6 Replace defective or damaged materials with new.

1.10 SYSTEM START-UP

- .1 Refer to Division 01 and as follows.
- .2 Instruct Departmental Representative and operating personnel in the operation, care and maintenance of equipment.
- .3 Arrange and pay for services of manufacturer's factory service Departmental Representative to supervise start-up of installation, check, adjust, balance and calibrate components, where required in these specifications.
- .4 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 aspects of its care and operation.

1.11 OPERATING INSTRUCTIONS

- .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
- .2 Operating instructions to include following:
 - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
 - .3 Safety precautions.
 - .4 Procedures to be followed in event of equipment failure.
 - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
- .4 Post instructions where directed.

- .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
- .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.12 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Division 01 - Construction/Demolition Waste Management and Disposal and with the Waste Reduction Work plan.
- .2 Avoid using landfill waste disposal procedures when recycling facilities are available.
- .3 Place materials defined as hazardous or toxic waste in designated containers.

1.13 DRAWINGS AND MEASUREMENTS

- .1 Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of work and are not detailed installation drawings. Do not scale the drawings. Obtain accurate dimensions from the Architectural and Structural drawings.
- .2 Consult the architectural drawings and details for exact locations of fixtures and equipment. Obtain this information from the Departmental Representative where definite locations are not indicated.
- .3 Take field measurements, where equipment and material dimensions are dependent upon building dimensions.
- .4 Where imperial units have been indicated in brackets [] following the requirements in SI units, the conversion is approximate and provided for convenience. The SI units shall govern.

1.14 PROJECT COORDINATION

- .1 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 Departmental Representative, without the Departmental Representative's written approval.
- .2 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.
- .3 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 Departmental Representative and all affected parties.

- .4 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 Departmental Representative of space problems before installing any material or equipment. Demonstrate to the Departmental Representative on completion of the work that all equipment installed can be properly, safely serviced and replaced, if and when required.

1.15 PROVISION FOR FUTURE EQUIPMENT AND CONSTRUCTION

- .1 Leave clear spaces designated for future equipment or building expansion where indicated. Plan for the installation under this contract and ensure clear accessible, unhindered access to the space is allowed for.
- .2 Where contract documents don't clearly indicate the future expansion requirements, but known services are required, provide written "request for information" to the Departmental Representative before making assumptions as to intent.

1.16 EQUIPMENT RESTRAINT

- .1 Related Section: 26 05 05 Seismic Restraint.
- .2 It is the entire 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.

1.17 PHASED CONSTRUCTION

- .1 See Architectural specifications and drawings for construction phasing. Make all allowances to phase the work in accordance with the project phasing.
- .2 All trades in this Division shall make allowance for the implications of having to totally complete all work in the new addition before proceeding with work in the existing building.

1.18 WARRANTY

- .1 Use of installed equipment during construction shall not shorten or alter the warranty period as specified in the Division 01.
- .2 Take note of any extended warranties specified in other sections of this Division.
- .3 Furnish a written warranty stating that all work executed under this Division will be free from defects of material and workmanship for a period of one (1) year from the date of substantial performance and include in O&M manual.
- .4 Promptly investigate any electrical or control malfunction, and repair or replace all such defective work and all other damages thereby which becomes defective during the time of the warranty.

1.19 TENDER INQUIRIES

- .1 All contractor queries during the tender period shall be made in writing to Departmental Representative. Contractor queries will be collected and suitable addenda will be issued for clarification.

1.20 RESPONSIBILITIES

- .1 Provide temporary lighting, power and systems for construction services and remove after construction is complete.

- .2 Ensure that equipment does not transmit noise and/or vibration to other parts of the building, as a result of poor installation practice.
- .3 Where the Contract Documents do not contain sufficient information for the proper selection of equipment for bidding, notify the Departmental Representative during the tendering period. If clarification is not obtainable, allow for the most expensive arrangement. Failure to do this shall not relieve the Contractor of responsibility to provide the intended equipment.
- .4 Protect equipment and material from the weather, moisture, dust and physical damage.
- .5 Cover equipment openings and open ends of conduit, piping and pullboxes as work progresses. Failure to do so will result in the Trade being required to adequately clean or replace materials and equipment at no extra cost to the Departmental Representative.
- .6 Refinish damaged or marred factory finish to factory finish.
- .7 The specifications and drawings form an integral part of the Contract Documents. Neither the drawings nor the specifications shall be used alone. Work omitted from the drawings but mentioned or reasonably implied in the specifications, vice versa, shall be considered as properly and sufficiently specified and shall be provided. Misinterpretation of any requirement of either plans or specifications shall not relieve this Contractor of the responsibility of properly completing his trade to the approval of the Departmental Representative.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- .1 Provide materials and equipment in accordance with Division 01 and as follows.
- .2 Material and equipment to be CSA certified. Where CSA certified material or equipment is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval.
- .3 Where equipment or materials are specified by technical description only, they are to be of the best quality available for the application for which it is to be installed.

2.2 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- .1 Provide all power and control wiring, conduit, wire, fittings, disconnect switches, motor starters, for all mechanical equipment unless otherwise specified.
- .2 Bond all motors to conduit system with separate bonding conductor in flexible conduit or bonding conductor in the flexible conduit.
- .3 Connections shall be made with watertight flexible conduit with watertight connectors.

2.3 WARNING SIGNS

- .1 Provide warning signs, as specified or to meet the requirements of Inspection Department, Authority having Jurisdiction and Departmental Representative.
- .2 Use decal signs, minimum 175 x 250 mm [7" x 10"] size

2.4 EQUIPMENT IDENTIFICATION

- .1 Identify all electrical equipment including but not limited to starters, disconnects, remote ballasts and controls with nameplates and labels as follows:

.2 Nameplates:

- .1 Lamicoïd 3 mm [0.125"] thick plastic engraving sheet, white face, black core, self adhesive unless specified otherwise. Provide white face, red core for all essential distribution equipment.

.2 Nameplate Sizes:

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 Typical Labelling:

.1 Panelboard & CDP – 5 lines

- .1 Line 1 – Panel/CDP designation – Size 4 lettering
 .2 Line 2 – eg 225A, 120/208V, 3 phase 4W – Size 2 lettering
 .3 Line 3 – Feeder: eg 4#3 – 35mm C – Size 2 lettering
 .4 Line 4 – Origin eg: Main Elect. Room – Size 2 lettering

.2 Distribution Circuit Breakers – 4 lines

- .1 Line 1 – Main Circuit Breaker – Size 4 lettering
 .2 Line 2 – Feeder: eg 4#3 – Size 2 lettering
 .3 Line 3 – Origin: eg K1 Sub-station – Size 2 lettering

.3 Label colours unless otherwise indicated:

- .1 Normal Power: white letters on black base.

- .4 Wording on nameplates to be approved prior to manufacture.
 .5 Allow for average of twenty-five (25) letters per nameplate.
 .6 Disconnects, starters and contactors: indicate equipment being controlled and voltage and CCT.
 .7 Terminal cabinets and pull boxes: indicate system and voltage and source.
 .8 Transformers: indicate capacity, primary and secondary voltages, source and lead.

.3 Labels:

- .1 Identify each outlet, starter, disconnect and all items of fixed equipment with the appropriate panel and circuit number origin by means of a small but good quality vinyl, self-laminating label such as T & B E-Z Code WSL, Dymo Letratag or Brother P-Touch equivalent printable markers. Embossed Dymo or any labels with edges and corners that are prone to lift will be rejected. Confirm location of labels with Departmental Representative before installing. Circuit number to agree with Record Drawings.

- .4 Provide plastic covered panel directory with circuits and areas served typed in, and mounted on inside of door. Directory to conform to Record Drawings.

2.5 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.
- .4 Use colour coded wires in communication cables, matched throughout system.

2.6 CONDUIT, CABLE AND PULLBOX IDENTIFICATION

- .1 Colour code conduits, metallic sheathed cables, pullboxes and junction boxes.
- .2 Code with 25 mm plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor and at 15 m intervals.

2.7 FINISHES

- .1 Shop finish metal enclosure surfaces by removal of rust and scale, cleaning, 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 finish.
- .3 Clean and prime paint exposed hangers, racks, fastenings to prevent rusting. Finish painting shall be provided by Division 09.
- .4 Paint outdoor electrical equipment "equipment green" finish, if applicable.

2.8 ANCHOR BOLTS AND TEMPLATES

- .1 Supply anchor bolts and templates for installation by other Divisions.

2.9 EQUIPMENT SUPPORTS

- .1 Provide stands and supports for equipment and materials supplied.
- .2 Lay out concrete bases and curbs required under Electrical Divisions. Coordinate with Concrete Divisions.
- .3 Concrete bases shall be a minimum of 100 mm [4"] thick, or as noted and shall project at least 150 mm [6"] outside the equipment base, unless otherwise directed. Bases and curbs shall be keyed to the floor and incorporate reinforcing bars and/or steel mesh. Chamfer edges of bases at 45 degrees.
- .4 Equipment with bedplates shall have metal wedges placed under the edges of the bedplates to raise them 25mm [1"] above the base after levelling. The wedges shall be left permanently in place. Fill the space between the bedplate and the base with non-shrink grout - Embecco or In-Pakt.
- .5 Construct equipment supports of structural steel. Securely brace. Employ only welded construction. Bolt mounting plates to the structure.
- .6 Support ceiling hung equipment with rod hangers and/or structural steel.

2.10 MISCELLANEOUS METAL

- .1 Be responsible for all miscellaneous steel work relative to Electrical Divisions of the Specifications, including but not limited to:
 - .1 Support of equipment.
 - .2 Hanging, support, anchoring, guiding and relative work as it applies to wiring raceways and electrical equipment.
 - .3 Earthquake restraint devices - refer also to "Seismic Restraint" sections
 - .4 Bridle rings - secure to structure or steel supports.
- .2 All steel work shall be prime and undercoat painted ready for finish under the related Division.

2.11 MAINTENANCE MATERIALS AND CABINET

- .1 Provide maintenance materials in accordance with Division 01 and specified in appropriate Sections.
- .2 Provide a finished painted sheet steel "spare equipment cabinet". Cabinet to have a continuous hinge and complete with shelves and hasp to suit padlock. Minimum size 600 [24"] x 900 [36"] x 200 [8"] deep. Mount on wall in the Electrical Room. Provide a plastic covered typewritten list of spare parts and affix to the inside of the door.

2.12 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for incorporation into maintenance manual specified in Division 01 and as follows.
- .2 Include in operations and maintenance data:
 - .1 Details of design elements, construction features, component function and maintenance requirements, to permit effective operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.
 - .2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.
 - .3 Wiring and schematic diagrams.
 - .4 Names and addresses of local suppliers for items included in maintenance manuals.
- .3 Include in the manual the following major sections:
 - .1 Title page (in plastic cover).
 - .2 Comprehensive description of the operation of the systems, including the function of each item of equipment within the system.
 - .3 Detailed instructions for the normal maintenance of all systems and equipment installed including procedures and frequency of operational checks and service and troubleshooting instructions.
 - .4 Local source of supply for each item of equipment.
 - .5 Wiring and control diagrams.
 - .6 Spare parts list.
 - .7 Copies of guarantees and certificates.
 - .8 Manufacturer's maintenance brochures and shop drawings.

2.13 PROJECT RECORD DRAWINGS

- .1 Provide project record documents as specified in Division 01 as further called for in this Division.
- .2 The contractor shall keep a complete set of white prints at the site office, including all addendums, change orders, site instructions, clarifications and revisions for the purpose of record drawings. As the work on site proceeds, the contractor shall clearly record in Red all as-built conditions which deviate from the original contract documents. Record drawings to include cable runs (complete with number of cables and ID number) and locations of all telecommunications equipment.
- .3 Prior to substantial performance, the Contractor shall submit completed red-line record drawings to the Departmental Representative. The Contractor shall certify, in writing that the as-built record drawings are complete and that they accurately indicate all electrical services and electrical pathway, including exposed as well as concealed items.
- .4 Preparation of record drawings in AutoCAD shall be performed by the Contractor based on the red-line record drawings submitted by the Contractor.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

3.2 NAMEPLATES AND LABELS

- .1 Ensure manufacturers nameplates and CSA labels to be visible and legible after equipment is installed.

3.3 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit and protruding 50 mm [2"].
- .2 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.
- .3 Install roof jacks where conduit and cables penetrate roofs. Apply sealant after installation. Install roof stand offs where conduit or teck is installed on roof.
- .4 All cables and conduits to be installed concealed in finished areas.

3.4 LOCATION OF OUTLETS

- .1 Do not install outlets back-to-back or in the same stud space in wall; allow minimum 400mm [16"] horizontal clearance between boxes.
- .2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000mm [10'- 0"] and information is given before installation.
- .3 Locate light switches on latch side of doors unless otherwise indicated.
- .4 Locate disconnect devices in mechanical and elevator machine rooms on latch side of door.

3.5 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 indicated verify before proceeding with installation. Confirm the height of devices in handicapped facilities before installation.
- .3 Adjust mounting heights to accessible heights to meet the BC Building Code where applicable.

3.6 FIELD QUALITY CONTROL

- .1 Load and Balance:
 - .1 Measure voltage and phase & neutral currents to panelboards with normal loads (lighting) 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 and neutral currents to dry-core transformers and motor control centres, operating under normal load,
 - .3 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- .2 Conduct and pay for the following tests:
 - .1 Power generation and distribution system including phasing, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
 - .4 Main ground resistance (at all grounding locations).
 - .5 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground (sea) before energizing.
- .3 Provide Departmental Representative with at least one week's notice prior to testing.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .5 Reports:
 - .1 Provide written reports in a timely manner upon completion of the testing and load balance. Indicate test hour and date.

3.7 CLEANING

- .1 Do final cleaning in accordance with Division 01.
- .2 At time of final cleaning, clean lighting reflectors, lenses and other lighting surfaces that have been exposed to construction dust and dirt.
- .3 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

- .4 Clean and prime paint exposed non-galvanised hangers, racks, fastenings to prevent rusting. Coordinate finish painting with Division 09.
- .5 Clean Communication Rooms and equipment located therein with vacuum or similar compressed air/pressurized duster system.

3.8 WORKMANSHIP

- .1 Workmanship shall be in accordance with well-established practice and standards accepted and recognized by the Departmental Representative and the Trade.
- .2 The Departmental Representative shall have the right to reject any item of work that does not conform to the Contract Documents and accepted standards of performance, quietness of operation, finish and appearance.
- .3 Employ only tradesmen holding valid Provincial Trade Qualification Certificates. Tradesmen shall perform only work that their certificate permits. Certificates shall be available for inspection by the Departmental Representative.

3.9 PROTECTION OF WORK

- .1 Protect equipment and materials, stored or in place, from the weather, moisture, dust and physical damage.
- .2 Mask machined surfaces. Secure covers over equipment openings and open ends of equipment and conduit, as the installation work progresses.
- .3 Equipment having operating parts, bearings or machined surfaces, showing signs of rusting, pitting or physical damage will be rejected.
- .4 Refinish damaged or marred factory finish.
- .5 All communication rooms shall be dust free at the time of installation of cabling and equipment. Communication rooms shall remain dust free during construction.

3.10 PROTECTION OF ELECTRICAL EQUIPMENT

- .1 Protect exposed live equipment during construction for personnel safety.
- .2 Shield and mark live parts, e.g. "LIVE 120 VOLTS".
- .3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.

3.11 CONCEALMENT

- .1 Conceal wiring and conduit in partitions, walls, crawlspaces and ceiling spaces, unless otherwise noted.
- .2 Do not install wiring and conduit on outside walls or on roofs unless specifically directed.

3.12 SERVICE PENETRATIONS IN RATED FIRE SEPARATIONS

- .1 All fire stopping materials shall be of one manufacturer;
- .2 All cabling, wiring, conduits, cable trays, etc. passing through rated fire separations shall be smoke and fire stopped to a ULC or cUL tested assembly system, in accordance with CAN4-S115-95, that meets the requirements of the Building Code in effect.

- .3 Firestop System installation must meet requirements of ASTM E 814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- .4 Install firestopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions. The Applicator shall be approved, licensed and supervised by the manufacturer in the installation of firestopping and are to follow the requirements of a rated system; installer to be FM 4991 Approved Contractor, UL Approved Contractor or Hilti Accredited Fire Stop Specialty Contractor.
- .5 Contractors are expected to submit system information detailing firestopping product, backing, penetrant, penetrated assembly, Fire (F) and Temperature (T) rating, and ULC or cUL system number during shop drawing stage.
- .6 Provide fire stopping material and system information in the maintenance manuals and via labels at major penetrations that are likely to be re-penetrated.
- .7 All penetrations for communication cabling are to be firestopped using re-penetrable penetrable EZ Path System (Specified Technologies Inc - STI) or re-penetrable Hilti Firestop Systems designated and installed for each specific application.
- .8 Allow openings for 100% capacity of raceway or 200% capacity of J-hooks (if applicable).
- .9 Provide Firestopping approval certificate including a Building Code / By-Law Schedule B & C-B signed by a BC registered Professional Engineer. Submit a letter certifying that all work is complete and in accordance with this specification.
- .10 A manufacturer's direct representative (account manager, fire protection specialist, not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details. Manufacturer's fire protection specialist to work with Departmental Representative to determine frequency of site walk-throughs to be submitted to construction manager and Departmental Representative.
- .11 Inspection of through-penetration firestopping by the manufacturer shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard and a field report shall be issued by the manufacturer to the Departmental Representative.
- .12 Electrical Contractor to provide for a 10% deconstruction test by the Departmental Representative during walk-through.

3.13 SERVICE PENETRATIONS IN NON-RATED SEPARATIONS

- .1 All cabling, wiring, conduits, cable trays, etc. passing through non-rated fire separations and non-rated walls and floors shall be tightly fitted and sealed on both sides of the separation with caulking or silicon sealant to prevent the passage of smoke and/or transmission of sound.

3.14 CONDUIT SLEEVES

- .1 Provide conduit sleeves for all conduit and wiring passing through rated walls and floors. Sleeves to be concentric with conduit or wiring.
- .2 Except as otherwise noted conduit sleeves are not required for holes formed or cored in interior concrete walls or floors.

- .3 Conduit sleeves shall extend 50 mm [2"] above floors in unfinished areas and wet areas and 6 mm [1/4"] above floors in finished areas.
- .4 Conduit sleeves shall extend 25 mm [1"] on each side of walls in unfinished areas and 6 mm [1/4"] in finished areas.
- .5 Conduit sleeves shall extend 25mm [1"] beyond exterior face of building. Caulk with flexible caulking compound.
- .6 Sleeve Size: 12 mm [1/2"] clearance all around, between sleeve and conduit or wiring.
- .7 Paint exterior surfaces of ferrous sleeves with heavy application of rust inhibiting primer.
- .8 Packing of Sleeves:
 - .1 Where sleeves pass through foundation walls and perimeter walls the space between sleeve and conduit shall be caulked with waterproof fire retardant non-hardening mastic.
 - .2 Pack future-use sleeves with mineral wool insulation and then seal with ULC approved fire stop sealant for rated fire separations.
- .9 Locate equipment and junction boxes in service areas wherever possible.

3.15 EQUIPMENT INSTALLATION

- .1 Provide means of access for servicing equipment.
- .2 CSA identification and equipment labels to be clearly visible after installation.

3.16 CUTTING, PATCHING, DIGGING, CANNING, CORING & CONCRETE

- .1 Lay out all cutting, patching, digging, canning and coring required to accommodate the electrical services. Coordinate with other Divisions. The performance of actual cutting, patching, digging, canning and coring is specified under other Divisions.
- .2 The Electrical Contractor shall be responsible for all cutting, patching, digging, canning and coring required to accommodate the electrical services.
- .3 The Electrical Contractor shall be responsible for correct location and sizing of all openings required under Electrical Divisions, including piped sleeves.
- .4 Verify the location of existing and planned service runs and structural components within concrete floor and walls prior to core drilling and/or cutting.
- .5 Openings through structural members of the building shall not be made without the approval of the Departmental Representative.
- .6 Openings in Concrete:
 - .1 Be responsible for the layout of all openings in concrete, where openings are not left ready under previous contract.
 - .2 All openings shall be core drilled or diamond saw cut.
 - .3 Refer to structural drawings for permissible locations of openings and permissible opening sizes in concrete floors and walls.
 - .4 Refer to structural drawings for locations of steel reinforcing.
 - .5 Be responsible for repairing any damage to steel reinforcing.
- .7 Openings in building surfaces other than concrete:
 - .1 Lay out all openings required.

- .8 Poured concrete for duct encasements, pole bases, transformer pads and housekeeping pads shall be provided by other Divisions, coordinated and supervised by the Electrical Divisions.
- .9 Excavation and backfilling will be provided by other Divisions. This Division to supervise the work and provide all layouts and parameters.

3.17 PAINTING

- .1 Clean exposed bare metal surfaces supplied under the Electrical Divisions removing all dirt, dust, grease and millscale. Apply at least one coat of corrosion resistant primer paint to all supports and equipment fabricated from ferrous metal.
- .2 Paint all hangers and exposed sleeves, in exposed areas, with a rust inhibiting primer, as they are installed.
- .3 Repaint all marred factory finished equipment supplied under the Electrical Divisions, to match the original factory finish.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

- .1 This Section of the Specification is to be read, coordinated and implemented in conjunction with all other parts of the Contract Documents.

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 Consulting Engineer should be able to provide a proof of professional insurance and the related practice credentials if requested by the Departmental Representative. The Seismic Consulting Engineer should be familiar with SMACNA, ECABC & NFPA guidelines as well as BCBC and VBBL requirements.
- .3 The Contractors' Seismic Consultant shall submit original signed BC Building Code "Letters of Assurance" "Schedules B and C-B" to the Departmental Representative.
- .4 Project shall comply with the local bylaw where applicable.
- .5 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 Consultant, 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 Consultant 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 Consultant 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.

PART 2 PRODUCTS

2.1 SLACK CABLE SYSTEMS

- .1 Slack cable restraint systems shall be designed and supplied by Vibra-Sonic Control or equal.
- .2 Slack cable restraints shall be provided on suspended and shelf mounted transformers along with associated equipment and assemblies connected to them at the points of vertical support (4 points). The restraint wires shall be oriented at approximately 90 degrees to each other (in plan), and tied back to the ceiling slab or its structure at approximately 45 degrees to the slab or basic structure. The restraints shall be selected for a 1 g earthquake loading, i.e. each wire shall have a working load capacity equal to the weight of the transformer. The anchors in the structure shall be selected for a load equal to the weight of the transformers at a 45 degree pull.
- .3 Slack cable systems to allow normal maintenance of equipment and shall not create additional hazard by their location or configurations. Contractor shall rectify any such installations at no additional cost, all to the satisfaction of the engineer and inspection authority having jurisdiction.
- .4 Coordinate requirements of slack cables with suppliers prior to installation.

PART 3 EXECUTION

3.1 GENERAL

- .1 All seismic restraints systems shall conform to local authority having jurisdiction and all applicable code requirements.

3.2 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.
- .3 Riser joints shall be braced or stabilized between floors.

- .4 Horizontal Conduits:
 - .1 Supports - Horizontal conduit shall be supported at sufficiently close intervals to keep in alignment and prevent sagging.
 - .2 EMT tubing - tubing shall be supported at approximately 1.2 m [4 ft] intervals for tubing.
- .5 Do not brace conduit runs against each other. Use separate support and restraint system.
- .6 Support all conduits in accordance with the capability of the pipe to resist seismic load requirements indicated.
- .7 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.
- .8 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.
- .9 Provide large enough conduit sleeves through walls or floors to allow for anticipated differential movements with firestopping where required.
- .10 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 consultant and submit shop drawings to Departmental Representative for their reference.

3.3 FLOOR MOUNTED EQUIPMENT

- .1 Bolt all equipment, e.g. transformers, switchgear, generators, motor control centres, free standing panelboards, control panels, capacitor banks, 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.

3.4 LIGHT FIXTURES

- .1 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 taut 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 taut 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 RELATED WORK

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 TERMS OF REFERENCE

- .1 Typically use insulated 98% conductivity copper conductor wiring enclosed in EMT (steel) conduit for the general wiring systems unless otherwise indicated. Refer to "Site Services" Section for allowable site conduits as an alternative to steel.
- .2 Aluminium conductors only permitted where indicated on drawings and then typically only for feeder conductors larger than 3/0 AWG. All conductor sizes indicated on drawings are based on copper conductors unless otherwise noted.
- .3 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.
- .4 Flexible armoured cabling (BX) shall not be used for the general wiring system other than final drops to light fixtures in ceilings.
- .5 Refer to Equipment Schedule(s) for detailed responsibilities.
- .6 Non-metallic sheathed wiring is not to be used on this project.

1.3 PRODUCT DATA

- .1 Provide product data in accordance with Division 01

PART 2 PRODUCTS

2.1 WIRING & CABLES – 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 RWU75XLPE for underground installations.
- .4 Site services sub-circuits, including site lighting, to be minimum #10 AWG for power and #12 AWG 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.
- .5 Main feeders to be conduit and copper insulated wiring unless otherwise noted on drawings. Provide bond wiring for all conduits. Increase conduit size as required.
- .6 Armoured (AC-90) cable may only be utilized for recessed tee bar luminaire drops from ceiling mounted outlet boxes. "Tite Bite" connectors and their counterparts of other manufacturers shall not be used. Use anti-short connectors. Cable from luminaire to luminaire is discouraged. Allow nominally 900mm [3'] extra cable looped and supported in the ceiling space to permit fixture relocations of one tile space.

- .7 TBS75 #14 AWG stranded shall be used in all switchgear assemblies. Current transformer secondary wiring shall be #12 AWG stranded. Current transformer leads shall incorporate ring type tongues for termination purposes
- .8 Conductors to be colour-coded. Conductors #10 AWG and smaller shall have colour impregnated into insulation at time of manufacture. Conductors size #8 AWG and larger may be colour-coded with adhesive colour coding tape, but only black insulated conductors shall be employed in this case, except for neutrals which shall be white wherever possible. Where colour-coding tape is utilized, it shall be applied for a minimum of 50 mm at terminations, junctions and pullboxes and conduit fittings. Conductors shall not be painted.

2.2 TECK CABLE

- .1 Cable: to CAN/CSA-C22.2 No. 131.
- .2 Conductors: copper and sized as indicated.
- .3 Insulation: Chemically cross-linked thermosetting polyethylene rated type RW90XLPE, 600V
- .4 Inner jacket: polyvinyl chloride material.
- .5 Armour: flat galvanized steel.
- .6 Overall covering: PVC jacket with **FT-4** flame spread rating. PVC flame retardant jacket over armour meeting requirements of Vertical Tray Fire Test of CSA C22.2 No. 0.3 with maximum flame travel of 1.2 m.
- .7 Fastenings:
 - .1 One (1) 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 (2) or more cables.
 - .3 Threaded rods: 6 mm dia. to support suspended channels.
- .8 Connectors: Watertight approved for TECK cable

2.3 ARMOURED CABLE (AC-90)

- .1 Conductors: insulated, copper, size as indicated.
- .2 Type: AC90 600 V rated.
- .3 Armour: interlocking type fabricated from galvanized steel.
- .4 Anti-short connectors.
- .5 Limited use to only lighting fixture drops in accessible ceiling space.

2.4 LOW VOLTAGE CONTROL CABLES

- .1 Type LVT: soft annealed copper conductors, with thermoplastic insulation, outer covering of thermoplastic jacket. Minimum size #18 AWG.
- .2 Unless otherwise specified wiring to be multicore individually identified and colour coded with grey sheath enclosed in conduit or (EMT).

2.5 WIRE & BOX CONNECTORS

- .1 Pressure type wire connector current carrying parts to be copper and sized to fit conductors used.
- .2 Fixture type splicing connector current carrying parts to be copper sized to fit conductors 10 AWG or less.
- .3 Bushing stud connectors to EEMAC 1Y-2 and suitable for stranded copper conductors
- .4 Clamps or connectors for armoured cable, flexible conduit, as required.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Install all cables and wiring.
- .2 Conductor length for parallel feeders to be identical. Provide permanent plastic nametag indicating load fed.
- .3 Group Teck, Armoured, MI & Sheathed cables on channels wherever possible.
- .4 Lace or clip groups of feeder conductors at all distribution centres, pullboxes, and termination points.
- .5 Wiring in walls should typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls should be avoided unless indicated.
- .6 All grounding and bonding conductors and straps to be copper. All bonding conductors to have green insulation jacket.
- .7 Colour coding to be strictly in accordance with Section 26 05 00 – Common Work Results.
- .8 Provide sleeves where cables enter or exit cast concrete or masonry.
- .9 Power wiring up to and including #6 AWG shall be spliced with nylon-insulated expandable spring-type connectors. Large conductors shall be spliced using split-bolt or other compression type connectors wrapped with cambric tape then PVC tape.
- .10 Wires shall be sized for 2% maximum voltage drop to farthest outlet on a loaded circuit. Increase home run cable size to meet these requirements.
- .11 All branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.
- .12 Install all control cables in conduit.
- .13 Provide numbered wire collars for all control wiring. Numbers to correspond to control drawing legend. Obtain wiring diagram for control wiring of other Divisions.

3.2 VOLTAGE REGULATION

- .1 The drawings are diagrammatic and indicate the general routing of conduit runs and not exact routing, either horizontally or vertically.

- .2 Branch circuit conductor sizes shall be #12 AWG or larger based on the Canadian Electrical Code CSA 22.1 Section 8, which allows a maximum 3% voltage drop for branch circuits.

3.3 WIRE & BOX CONNECTORS

- .1 Remove insulation carefully from ends of conductors and:
 - .1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65
 - .2 Install fixture type connectors and tighten. Replace insulating cap.
 - .3 Install bushing stud connectors in accordance with EEMAC 1Y-2

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 26 05 21 Wires, Cables, and Connectors (0-1000V).

1.2 REFERENCES

- .1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)
 - .1 ANSI/IEEE 837-02, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

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 grounding equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

- .1 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance 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 in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect grounding equipment from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 EQUIPMENT

- .1 Copper conductor:
 - .1 Bare copper with mechanical protection.
 - .2 Conductor size as per the single line diagram.
 - .3 Length of conductor to be determined by the contractor to reach the bottom of the sea as per Section 78 and 10 of the CSA.
 - .4 Grounding conductor to be thermit-welded to the steel plate electrode at harbour bottom.

- .2 Mechanical protection: RPVC as per the single line diagram, with minimum two compression bolt to the steel piling(s). Extend conduit minimum two meters below the low water level.
 - .1 Contractor responsible for identifying the low water level prior to work.
- .3 Plate electrodes: galvanized steel plate electrode min 600mm x 600mm, minimum 10 mm thick.
- .4 Grounding conductors: bare stranded copper, soft annealed, size as indicated.
- .5 Insulated grounding conductors: green, copper conductors, size as indicated.
- .6 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.
- .7 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
 - .1 Grounding and bonding bushings.
 - .2 Protective type clamps.
 - .3 Bolted type conductor connectors.
 - .4 Thermit welded type conductor connectors.
 - .5 Bonding jumpers, straps.
 - .6 Pressure wire connectors.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grounding equipment installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION GENERAL

- .1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process, permanent mechanical connectors or inspectable wrought copper compression connectors to ANSI/IEEE 837.
- .5 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .6 Soldered joints not permitted.
- .7 Minimum depth of burial for ground loop and grounding cables shall be minimum 600mm.

- .8 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- .9 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.
- .10 Bond single conductor, metallic armoured cables to cabinet at supply end.
- .11 Ground secondary service pedestals.

3.3 MAINTENANCE HOLES

- .1 Install conveniently located grounding stud, electrode, size as indicated stranded copper conductor in each manhole.
- .2 Install ground rod in each manhole so that top projects through bottom of manhole. Provide with lug to which grounding connection can be made. Confirm ground resistance meets or exceeds Canadian Electrical Code minimum requirements.

3.4 ELECTRODES

- .1 Install rod and plate electrodes and make grounding connections as indicated.
- .2 Bond separate, multiple electrodes together.
- .3 Use size #6 AWG copper conductors for connections to electrodes.
- .4 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.5 FIELD QUALITY CONTROL

- .1 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .2 Perform tests before energizing electrical system.

3.6 CLEANING

- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 This Section of the Specifications forms part of the Contract Documents and shall be read, interpreted and coordinated with all other parts.

PART 2 PRODUCTS

2.1 SUPPORT CHANNELS

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted, suspended or set in poured concrete walls and ceilings.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Secure equipment to hollow and solid masonry, tile and plaster surfaces with lead anchors or nylon shields.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.
- .5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .6 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.
- .7 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.
- .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 and approval of Departmental Representative.
- .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 RELATED WORK

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

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, connection bars 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 [1"] minimum extension all around, for flush-mounted pull and junction boxes.

2.3 CABINETS

- .1 Type E: sheet steel, hinged door and return flange overlapping sides, handle and catch, for surface mountings.
- .2 Type T: sheet steel cabinet, with full length hinged door, latch, lock, 2 keys, containing 19 mm G1S fir plywood backboard for surface or flush mounting as appropriate.
- .3 Include filtered vents and/or fan-cooling when enclosed equipment is heat producing.

PART 3 EXECUTION

3.1 SPLITTER INSTALLATION

- .1 Install splitters as indicated 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 spaces.
- .2 Only main junction and pull boxes are indicated. Provide pull boxes so as not to exceed 30 m of conduit run between pull boxes.
- .3 Provide pull boxes and junction boxes in locations shown on the drawings and as required to suit job conditions.
- .4 Locate pull boxes and junction boxes above removable ceilings, in electrical rooms, utility rooms or storage areas.

- .5 Junction boxes, when used, to be installed in areas that are accessible through luminaire openings, and/or access panels.
- .6 Where pull boxes are flush mounted, provide overlapping covers with flush head cover retaining screws, prime coated and painted to match wall or ceiling finish.
- .7 Where cast corrosion resistant boxes are used, covers to be of matching type and gasketed.
- .8 For special (not 100mm [4"] square or octagonal) pull boxes and/or junction boxes, paint identification for the system and provide lamicaid nametags to box covers with a size 2 nameplate 5mm [0.25"] lettering identifying system.
- .9 Interior of all pull boxes and junction boxes for each system to be spray painted with colour as specified in Section 26 05 00
- .10 All pull boxes, junction boxes and cabinets to be supported directly from building structure using one or a combination of galvanized screws, galvanized bolts, galvanized rods, and approved box clip.
- .11 Support of pull boxes, junction boxes by conduit fittings or wire is not acceptable.

3.3 CABINETS INSTALLATION

- .1 Mount cabinets with top not higher than 2 m [6'] above finished floor.
- .2 Cabinets shall be flush mounted in finished areas where depth can be accommodated in the walls. Provide flush trim to suit.
- .3 Provide fit up in Type T cabinets as indicated.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

PART 2 PRODUCTS

2.1 OUTLET AND CONDUIT BOXES IN GENERAL

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm [4"] 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 347V outlet boxes for 347V switching devices.
- .6 Combination boxes with barriers where outlets for more than one system are grouped shall be equal to Spyder Technology multi-gang boxes.
- .7 Standard of acceptance is Thomas and Betts - Iberville.

2.2 SHEET STEEL OUTLET BOXES

- .1 Electro-galvanized steel single and multi-gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm [3" x 2" x 1.5"] or as indicated. Larger 103 mm square x 54mm deep [4"x 2"] outlet boxes (No. 52151 or 52171) to be used when more than one conduit enters one side. Provide extension and plaster rings as required.
- .2 For larger boxes use GSB solid type as required.
- .3 Boxes for surface mounted switches, receptacles, communications, telephone to be 100mm square No. 52151 or 52171 with Taylor 8300 series covers.
- .4 Lighting fixture outlets: 103 mm [4"] square outlet boxes (No 52151, 52171 or 72171) or octagonal outlet boxes (No 54151 or 54171).
- .5 103 mm [4"] square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster and/or tile walls.
- .6 Standard of acceptance is Thomas and Betts - Iberville.

2.3 MASONRY BOXES

- .1 Electro-galvanized steel masonry single and multi-gang type MDB boxes for devices flush mounted in exposed block walls.
- .2 Standard of acceptance is Thomas and Betts - Iberville.

2.4 CONCRETE BOXES

- .1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

- .2 Standard of acceptance is Thomas and Betts - Iberville.

2.5 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 Standard of acceptance is Thomas and Betts - Iberville.

2.6 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 [1.25"] Use pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.
- .5 Standard of acceptance is Thomas and Betts - Iberville.

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 Ceiling outlet boxes to be provided for each surface mounted fixture or row of fixtures installed in other than T bar ceilings with removable tiles.
- .4 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm [0.25"] of opening.
- .5 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers 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 Adjust position of outlets in finished masonry walls to suit masonry course lines. Coordinate cutting of masonry walls to achieve neat openings for all boxes. All cutting of masonry work for installation of electrical fittings to be done using rotary cutting equipment.
- .8 No sectional or handy boxes to be installed.
- .9 When installed in wood walls, plastic outlet boxes shall only be used with permission of the Departmental Representative.
- .10 Provide vapour barrier wrap or boots behind outlets mounted in exterior walls. Maintain integrity of the vapour barrier and insulation to prevent condensation through boxes.
- .11 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.

- .12 Outlets installed back to back in party stud walls to be off-set by one stud space.
- .13 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.
- .14 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.
- .15 Where outlet boxes penetrate through a fire separation, ensure that the boxes are externally tightly fitted with an approved non-combustible material to prevent passage of smoke or flame in the event of a fire.
- .16 Conduit for floor mounted boxes shall terminate with a locknut and bushing in base of the fitting. Seal around conduit and the conduit itself after installation of conductors with heavy density fiberglass.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 SCOPE

- .1 Drawings do not show all conduits. Those shown are in diagrammatic form only.
- .2 Conceal all conduits where possible in finished areas. Conduits may be surface mounted either only where indicated or in service areas accessible only to authorized personnel.
- .3 If a finished area is concrete or concealment is not practical, obtain ruling from Departmental Representative where exposed wiremold may be substituted.
- .4 Note particular requirements for routing of conduits where detailed.
- .5 Provide polypropylene pull cord in all "empty" conduits.

PART 2 PRODUCTS

2.1 CONDUITS

- .1 Rigid metal conduit: to CSA C22.2 No.45 Galvanized Steel.
- .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 Flexible metal conduit: to CSA C22.2 No.56 liquid-tight flexible metal conduit.
- .6 Minimum size 21mm [$\frac{3}{4}$ "] conduits throughout the project.

2.2 CONDUIT FASTENINGS

- .1 One hole steel straps to secure surface conduits 41mm [1.5"] and smaller. Use two hole steel straps to conduits larger than 41mm [1.5"].
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits.
- .4 10mm [$\frac{3}{8}$ "] threaded rods to support suspended channels.

2.3 CONDUIT FITTINGS

- .1 Fittings manufactured for use with conduits specified. Coating same as conduit.
- .2 Provide factory "ells" where 90 degree bends are required for 27mm [1"] and larger conduits.
- .3 EMT couplings and connectors shall be steel, or Regal Die-cast zinc alloy. Couplings used on conduit containing fire-rated cable shall be steel. Regular die-cast alloy fittings and couplings are not acceptable. Provide plastic bushings (insulated throat) for all

connectors for 27mm EMT or larger. Provide water-tight connectors in damp or wet locations and for surface equipment (e.g. Panelboards, MCC's, etc.) in rooms that are fire sprinkler protected.

2.4 EXPANSION FITTINGS FOR RIGID CONDUIT

- .1 Weatherproof expansion fittings with internal bonding assembly suitable linear expansion.
- .2 Water-tight expansion fittings: with integral bonding jumper, suitable for linear expansion and 21mm [3/4"] deflection in all directions.
- .3 Weatherproof expansion fittings for linear expansion at entry to panel as required.

2.5 RIGID P.V.C. CONDUIT

- .1 Conduit: rigid non-metallic conduit of unplasticized polyvinyl chloride as manufactured C.G.E. "Sceptre".
- .2 Fittings: threaded male or female solvent weld connectors and solvent weld couplings, as supplied by conduit manufacturer.
- .3 Solvent: as recommended by conduit manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

- .1 Generally use electrical metallic tubing (EMT) in the building interior and in above grade slabs except where subject to mechanical injury or where otherwise indicated.
- .2 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass. Set out the work and coordinate with other services prior to installation. Maintain access to junction and pull boxes.
- .3 Where practical conceal conduits.
- .4 Any exposed conduit in finished areas to be free of unnecessary labels and trademarks.
- .5 All conduit ends to be reamed to ensure a smooth interior finish that will not damage the insulation of the wiring.
- .6 Ensure bonding continuity in all conduit systems.
- .7 Surface conduits are acceptable in mechanical and electrical service rooms and in unfinished areas or where indicated.
- .8 Use rigid galvanized steel (RGS) threaded conduit where the installation is subject to mechanical injury. In any event, use RGS conduit for surface installations up to 1.5m [5'] above the finished floor.
- .9 Field threads on rigid conduit shall be sufficient length to draw conduits ends together.
- .10 Unless otherwise noted and where practical, all conduits to be routed through the ceiling space rather than in, or below, slabs or floor structures to facilitate future changes.
- .11 Conduits in walls should typically drop (or loop) vertically from above to better facilitate future renovations. Generally conduits from below and horizontal conduits in walls and concrete structures should be avoided unless indicated.

- .12 All home-run branch circuit conduit and communication conduits to be minimum 27 mm [1"] diameter unless otherwise indicated.
- .13 Generally use Rigid PVC conduits in or below ground level slab unless otherwise noted. Transition to RGS conduit in exposed locations: eg where conduits emerge from ground level slab.
- .14 Conduits are not permitted in terrazo or concrete toppings.
- .15 Cap turned up conduits to prevent the entrance of dirt or moisture during construction.
- .16 Locate conduits more than 75mm [3"] parallel to steam or hot water lines with a minimum of 27mm [1"] at crossovers.
- .17 Bend conduits cold, so that conduit at any point is not flattened more than 1/10th of its original diameter. Conduits bent more than this or kinked to be replaced.
- .18 Provide polypropylene pull cord in empty conduits to facilitate pulling wiring in future.
- .19 Where conduits become blocked, the use of corrosive agents is prohibited. Remove and replace blocked section.
- .20 Damaged conduits to be repaired or replaced.
- .21 Dry conduits out thoroughly before installing wiring. Swab out conduit and thoroughly clean internally before wires and cables are pulled.
- .22 Conduits shall not pass through structural members except as indicated.
- .23 Conduit sizes indicated on drawings are minimum only. Increase sizes as required to suit alternative wiring types, to comply with Code or for ease of conductor installation.
- .24 Conduits and ducts crossing building expansion joints shall have approved conduit expansion fittings to suit the type of conduit used.
- .25 Seal conduits with approved sealant where conduits are run between heated and unheated areas.
- .26 Seal openings with approved sealant where conduits, cables, or cable trays pierce fire separations.
- .27 Where conduits pass through walls, they shall be grouped and installed through openings. After all conduits are installed, wall openings shall be closed with material compatible with the wall construction and/or to meet any fire separation integrity.
- .28 Where drawings show conduit designations, these conduits shall be identified at each point of termination with Thomas & Betts "Ty-Rap" No. TY532M labels.
- .29 Use "Condulet" fittings for power and telephone type conduit terminations in lieu of standard boxes where box support is not provided.
- .30 Provide necessary roof jacks or flashing where conduits pass through roof or watertight membranes. Apply approved sealant to maintain membrane integrity.
- .31 Use flexible metal conduit for connection to recessed luminaires without a prewired outlet box.
- .32 Use liquid tight flexible metal conduit for connection to motors sprinkler monitoring devices, and other vibrating equipment and transformers.
- .33 Use explosion proof flexible connection for connection to explosion proof motors.

- .34 Install conduit-sealing fittings in hazardous areas, isolation rooms and clean rooms. Fill with compound.

3.2 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with minimum 1.5m [5'] clearance.
- .3 Conduits to be run in flanged portion of structural steel.
- .4 Group conduits wherever possible on suspended and/or surface channels.
- .5 Surface conduits will not be accepted in finished areas unless detailed.

3.3 SPARE CONDUITS

- .1 Provide spare conduits as indicated.
- .2 Provide 4x27 mm [1"] spare conduits up to ceiling space and 2x27 mm [1"] spare conduits down to ceiling space below from each flush panel tub. Terminate the conduits in 150x150x100 mm [6"x6"x4"] junction boxes in ceiling spaces or in case of an exposed concrete slab, terminate each conduit in a flush concrete box. Provide cover plates for all junction boxes.

3.4 EXPANSION JOINT CONDUIT FITTINGS

- .1 Provide conduit expansion joint fittings at concrete expansion joint.

3.5 RIGID P.V.C. CONDUIT

- .1 Use in accordance with the Canadian Electrical Code and Building Codes and as noted below:
- .2 Use as raceways for following applications
 - .1 In poured slab on grade concrete floors and walls and for underground runs exterior to the buildings unless otherwise noted.
 - .2 Wiring installed in areas subject to intermittent or continuous moisture but not surface mounted.
 - .3 Rigid PVC conduit shall not be surface mounted or exposed within buildings.
- .3 Do not use in return air plenums or for exit light circuits and emergency lighting.
- .4 Provide insulated ground wire in all rigid PVC conduits in accordance with the Canadian Electrical Code.
- .5 Where rigid PVC conduit is set in poured concrete, solvent joints must be completed and allowed to set as per manufacturer's instructions before pour.
- .6 Bend rigid conduit in strict accordance with manufacturer's directions. Distorted bends will not be accepted.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- .1 Dry type transformers to 600 V.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C9, Dry-Type Transformers.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
 - .1 EEMAC GL1-3, Transformer and Reactor Bushings.
- .3 National Electrical Manufacturers Association (NEMA)
- .4 Transformers shall meet NEMA TP-1, Table 4.2, standards for energy efficiency.

PART 2 PRODUCTS

2.1 TRANSFORMERS

- .1 Transformer provided for the new SAR Workshop:
 - .1 ANN, CSA Dry Type 1 enclosure, ventilated
 - .2 Rating: 45 kVA, 3-phase, 60 Hz, 600-120/208V, delta-wye grounded
 - .3 Voltage taps standard +/- 2½% and +/- 5%
 - .4 Insulation: Class H 220°C insulation
 - .5 Windings: copper or aluminum
 - .6 Basic Impulse Level (BIL): standard
 - .7 Hi-pot: standard
 - .8 Average sound level: 50 dBA maximum
 - .9 Impedance at 170°C: standard
- .2 Transformer shall meet the energy efficiency per CAN/CSA-C802.2-00, Minimum Efficiency Values for Dry-Type Transformers.
- .3 Transformer shall be manufactured and tested (production tests) in accordance with CSA C9 (current issue) incorporating modifications as specified herein.
- .4 Dry type transformer shall be as manufactured by Schneider Group, Cutler Hammer, CGE, Rex, Hammond, Delta, Tracon or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Transformers 75kVA and smaller may be wall mounted. Seismic restraint and structural support information shall be provided to the consultant when requested. Provide

vibration isolation hangers to prevent transmission to building structure. Transformer to be installed to ensure adequate air circulation is available on all four sides.

- .2 Install transformers in level upright position with vibration isolation pads in the base.
- .3 Loosen isolation pad bolts until no compression is visible.
- .4 Make primary and secondary connections in accordance with wiring diagram. Conductors shall not enter the transformer through the top of the enclosure.
- .5 Make flexible aluminum conduit connections on secondary sides of all transformer.
- .6 Energize transformer after installation is complete.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 PLANT ASSEMBLY

- .1 Install circuit breakers in panelboards before shipment from plant.
- .2 Install and prewire low voltage relays assemblies where indicated.
- .3 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.
- .4 All panelboards to be of a common manufacturer.

1.3 FINISH

- .1 Apply finishes in accordance with Section 26 05 00.
- .2 Panel finish in electrical and equipment rooms and closets to be standard ASA Grey baked enamel for normal power service. Confirm with Consultant prior to shop finishing panels.

PART 2 PRODUCTS

2.1 PANELBOARDS, DOORS AND TRIMS

- .1 Bus and breakers rated for 22 KA symmetrical, minimum, interrupting capacity for 600V and 10kA symmetrical, minimum interrupting capacity for 208V or as indicated.
- .2 Copper bus with full size neutral.
- .3 Minimum 20% spare capacity.
- .4 Mains, number of circuits and number and size of branch circuit breakers as indicated.
- .5 Provide all necessary connectors and mounting hardware in every space to facilitate installation of future breakers. Provide blank fillers for all spaces.
- .6 Concealed hinges and concealed trim mounting screws, hinged locking door with flush catch.
- .7 Panelboards to have flush doors. (Gasketed where required).
- .8 Provide two keys for each panelboard and key similar voltage panelboards alike.
- .9 Panel tubs to be typically 600mm [20"] wide.
- .10 Provide "sprinkler-proof" design in areas where sprinkler fire protection is installed. In any event, all surface mounted enclosures to be complete with sprinkler drip cover.
- .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 Feed through lugs as indicated.
- .13 Integral Surge Protection Devices as indicated; refer to section 26 24 17.

2.2 BREAKERS

- .1 All breakers to be bolt on type, moulded case, non-adjustable and non-interchangeable trip, single, two and three pole, 120/208(240)V 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. Minimum interrupting rating of breakers to be as follows:
 - .1 120/208V panelboards - 10,000 Amps at 250 volts.
- .3 Main breaker 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.
- .5 Provide at least 10% spare 15 Amp single pole breakers whether indicated or not.
- .6 Provide GFI type breakers as indicated.
- .7 Provide Lock-on devices as indicated and in any event for Fire Alarm circuits, Security equipment circuits, EXIT sign circuits and Emergency Battery equipment circuits.

2.3 PANELBOARD IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00.
- .2 Nameplate for each panelboard size 5 (2 line) engraved as indicated and include panel designation and voltage/phase.
- .3 Complete 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.

2.4 STANDARD OF ACCEPTANCE

- .1 Cutler Hammer Type Pow-R Line 1a
- .2 Schneider Type NQOD
- .3 Siemens Canada.

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 Connect loads to circuits as indicated.
- .4 Connect neutral conductors to common neutral bus with respective neutral identified.
- .5 Install 4x27mm [1"] empty conduits from each panelboard single tub to ceiling space above and terminate in a pullbox sized to accommodate the conduit fill of all empty conduits provided.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International) – most recent version
 - .1 CSA-C22.2 No.42, General Use Receptacles, Attachment Plugs and Similar Devices.
 - .2 CSA-C22.2 No.42.1, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
 - .3 CSA-C22.2 No.55, Special Use Switches.
 - .4 CSA-C22.2 No.111, General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).

PART 2 PRODUCTS

2.1 SWITCHES

- .1 20 A, 120 V or 347 V, single pole, double pole, three-way, four-way switches as indicated, white commercial grade. Equal to Leviton 1243 series
- .2 Switches shall be “Decora” style.
- .3 Switches of one manufacturer throughout project.
- .4 Provide 3 way switches/dimmers as required and as shown.
- .5 Alternate Manufactures: Pass & Seymour, Hubbell

2.2 RECEPTACLES – GENERAL

- .1 Duplex receptacles, CSA type 5-15R, 125 V, 15 A, U ground, white commercial grade.
- .2 T-Slot duplex receptacles, CSA type 5-20R, 125 V, 20 A, U ground, white commercial grade.
- .3 Use tamper resistant receptacles where required by Code and as indicated.
- .4 Receptacles shall be ‘Decora’ style.
- .5 Receptacles of one manufacturer throughout project.
- .6 Standard of acceptance:
 - .1 Leviton 5340 series
- .7 Alternate Manufactures: Pass & Seymour, Hubbell

2.3 RECEPTACLES – PARTICULAR APPLICATION

- .1 Ground Fault Interrupter type to be 15 Amp, 125 volt duplex receptacles to be 2 pole, 3 wire, U ground, impact resistant nylon face, complete with breaker and reset button. white commercial grade.
- .2 Ground Fault Interrupter located outside shall come with wet location cover plates.
- .3 Use tamper resistant receptacles where required by Code and as indicated.
- .4 Receptacles of one manufacture throughout project.
- .5 Standard of Acceptance:
 - .1 Leviton 7899 series indoors
 - .2 Leviton W7899 series outdoors
- .6 Alternate Manufactures: Pass & Seymour, Hubbell
- .7 Surge Protective type to be T slot 5-20R, 125 volt duplex receptacles to be 2 pole, 3 wire hospital grade, blue face, parallel blade, U ground, impact resistant nylon face audible and LED indicator.
- .8 Standard of Acceptance:
 - .1 Leviton 7380-IGG (type 3)
- .9 Alternate Manufacture: Pass & Seymour, Hubbell.
- .10 All other single outlet and special purpose receptacles to be similar to the grade and series indicated above. Confirm ampacity, voltage and pin configuration prior to installation.

2.4 INTERVAL TIMERS

- .1 Range: 0-30 minutes.
- .2 Digital without hold feature.
- .3 Single pole 120 volt, 20 Amp contacts to open at end of timing cycle.
- .4 Finished to match switches in colour.
- .5 Standard of acceptance:
 - .1 Leviton 6230M series
- .6 Alternate Manufacture:
 - .1 Wattstopper
 - .2 Intermatic

2.5 COVER PLATES

- .1 Cover plates for devices shall match device in color, be stainless steel.
- .2 Wall plates to be flush mounting with "positive bow" feature to ensure that all edges of plate are flush with wall or surface box when installed.
- .3 All plates to be bevelled type with smooth rolled outer edge and smooth face. Exposed sharp edges are not acceptable.
- .4 Cover plates for all wiring devices to be from one manufacturer throughout project.

PART 3 EXECUTION

3.1 INSTALLATION GENERAL

- .1 Mount wiring devices to height specified in Section 26 05 00 or as indicated.
- .2 Upper edge of plates located on separate outlets immediately alongside one another to be at exactly the same height above finished floor.
- .3 All plates to be installed parallel or perpendicular to building lines.

3.2 INSTALLATION PARTICULAR

- .1 Switches:
 - .1 Install single throw switches with handle in "UP" position when switch closed.
 - .2 Install switches in gang type outlet box when more than one switch is required in one location.
 - .3 Install on latch side of door; coordinate with Architectural drawings prior to install.
- .2 Receptacles:
 - .1 Install all receptacles in the vertical plane unless otherwise noted.
 - .2 Generally install the 5-15/20R U ground pin down unless otherwise noted. Neutral up when receptacle in mounted horizontal.
 - .3 Install receptacles vertically in gang type outlet box when more than one receptacle is required in one location.
 - .4 Install receptacles near mechanical equipment mounted on the roof as per the CEC. Provide wet location rated cover plates.
 - .5 Ground fault interrupter duplex receptacles to be used whenever within 1.5 meters of all sinks or water sources.
 - .6 Utilize tamper resistant receptacles in public areas and in all areas dedicated for children.
- .3 Cover plates:
 - .1 Install suitable common cover plates where wiring devices are grouped.
 - .2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.
 - .3 Provide wet location cover plates which provide a seal whether or not a plug is inserted into the receptacle.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 This Section of the Specification forms part of the Contract Document and is to be read, interpreted and coordinated with all other parts.

1.2 REFERENCES

- .1 CSA International – most recent version
 - .1 CSA C22.2 No. 5, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

PART 2 PRODUCTS

2.1 BREAKERS GENERAL

- .1 Moulded-case circuit breakers, Circuit breakers, ground-fault circuit-interrupters to CSA C22.2 No. 5
- .2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation.
- .3 Plug-in moulded case circuit breakers: quick- make, quick-break type, for manual and automatic operation.
- .4 Common-trip breakers: with single handle for multi-pole applications.
- .5 Circuit breakers with interchangeable trips.
- .6 Circuit breakers to have minimum 10kAIR symmetrical RMS interrupting capacity rating at 208V and 22kAIR at 600 V.
- .7 Moulded case circuit breakers shall be of one manufacturer and match distribution equipment manufacturer.

2.2 MAGNETIC BREAKERS

- .1 Moulded case circuit breaker to operate automatically by means of magnetic tripping devices to provide instantaneous tripping for short circuit protection.

2.3 OPTIONAL FEATURES

- .1 Include:
 - .1 Shunt trip.
 - .2 On-off locking device.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Install circuit breakers as indicated.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 REFERENCES

- .1 CAN/CSA C22.1, Canadian Electrical Code, Part I - most recent version
- .2 CAN/CSA C22.2 No.9.0, General Requirements for Luminaires.
- .3 IESNA Illuminating Engineering Society of North America - Lighting Handbook – most recent version
- .4 ASHRAE 90.1-2016 – American Society of Heating, Refrigerating and Air-Conditioning Engineers.
- .5 IES RP-33 Lighting for the Exterior Environment

1.3 ADDITION OF ACCEPTABLE MANUFACTURERS

- .1 Where listed luminaire is out of date; the manufacturer shall indicate alternate to Department Representative during Tender period. No extra will be provided for out of date luminaires not identified during the Tender process; Department Representative has final say on alternate fixture in this case.

1.4 INTENT

- .1 Provide lighting fixtures and accessories for all outlets as listed in the Fixture Schedule and as shown on the electrical drawings.
- .2 Lighting fixtures shall be structurally well designed and constructed, using new parts and materials of the highest commercial grade available.
- .3 Bond all lighting equipment to grounding system.
- .4 Verify all ceiling types and finishes before ordering fixtures and provide fixtures suitable for mounting in or on ceilings being installed in each area, as specified. Where fixture types specified are not suitable for ceiling being installed, **obtain written instructions from the Department Representative before ordering fixtures.**
- .5 Fixtures of the same or similar type shall be supplied by the same manufacturer.
- .6 Electrical contractor shall supply and install all luminaries complete with lamps, mounting brackets, lenses, ballasts (dimming or otherwise), drivers and all necessary accessories in accordance with luminaire types shown on drawings and listed in luminaries schedule unless otherwise noted.
- .7 Supply and install complete and proper support and hangers for all luminaires in ceiling space where required for proper support of outlet boxes and luminaire hanger assemblies.

PART 2 PRODUCTS

2.1 LED DRIVERS

- .1 LED drivers shall be fully dimmable, Energy Star compliant, maximum THD of 20%, power factor to be greater than .95, have high voltage regulation and have internal surge protection.
- .2 LED lit luminaires shall meet the LM-79 and LM-80 test protocols (70% output at 50,000 hours), a minimum efficacy of 90 watts per lumen and shall meet or exceed ENERGY STAR SSL standards to ensure lumen and color consistency between luminaires.
- .3 Drives shall have 0-10V dimming standard.

2.2 LEDES

- .1 LEDs in fixtures shall be 4 step Binning or better.
- .2 LEDs shall be CRI 80 or higher.
- .3 Fixtures shall be designed to allow for replacement of LED boards.

2.3 WIRE GUARDS

- .1 All fixtures in storage rooms and service rooms shall have wire guards.

2.4 FIXTURES

- .1 Provide fixtures as indicated on the fixture schedule.
- .2 All fixtures shall comply with CSA Standard C22.2 No.9. Accessories and components shall comply with relevant CSA Standards applicable to accessory or components.
- .3 Recessed down light luminaires shall be of the approved pre-wired type with junction box forming an integral part of luminaires assembly with access facility to the satisfaction of the electrical inspection authority. Supply and install all necessary plaster rings, supports, etc. required for complete and proper installation.
- .4 Except where otherwise noted in the Fixture Schedule, depth of recessed fixtures shall not exceed 150 mm, including mounting yokes, or bridges and the distance from the back face of the diffuser or lens to the centre of the lamp shall be not less than 75 mm. Design of reflector and lamp position shall be to provide high efficiency, even brightness and lack of lamp lines.
- .5 Fixtures shall be constructed of not less than code gauge steel. All metal parts shall be thoroughly cleaned and finished in high reflectance baked white enamel over corrosion-resistant primer. Reflecting surfaces and exposed surface shall have not less than two coats of baked white enamel with reflectance of not less than 85%.
- .6 All fixture diffusers, lens panels, lens frames, etc., shall be securely and adequately supported and shall be removable without the use of tools for cleaning.
- .7 Where recessed LED luminaires are to be mounted in drywall ceilings or type of ceilings requiring frames, supply drywall frames for the recessed luminaires and turn frames over to the general contractor for installation.

PART 3 EXECUTION

3.1 VERIFICATION OF CONDITIONS

- .1 Confirm all ceiling depths against the final architectural ceiling plans and sections to ensure that recessed fixtures can be installed in all ceiling conditions and advise the Department Representative immediately of any discrepancies prior to ordering of the fixtures or proceeding with the work.

3.2 INSTALLATION - GENERAL

- .1 Lighting fixtures shall be installed as indicated on architectural reflected ceiling plans, Electrical Drawings, and per approved shop drawings.
- .2 Verify locations and spacing of lighting fixtures with reflected ceiling plans and notify Department Representative of any variance or conflict between the plans and field conditions. Do not proceed until conflict has been resolved.
- .3 Work shall be coordinated with other trades. Lighting fixture locations shall have priority over locations of ducts, diffusers, sprinklers, smoke detectors, and other non-structural obstructions.
- .4 All fixtures shall be supported directly from the building structural members or from bridging attached to the structural members by rod hangers and inserts. Provide all necessary hardware and blocking to ensure that fixtures hang true.
- .5 Lighting fixtures shall be adequately supported and braced to satisfy seismic codes. Refer to Section 26 05 05 Seismic Restraints.
- .6 Mount wall fixtures at elevations specified or as shown on Architectural or Electrical Drawings. Where no elevation is shown, confirm mounting height with the Department Representative prior to rough-in.

3.3 INSTALLATION AND SUPPORTS

- .1 Provide complete and proper support for all fixtures, fixture hangers, etc., including headers in ceiling space, where required, for proper support of outlet boxes and fixture hanger assemblies.
- .2 Support fixtures as shown on the drawings, level, plumb and true with the structure and other equipment in a horizontal or vertical position as intended. Wall or side bracket mounted fixture housings shall be rigidly installed and adjusted to give a neat flush fit to the surface on which it is mounted.
- .3 All hangers, supports, fastenings or accessory fittings shall be protected against corrosion. Care shall be taken during the installation to assure that insulation and corrosion protection is not damaged.
- .4 Self-aligning seismically rated ball joint hangers shall be used for rod suspended fixtures. Ceiling canopies or hood assemblies intended to cover the suspension attachments shall be installed to fit tightly to the ceiling without restricting the alignment of the hanger. Support fixtures by hangers and mounting arrangements which will not cause the fixture frame, housing, sides or lens frame to be distorted; or prevent complete alignment of several fixtures in a row.
- .5 The suspension length of all ceiling mounted suspended types of lighting fixtures as listed in the Fixture Schedule shall be the overall length from the ceiling to the lowest point of the fixture body, reflector or glassware in its hanging position.

- .6 Metal inserts, expansion bolts or toggle bolts in concrete slabs for stems which do not carry wiring must be accurately located in relation to the outlet boxes, to allow perfect alignment and spacing of suspension stems.
- .7 Where fixtures are surface mounted on the underside of an inverted tee bar ceiling, the fixture shall be supported either directly from the building structure by means of rod hangers and inserts or by means of metal angle headers, supported from the tee bar framing structure above the tile. Fixtures shall be supported from the quarter points.
- .8 All recessed fixtures to be installed so that they are removable from below to gain access to outlet box or prewired fixture box. Connect all recessed fixtures to boxes with flexible conduit and approved fixture wire. Provide approved drywall enclosures in insulated ceilings. Volume of enclosure to comply with Electrical Code.
- .9 Install fixture lenses as late as possible to protect from dirt and dust. Remove and clean or replace lenses to the satisfaction of the Department Representative.
- .10 Provide and install all conduit, boxes, wire and make emergency power connection to all units and to unit controllers. Refer to architectural reflected ceiling plans for locations prior to conduit installation. Obtain all specialty backboxes, switches, controllers, etc. from contractor and coordinate installation as required.
- .11 Where drivers are to be remotely located, they shall be racked together and labelled with size 3 lamicoïd. Label shall bear the driver number which has a corresponding location on an adjacent floor plan reference drawing. Labels and floor plans shall be provided by electrical contractor. Floor plans shall measure 280mm x 430mm (11"x17") and shall be framed and laminated.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 GUARANTEE

- .1 Provide a written guarantee, stating that the battery for emergency lighting is guaranteed against defects in material and workmanship for a period of ten years, with a no-charge replacement during the first five years and a pro-rate charge on the second five years, from the date of the Final Certificate of Completion.

PART 2 PRODUCTS

2.1 BATTERY UNIT EQUIPMENT

- .1 Unit equipment for emergency lighting: to CSA C22.2 No.141.
- .2 Battery pack units shall be equal to Lumacell RGS series, 12V DC complete with 2 LED emergency light heads. Units shall be sized as per Drawings.
- .3 Alternate Manufacturers:
 - .1 ReadyLite LDX series
 - .2 Beghelli Nova series

2.2 REMOTE LAMP HEADS

- .1 LED Remote Dual Head devices shall be equal to Lumacell MP-BLD series (12V 6W). Do not provide single lamp devices.
- .2 Size of battery units indicated on drawings were calculated with the remote lamps noted here. Battery units shall be resized by the contractor during construction to accommodate any difference in selection to meet minimum battery life requirements.
- .3 Acceptable Manufacturers:
 - .1 Lumacell
 - .2 ReadyLite
 - .3 Beghelli

2.3 WIRING FOR REMOTE EQUIPMENT

- .1 Wiring 12V battery standby circuits to all remote heads and exit signs.

- .2 Low voltage wiring to be installed so that the maximum volt drop does not exceed 5%.
The following wiring/load sizes shall not be exceeded for the 12-volt system:
 - .1 #8 AWG not to exceed 6500 watt feet per run.
 - .2 #10 AWG not to exceed 4000 watt feet per run (minimum size).

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Provide and install a fully functional emergency lighting system as detailed on the Drawings. Paint all junction boxes green for the emergency lighting system.
- .2 The emergency lighting system shall be tested for maintained luminance to a minimum of 30 minutes. Provide written document verifying the operation of the system after the test.
- .3 The contractor shall ensure conductor size is suitable for the emergency lighting system to maintain a minimum of 3% volt drop to remote heads.
- .4 Install unit equipment for emergency lighting in accordance with CSA C22.1, Section 46.
- .5 Install unit equipment and remote mounted fixtures as indicated.
- .6 Direct heads as indicated.
- .7 Provide a junction box adjacent to the battery pack for the purpose of splicing the separate wiring runs together.
- .8 Provide a 15 Amp, 125 volt receptacle adjacent to each battery unit and connect circuit to lighting circuit in the area service by the batter pack.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 REFERENCES

- .1 Canadian Standards Association:
 - .1 CSA C22.2 No.141, Unit Equipment for Emergency Lighting.
 - .2 CSA C860, Performance of Internally-Lighted Exit Signs.
 - .3 Canadian Electrical Code, Section 46.
- .2 BC Building Code, Part 3, Section 3.4.5

PART 2 PRODUCTS

2.1 SCHEDULE

- .1 Refer to drawings for location and types. Install in direction as indicated.

2.2 EXIT SIGNS GENERAL

- .1 Green and white coloured pictogram.
- .2 Wall, end, or ceiling mounted as shown on drawings.
- .3 Exit signs to be approved by the Department Representative prior to purchase and shall be:
 - .1 Long-life white LED Running Man, ac/dc standard
 - .2 Energy efficient, less than 3W
 - .3 Self-powered at minimum 120 minutes of emergency lighting
- .4 Exit signs must meet CSA C860, 22.2 No. 141-10 and ISO 7010 standards.
- .5 Exit sign wiring to be installed in separate conduit and conductors to be #12 AWG with RW90 X-link insulation. Exit signs to be complete with LED lamps.
- .6 Single or double-faced as indicated
- .7 Faceplate and housing to have no visible unused knockouts.
- .8 Provide weatherproof exit signs for all exterior installations.
- .9 CSA 860-01 approved.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Install Exit Signs as indicated.

- .2 Connect Exit Signs to dedicated circuits and breakers as required by the Canadian Electrical Code. Provide circuit breaker locks for Exit Sign circuits.
- .3 Power to exit signs to be sourced from emergency power where available.
- .4 Provide at least one Exit Sign circuit for each floor level except as noted.
- .5 All Exit Sign wiring to be installed in separate conduit and boxes.
- .6 All conductors to be minimum #12 AWG with RW90 X-link insulation.
- .7 Provide Exit Sign 12VDC standby lighting and separate connection points where standby emergency lighting battery packs are used for the emergency lighting.
- .8 Support Exit Signs from ceiling tile in tee bar installation locations so as to provide a flush/neat installation and minimize tile lift.
- .9 Provide approved support hardware to the tee bar rail assembly to minimize tile stress and provide independent seismic cable(s) restraint from building structure.
- .10 Wall mounted exit signs to be mounted 2290mm [7' 6"] to underside or as detailed.
- .11 Ceiling mounted exit signs in all service spaces to be suspended to 2290mm [7' 6"] to the underside.

3.2 FINAL ACCEPTANCE

- .1 Position exit signs to optimize viewing angles and to avoid line of site obstructions.
- .2 Attend the building occupancy review with the Authority Having Jurisdiction and adjust any locations as required.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 This Section of the Specifications forms part of the Contract Documents and shall be read, interpreted and coordinated with all other parts.

1.2 REFERENCES

- .1 ANSI/TIA 607-B Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
- .2 ANSI/TIA-606-B Administration Standard for the Commercial Telecommunications Infrastructure.
- .3 Telecommunications Distribution Methods Manual (Bicsi) Chapter 9 Bonding and Grounding (Earthing).

1.3 SYSTEM DESCRIPTION

- .1 The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, raceways, and other associated hardware that has the potential for acting as a current carrying conductor. The TBB shall be installed independent of the buildings electrical and building ground and shall be designed in accordance with the recommendations contained in the ANSI/TIA-607-B Telecommunications Bonding and Grounding Standard and the Telecommunications Distribution Methods Manual (Bicsi) Chapter 9 Bonding and Grounding (Earthing).
- .2 Provides ground reference for telecommunications systems within building and bonding to it of telecommunications room.
- .3 Metallic pathways, cable shields, conductors, and hardware within the telecommunication spaces are bonded to telecommunications grounding and bonding system.

PART 2 PRODUCTS

2.1 PRIMARY BONDING BUSBAR (PBB)

- .1 Predrilled copper bus-bar, listed by NRTL, electro-tin plated with holes 8 mm diameter for use with standard-sized lugs to: ANSI/TIA 607-B.
- .2 Dimensions 6mm thick, 50 mm wide, 150 mm long to: ANSI/TIA 607-B.

2.2 BONDING CONDUCTOR FOR TELECOMMUNICATIONS

- .1 #6 AWG copper conductor, green insulated to: ANSI/TIA 607-B.

2.3 WARNING LABELS

- .1 Non-metallic warning labels in English and French to: ANSI/TIA 607-B. Identify labels with wording "If this connector is loose or must be removed, please call the building telecommunications manager".

PART 3 EXECUTION

3.1 PRIMARY BONDING BUSBAR (PBB)

- .1 Install PBB in the Telecommunication room (TR) on insulated supports 50 mm high at location close to electrical power panel if one is installed in same room as indicated.
- .2 Install #6 AWG copper insulated bonding conductor from PBB to alternating current equipment ground (ACEG) enclosure of serving electrical power panel (panelboard).
- .3 Install #6AWG copper insulated bonding conductor minimum from PBB to main building ground electrode. Make connections below grade utilizing exothermic weld connection. Install insulated ground in conduit and bond both ends of the conduit.
- .4 Install #6AWG copper insulated bonding conductor from PBB in star configuration to 19` ground bus bar located on the top of each rack and equipment cabinet. Use ``star`` paint-piercing washer. Lugs must be fastened with two-hole bolts.

3.2 BONDING CONDUCTORS GENERAL

- .1 When placed in ferrous metallic conduit or EMT longer than 1 m, bond to each end of conduit or EMT using grounding bushing 6 AWG copper conductor.
- .2 Where metallic panels attached to the rack to not have sufficient metal to metal contact to provide an adequate path to ground, they shall be bonded to the rack using a minimum #6 AWG copper conductor. The copper conductor size shall be upgraded based on the largest power conductor feeding any rack mount equipment. The conductor shall be continuous; attaching all isolated components in a daisy chain fashion from top to bottom and bonded to the rack using an appropriate compression connector.

3.3 BONDING CONDUCTOR FOR TELECOMMUNICATIONS

- .1 Install bonding conductor for telecommunications from PBB to service equipment (power) ground.
- .2 Use exothermic welding, approved 2 hole compression lugs for connection to PBB.

3.4 BONDING TO PBB

- .1 Bond metallic raceways in telecommunications room (TR) to PBB using #6 AWG green insulated copper conductor.
- .2 For cables within telecommunications entrance room having shield or metallic member, bond shield or metallic member to PBB using #6 AWG green insulated copper conductor.
- .3 Bond equipment racks and cabinets located in telecommunications entrance room to PBB using #6 AWG green insulated copper conductor.

- .4 All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the Communication rooms shall be grounded using a minimum #6 AWG stranded copper bonding conductor and compression connectors.
- .5 Bond metallic raceways in telecommunications rooms and telecommunications equipment rooms to TGB using #6 AWG green insulated copper conductor.
- .6 For cables within telecommunications room having shield or metallic member, bond shield or metallic member to TGB using #6 AWG green insulated copper conductor.
- .7 All racks and cabinets must be grounded with #6 insulated copper ground wire (a separate per rack) to a telecommunications bonding busbar (PBB) in the telecoms and or equipment room. the lugs must be fastened with two hole bolts.
- .8 Install 19” grounding bus bar on top of each rack and equipment cabinet. Use “star” paint-piercing washer.
- .9 Each rack and or equipment cabinet will be grounded in a star configuration to telecoms bonding bus bars. Install ground in conduit and bond both ends of the conduit.
- .10 The racks and cabinets to have 2-hole compression ground lugs.

3.5 LABELLING

- .1 All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape. All cables and bus bars shall be identified and labelled in accordance with the System Documentation Section of this specification.
- .2 Apply additional administrative labels to: ANSI/TIA-606B.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 This Section of the Specifications forms part of the Contract Documents and shall be read, interpreted and coordinated with all other parts.

1.2 REFERENCE STANDARDS

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 26 05 00 Common Work Results.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for communication raceway systems and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 26 05 00 Common Work Results.
- .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 indoors, off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect communication raceway systems from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

- .1 Empty telecommunications raceways system consists of outlet boxes, cover plates, terminal distribution cabinets, conduits, cable trays, pull boxes, sleeves and caps, fish wires, service poles, service fittings, concrete encased ducts.

2.2 MATERIAL

- .1 Conduits: 27mm RPVC/EMT type, in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings and Section 26 05 29-Hangers and Supports for Electrical Systems.
- .2 Junction boxes in accordance with Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets.

- .3 Outlet boxes, conduit boxes, and fittings: in accordance with Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets.
- .4 Fish wire: polypropylene type.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for communication raceway systems installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Install empty raceway system, fish wire, terminal cabinets, outlet boxes, floor boxes, pull boxes, cover plates, conduit, sleeves and caps, cable tray, service poles, miscellaneous and positioning material to constitute complete system.

3.3 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by pathways for communications systems installation.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 26 05 00 Common Work Results.

1.2 REFERENCE STANDARDS

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).
- .2 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S304-06, Signal Receiving Centre and Premise Burglar Alarm Control Units.
 - .2 CAN/ULC-S306-03, Intrusion Detection Units.
 - .3 ULC-S318-96, Standard for Power Supplies for Burglar Alarm Systems.
 - .4 ULC-C634-M1986, Guide for the Investigation of Connectors and Switches for Use with Burglar Alarm Systems.
- .3 Underwriters' Laboratories (UL)
 - .1 UL 603-[08], Power Supplies For Use With Burglar-Alarm Systems.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit:
 - .1 Functional description of equipment.
 - .2 Technical data for devices.
 - .3 Device location plans and cable lists.
 - .4 Devices mounting location detail drawings.
 - .5 Typical devices connection detail drawings.
 - .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in BC, Canada.
 - .2 Shop drawings to indicate project layout, mounting heights and locations, wiring diagrams, detection device coverage patterns, contact operating gaps.
 - .3 Submit zone layout drawing indicating number and location of zones and areas covered.
 - .3 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit 1 sample of each control panel, detection device accessory.
 - .4 Reviewed and accepted control panel, detection device accessory will be returned for incorporation into work.

- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .1 Submit UL Product Safety Certificates.
 - .2 Submit verification Certificate that service company is ULC/UL List alarm service company.
 - .3 Submit verification Certificate that intrusion alarm system is Certified Alarm System.
- .5 Test and Evaluation Reports:
 - .1 Submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
- .6 Manufacturer's Instructions: submit manufacturer's installation instructions.
- .7 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 CLOSEOUT SUBMITTALS

- .1 Operation and Maintenance Data: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
 - .1 Include:
 - .1 System configuration and equipment physical layout.
 - .2 Functional description of equipment.
 - .3 Instructions of operation of equipment.
 - .4 Illustrations and diagrams to supplement procedures.
 - .5 Operation instructions provided by manufacturer.
 - .6 Cleaning instructions.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance 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 in dry location, off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect intrusion detection from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.6 WARRANTY

- .1 For all materials the 12 month warranty period prescribed in subsection GC 32.1 of General Conditions is extended to 60 months.

- .2 Manufacturer's Warranty: submit, for Departmental Representative's acceptance, manufacturer's standard warranty document executed by authorized company official.
 - .1 Include manufacturer/dealer recommendations, information and support services for 2 years.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Provide a fully functional security system not limited to the electrical drawings with the following requirements:
 - .1 One Security Alarm Panel: DSC PC-3000 or approved equivalent by the Departmental Representative .
 - .2 Two (2) Motion Detectors (one per floor), as indicated.
 - .3 One Security system Dis-arming Keypad as indicated.
- .2 Design Criteria:
 - .1 Design intrusion detection system using only ULC/UL listed products.
 - .2 Design intrusion detection system using ULC/UL listed alarm service company, company specializing in intrusion detection systems.
 - .3 Design intrusion detection system as a ULC/UL certified alarm system.
 - .4 Design system as a modular access control, alarm monitoring system expandable, and easily modified for inputs, outputs and remote control stations.
 - .1 Design components in accordance with CAN/ULC-S306 and be capable of:
 - .1 Annunciating undesirable, abnormal or dangerous condition.
 - .2 Prioritizing alarms by alarm type; i.e. panic/duress, intrusion and tamper.
 - .3 Determining zone where alarm occurred.
 - .4 Annunciating power failure and power restoration.
 - .5 Annunciating low battery condition.
 - .6 Operate continuously for minimum period of 4 hours in the event of a power failure.
 - .5 Equip control panels with continuous tamper detection on door and wall.
 - .1 Tamper detection to trigger trouble light, alarm.
 - .6 Design system with:
 - .1 Alarm masking.
 - .2 Remote maintenance or diagnostics with password activation and callback modem.
 - .3 Unique identifier for each authorized person.
 - .4 Arming and disarming capabilities: manual and automatic by time of day, day of week, or by operator command.
 - .5 Support both manual and automatic responses to alarms entering system.

- .6 Each alarm capable of initiating different functions of camera, homing, and activation of remote devices, audio switching, door control and card or pin validation.
- .7 Zone or alarm location annunciated at monitoring station.
- .7 Communications link: security level of VII to CAN/ULC-S304.
- .8 Signal link: security level of III to CAN/ULC-S304.
- .9 Alarm condition: design system to provide maximum time for an alarm to be communicated of 60 seconds from alarm initiation to annunciation at remote monitoring location.
- .10 Junction boxes: tamper proof with continuous tamper-detection capability.
- .11 Design system power supplies rated to provide cumulative load of all systems components plus safety factor of 50% or greater.
- .3 Control Panel: ULC approved.
 - .1 Zones (protection inputs)
 - .2 Fixed zones: 8.
 - .3 Number of areas/partitions required: 2.
 - .4 Keypads: LCD (liquid crystal display).
 - .5 Alarm: local.
 - .6 System: wired.
 - .7 Integrated with sub systems building entry.
 - .8 System supervision: siren, battery, telephone line.
 - .9 Siren output.
 - .10 Number of devices per zone: 1 device per zone.
- .4 Detection Accessories:
 - .1 Passive Infrared Detectors (PIR's): ULC approved, digital.
 - .1 Tamper switch.
 - .2 Mounting: wall.
 - .2 Glass break detector: ULC approved, complete with tamperproof switch and be designed to meet temperature and mounting requirements of project.
 - .3 Dual passive infrared and microwave: ULC approved, complete with tamperproof switch, and be designed to meet temperature and mounting requirements of project.
 - .4 Contacts: ULC approved.
 - .1 Mounting: surface.
 - .2 Mounting locations: door.
 - .3 Operating gap: 12.7 mm.
 - .4 Security level: biased.
 - .5 Type: magnetic balanced.
 - .5 Vibration or shock sensors.
 - .6 Notification devices:
 - .1 Siren: 30 watt.

- .2 Speaker complete with driver.
- .5 Communications: telephone line digital dialer.
- .6 Environmental monitoring: design system for detection of smoke/heat.
- .7 Connectors and switches: to ULC-C634.
- .8 Power supplies: to ULC-S318.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for intrusion detection installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

3.2 INSTALLATION

- .1 Install panels, intrusion detection system and components in accordance with manufacturer's written installation instructions to locations, heights and surfaces shown on reviewed shop drawings.
- .2 Install panels, intrusion detection system and components secure to walls, ceilings or other substrates.
- .3 Install required boxes in inconspicuous accessible locations.
- .4 Conceal conduit and wiring.

3.3 SITE TEST AND INSPECTION

- .1 Perform verification inspections and test in the presence of Departmental Representative.
 - .1 Provide necessary tools, ladders and equipment.
- .2 Visual verification: objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents. Visual inspection to include:
 - .1 Sturdiness of equipment fastening.
 - .2 Non-existence of installation related damages.
 - .3 Compliance of device locations with reviewed shop drawings.
 - .4 Compatibility of equipment installation with physical environment.
 - .5 Inclusion of all accessories.
 - .6 Device and cabling identification.
 - .7 Application and location of ULC approval decals.
- .3 Technical verification: purpose to ensure that all systems and devices are properly install and free of defects and damage. Technical verification includes:
 - .1 Measurements of coverage patterns

- .2 Connecting joints and equipment fastening.
- .3 Compliance with manufacturer's specification, product literature and installation instructions.
- .4 Operational verification: purpose to ensure that devices and systems' performance meet or exceed established functional requirements. Operational verification includes:
 - .1 Operation of each device individually and within its environment.
 - .2 Operation of each device in relation with programmable schedule and or/specific functions.

3.4 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Obtain written reports from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product.
 - .2 Submit manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Ensure manufacturer's representative is present before and during [critical periods of installation] [testing].
 - .4 Schedule site visits to review Work at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.
 - .2 [Twice] during progress of Work at [25%] and [60%] complete.
 - .3 Upon completion of Work, after cleaning is carried out.

3.5 ADJUSTING

- .1 Adjust all components for correct function.

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

3.7 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by intrusion detection installation.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

- .1 This Section of the Specification forms an optional scope of work as a separate bid, and is to be read, interpreted and coordinated with all other parts upon acceptance.**

1.2 REFERENCES

- .1 CSA C22.1, Canadian Electrical Code.
.2 NFCC, National Fire Code of Canada
.3 BCBC, BC Building Code.
.4 Underwriter's Laboratories of Canada (ULC)
.1 CAN/ULC S524, Installation of Fire Alarm Systems.
.2 CAN/ULC S525, Audible Signal Appliances for Fire Alarm.
.3 CAN/ULC S526, Visual Signal Appliances, Fire Alarm.
.4 CAN/ULC S527, Control Units.
.5 CAN/ULC S528, Manual Pull Stations.
.6 CAN/ULC S529, Smoke Detectors.
.7 CAN/ULC S530, Heat Actuated Fire Detectors.
.8 CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems.
.9 CAN/ULC S537, Verification of Fire Alarm Systems.
.10 CAN/ULC-S561, Installation and Services for Fire Signal Receiving Centres and Systems.

1.3 SCOPE

- .1 Provide all labour, material and equipment necessary to test, verify the existing fire alarm system sequence of operations in conjunction with the card access system.
.2 Verify that the fire alarm system releases all existing door hold opens, and electric door strikes.
.3 Make modifications to the existing fire alarm system as required and provide all fire alarm interconnections.
.4 Include all wiring and material required to modify the existing system. Items obviously necessary or reasonably implied to complete the work are to be supplied as if indicated on the drawings and called for in the specifications.
.5 All components shall be ULC listed and approved for use on the intended equipment and to be of the same manufacturer and compatible to the existing fire alarm system. Coordinate on site as required.
.6 Work Included:
.1 Completely verify the existing fire alarm system and notify the Department Representative of any changes that may apply to the electrical drawings.

- .2 Provide and install all new ancillary relays, modules, and devices as indicated on the drawings not limited to:
 - .1 Fire alarm monitoring modules
 - .2 Sprinkler flow switches
 - .3 Sprinkler tamper switches
 - .4 Fire alarm horns
 - .5 Fire alarm pull stations 1050-1100mm above finished floor level c/w clear guard.
- .3 Connect to existing fire alarm panel as required.
- .4 Modify all existing annunciators as required.
- .5 Perform all the required programming and verification as required.

1.4 SYSTEM DESCRIPTION

- .1 Modify the existing supervised, microprocessor-based, fire alarm system, utilizing digital techniques for data control and digital multiplexing techniques for data transmission.
- .2 System to include (but not limited to):
 - .1 Trouble signal devices.
 - .2 Power supplies.
 - .3 Initiating/input circuits.
 - .4 Output circuits.
 - .5 Wiring (Class A).
 - .6 Manual and automatic addressable initiating devices.
 - .7 Audible and visual addressable signalling devices.
 - .8 Boosters where required.
 - .9 End-of-line resistors.
 - .10 Addressable Loop Isolation modules.
 - .11 Local and remote annunciators.
 - .12 Monitoring and Control Modules
 - .13 Ancillary devices - for:
 - .1 Door release devices
 - .2 Signal alarm and trouble at the building's control & automation system.
 - .3 Interlocks with access control, intrusion alarm and video surveillance systems.

1.5 SYSTEM OPERATION

- .1 System to operate as existing; add additional devices and zones as indicated on the drawings.

1.6 REQUIREMENTS OF REGULATORY AGENCIES

- .1 System components: listed by ULC and comply with applicable provisions of Local/Provincial Building Code, and meet requirements of local authority having jurisdiction.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.

2.2 FIRE ALARM PANEL

- .1 The fire alarm panel is existing.

2.3 ADDRESSABLE MONITOR MODULES

- .1 Addressable monitor elements to meet or exceed the following technical requirements:
 - .1 Field programmed.
 - .2 Individually identifiable.
 - .3 Supervised.
 - .4 Supervises and controls N.O. contact devices on supervised slave line. Supervision in Class B format with end-of-line resistor.
 - .5 Operating Voltage: 24 volts.
 - .6 Complete with lamicoïd identification on cover identifying address and device monitored.
 - .7 Pull stations for main and second floors
 - .8 Horns for main floor and second floors
 - .9 Waterflow devices as specified within the electrical drawings.

2.4 ADDRESSABLE CONTROL MODULES

- .1 Addressable control elements to meet or exceed the following technical requirements:
 - .1 Field programmed.
 - .2 Individually identifiable.
 - .3 Supervised.
 - .4 May be operated by any one or group of identifiable devices, from control centre and automatically by system.
 - .5 Contact rating: .5 amperes 120 volts AC, 2 amperes at 24 volt DC, with one (1) set of Type C contacts.
 - .6 Complete with lamicoïd identification on cover identifying address and device controlled.

2.5 ADDRESSABLE DETECTOR BASES

- .1 Addressable detector bases to meet or exceed following technical requirements:
 - .1 Field programmable.
 - .2 Supervised, including removal of specified plug-in detector devices.
 - .3 Designed to accept ionization, photo-electric, heat detectors and electronic heat detectors.
 - .4 Designed for remote LED output and base mounted LED.
 - .5 Operation on system data loop.

2.6 ISOLATORS

- .1 Mapnet (addressable loop) isolators shall be provided in each circuit per zone area, and for each stairway such that a fault on any device in that zone shall not affect any other zone.

2.7 WIRE AND CABLE

- .1 Conductors: Copper, to CSA C22.2 and No.75-M1983 and as follows:
 - .1 Conductor Insulation: Minimum rating 300 volts. Single conductor RW90 X-link.
Multi-conductor cables 105°C with outer PVC jacket, colour coded, FAS rated.
 - .2 Conductor sizes as follows:
 - .1 Minimum conductor size for alarm initiating circuits shall be #18 AWG.
 - .2 Minimum conductor size for signal circuits shall be #16 AWG.
 - .3 Minimum conductor size for AC circuits shall be #12 AWG.
 - .4 Minimum conductor size for visual signal appliance circuits shall be #14 AWG.
 - .5 Size all fire alarm wiring for maximum 3% voltage drop at maximum load at last device in run.
 - .2 All wiring for systems to be PVC insulated, FT6 shielded, twisted pair, multi-conductor or coaxial, as called for or as required. All wiring for systems to be installed in conduit.
 - .3 Selection of type of cable to be at discretion of system installer but the system meeting all code requirements, when complete, must perform to the complete satisfaction of the Owner. All wiring to be terminated in terminal panels, junction boxes, etc. on suitable terminal strips or blocks, and to be neatly installed, laced and tagged where required. All terminals in terminal panels and junction boxes shall be made with solderless connectors to terminal blocks with separate terminal for each conductor.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Install new devices at locations indicated and in accordance with the manufacturer's layout drawings. Relocate and replace all existing devices shown on the Drawings. Not all devices in the area of construction are shown on the drawings.
- .2 Wire to and connect all door hold-open devices, access controlled doors, as indicated on the Drawings.
- .3 Elevators to return to 1st floor upon activation of an initiating device; the elevator will then be 'locked out' until the initiating circuit is clear. Should the smoke detector on the 1st floor lobby be activated the elevator shall not return to that level and shall home to an alternate floor. Refer to CAN/ULC B-44 and CSA-282 for exact requirements.
- .4 Each device shall be clearly identified with its zone and address number, using machine-printed clear adhesive tape with black lettering.
- .5 All fire alarm system junction boxes, conduits, and wiring shall be painted and identified.
- .6 All fire alarm conduits and BX drops shall be identified with a red band at 3 meter intervals and at all wall or slab penetrations.

- .7 Door mags and door hold-open devices shall have their respective power circuit numbers identified on them in conspicuous location. Labels shall be black text on clear adhesive tape.
- .8 Integrate the fire alarm system with the following systems as indicated and/or as required by code or standard.
 - .1 Card Access system.
- .9 Wiring shall be installed in conduit and shall be as recommended by the system manufacturer and as required by the CEC. Wiring to be Class A; Hybrid are only to be utilized upon approval from the Consultant. Provide 2 hour rated cabling where required by Code.

3.2 OPERATION OF FIRE ALARM SYSTEM DURING RENOVATIONS

- .1 Construction/demolition activities in the existing building may require that certain fire alarm devices are protected from construction dust, damage etc. Coordinate with the Owners representative as required to protect components of the fire alarm system to prevent nuisance operation and alarms.
- .2 Provide, install and test temporary heat detectors in the area of construction where the construction area is not protected by an active supervised fire protection sprinkler system. The “construction” detectors to be removed and discarded at the end of the project.
- .3 Maintain existing fire alarm system in areas under construction where practical. Relocate, rewire and provide interim connections as required while installing the new system to replace the existing. Provide temporary fire alarm devices and audible signals to suit any temporary exiting provisions.
- .4 Fire watch shall be put into effect at the Contractor’s own expense and no cost to the Owner during the interim period between demolition and the ‘temporary’ heat detectors being installed and verified; or any time the area is unsupervised.
- .5 Devices and/or wiring shall be immediately re-verified in accordance to CAN/ULC-S537-13 whenever a change or modification is performed. Inform monitoring station prior to any modifications.
- .6 Contractor to check in with Department’s Representative at the start and end of each working day to confirm the fire alarm status in the area of work. Arrange for the related fire alarm zone card or area to be deactivated either to suit the progress of the work and/or where dust will be present on a day to day basis. Bag and protect fire detectors in dusty areas during construction. Remove any bagging at the end of the work day. Any existing detectors subject to construction dust to be immediately vacuumed and marked to be replaced at the end of the project. Any fire alarm devices subject to moisture to be replaced immediately.
- .7 The fire alarm system is to be fully functional in the area of construction when the contractor is neither on site nor after the contractors normal work hours. (i.e. overnight, holidays, weekends)

3.3 SYSTEM VERIFICATION

- .1 Fire alarm equipment supplier to make a thorough inspection of the complete installed fire alarm system including all components such as manual stations, thermal detections, products-of combustion detectors, and controls to ensure the following:
 - .1 System is complete and functional in accordance with engineer's specifications.

- .2 System is installed according to CAN/ULC S524 requirements.
- .3 System is installed in accordance with manufacturer's recommendations.
- .4 Regulations covering supervision of components are adhered to.
- .5 Subsequent changes necessary to conform to Items 1, 2, 3 and/or 4 to be done by Division 28 with technical assistance supplied by the manufacturer.
- .6 During the period of this inspection by the manufacturer, supply to the manufacturer one journeyman electrician.
- .7 Verification shall be performed by manufacturer's certified representative with contractor's assistance. Verification results shall be documented by the manufacturer's representative on the manufacturer's comprehensive fire alarm verification forms.
- .8 Notify Engineer of verification date and time at least ten business days in advance.
- .9 Verification may be performed only after:
 - .1 Elevators are operational.
- .10 Provide all testing equipment and material required for testing smoke detectors and heat detectors during verification. Testing methods are to be as approved by manufacturer. All verification shall be to CAN/ULC-S537.
- .11 Provide all testing equipment and material required for testing sound levels of the fire alarm signaling devices during verification.
- .12 Verification to be performed by the system manufacturer or its qualified representative, certified to verify fire alarm system within the Province of British Columbia.

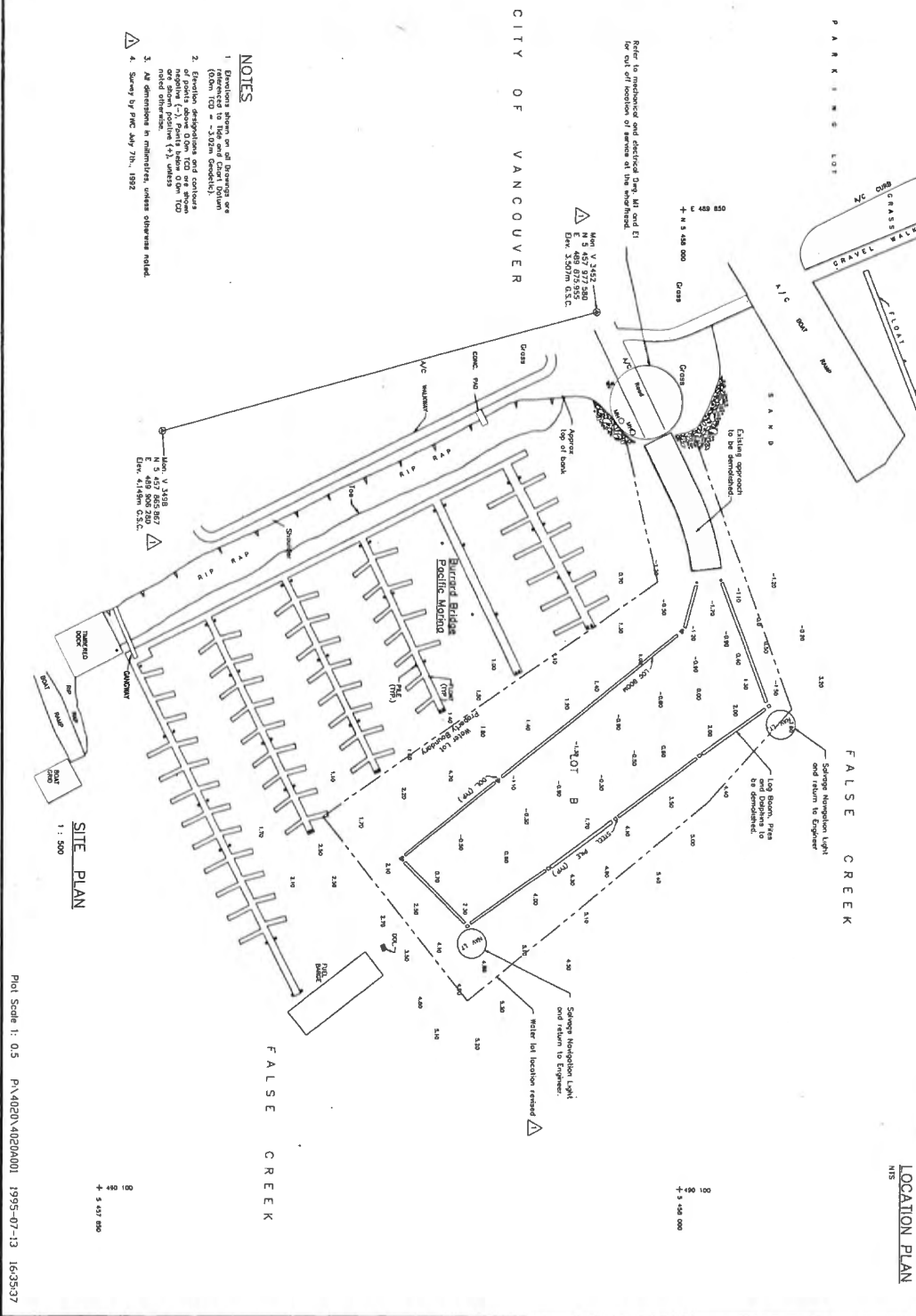
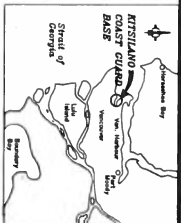
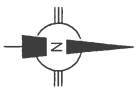
END OF SECTION

Kitsilano CCG SAR - Workshop Reconstruction
Vancouver, B.C.
Project No. F521A-210639

Appendix A

APPENDIX A

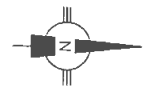
Kitsilano-Existing Wharf Drawings



- NOTES**
1. Elevations shown on all drawings are referenced to UTM and Coast Datum.
 2. Elevation of ground surface is shown by dashed lines.
 3. All dimensions in millimetres, unless otherwise noted.
 4. Survey by P.M.C. May 7th, 1992.

Fig. Scale 1: 0.5 P:\4020\4020A001 1995-07-13 16:35:37

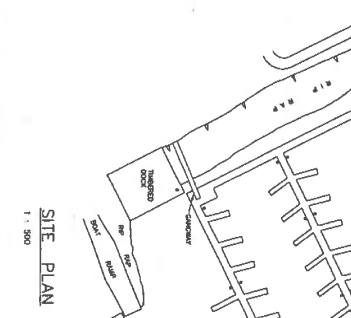
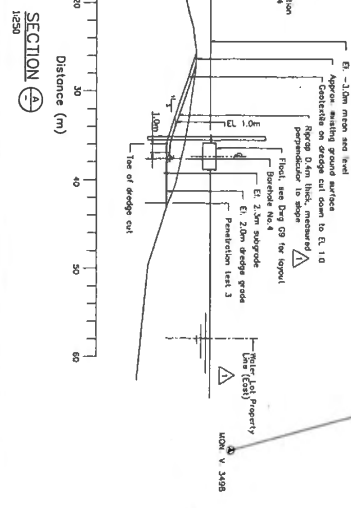
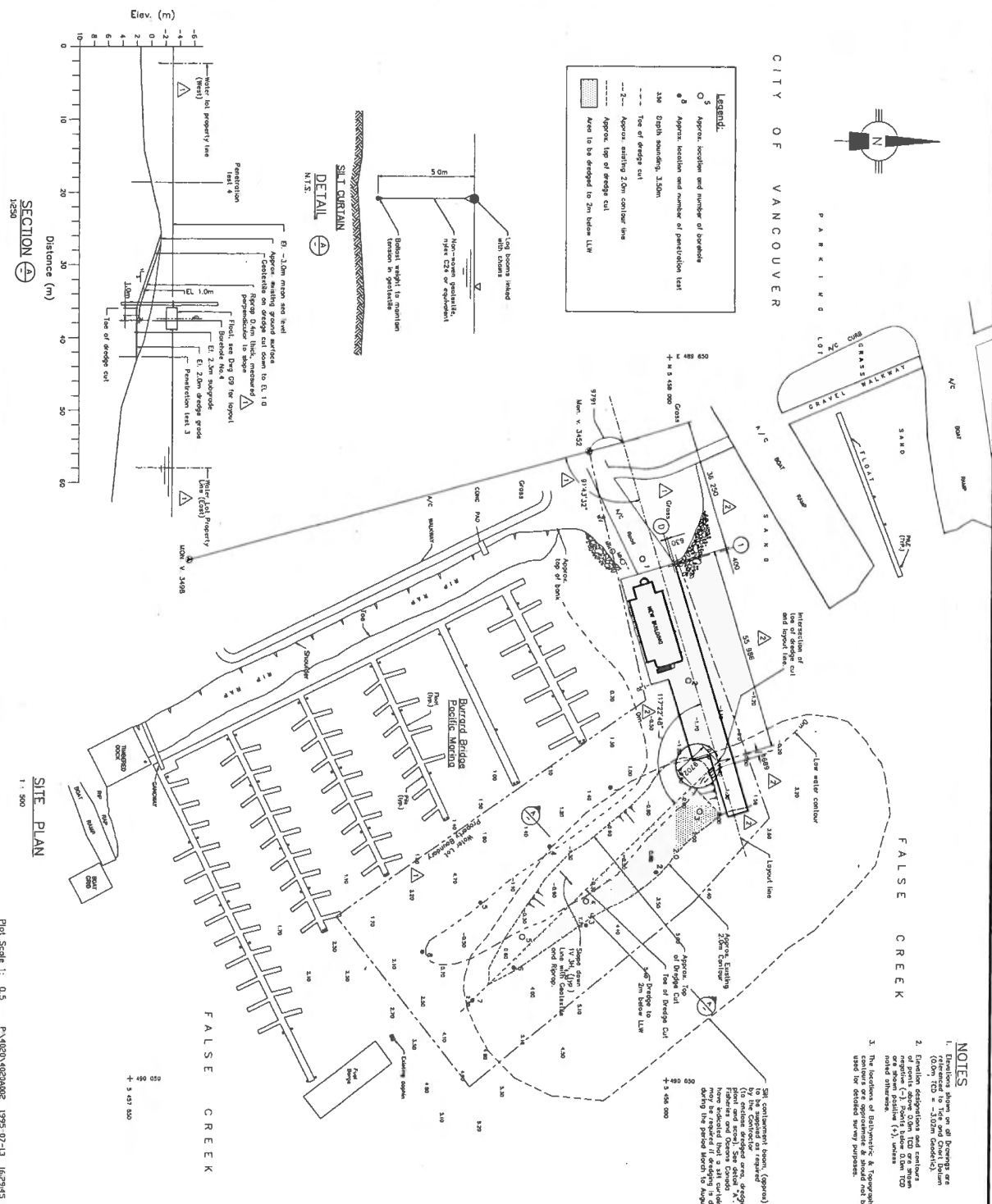
<p>Pacific Western Region</p>	<p>Transport Canada Canadian Coast Guard Search and Rescue</p>	<p>AS BULK, MAY 21, 1995</p> <p>Addendum No. 2</p> <p>Water lot resection 93/08/10 by 4020</p>	<p>VANCOUVER, B.C. KITSILANO COAST GUARD BASE REPLACEMENT</p>	<p>EXISTING SITE</p>
<p>Project: J. KING May 1993</p> <p>Client: M. MCNEILLY / B. WONG May 1993</p> <p>Design: A. FORDIS May 1993</p> <p>Drawn: J. KING May 1993</p>	<p>705049</p>	<p>G1 of G14</p>	<p>1: 500</p>	<p>1: 500</p>



CITY OF VANCOUVER

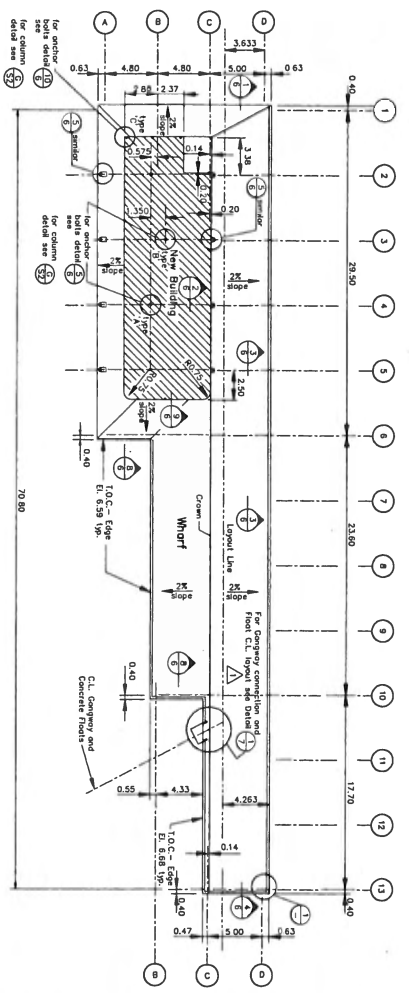
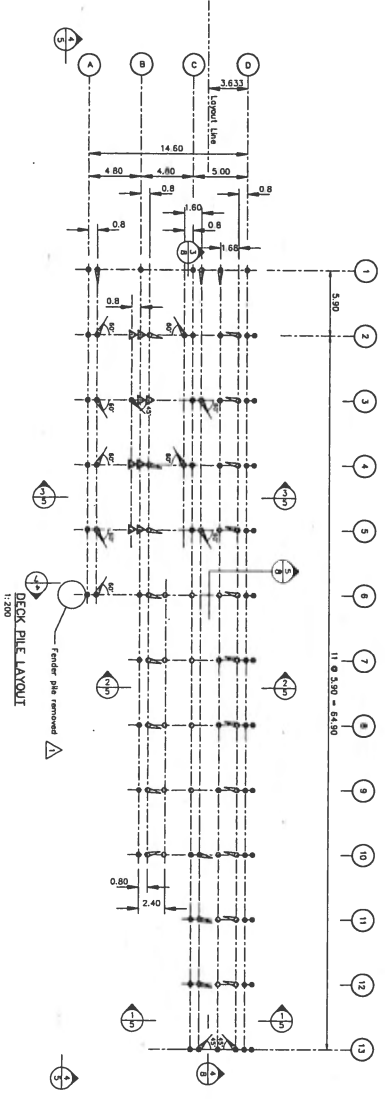
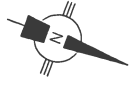
Legend

- 5 Approx location and number of borings
- 8 Approx location and number of penetration test
- 2.00 Depth sounding, 1.50m
- - - - - Top of dredge cut
- - - - - Approx existing 2.0m contour line
- - - - - Approx top of dredge cut
- - - - - Approx to be dredged to 2m below LLW



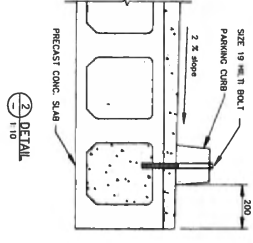
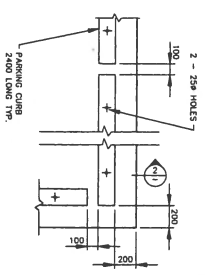
- NOTES**
1. Dredging along part of Burrard and False Creek is shown in red. Refer to Title and Civil Plans (0.0m, 1.0m, 2.0m, 3.0m, 4.0m, 5.0m, 6.0m, 7.0m, 8.0m, 9.0m, 10.0m, 11.0m, 12.0m, 13.0m, 14.0m, 15.0m, 16.0m, 17.0m, 18.0m, 19.0m, 20.0m, 21.0m, 22.0m, 23.0m, 24.0m, 25.0m, 26.0m, 27.0m, 28.0m, 29.0m, 30.0m, 31.0m, 32.0m, 33.0m, 34.0m, 35.0m, 36.0m, 37.0m, 38.0m, 39.0m, 40.0m, 41.0m, 42.0m, 43.0m, 44.0m, 45.0m, 46.0m, 47.0m, 48.0m, 49.0m, 50.0m, 51.0m, 52.0m, 53.0m, 54.0m, 55.0m, 56.0m, 57.0m, 58.0m, 59.0m, 60.0m, 61.0m, 62.0m, 63.0m, 64.0m, 65.0m, 66.0m, 67.0m, 68.0m, 69.0m, 70.0m, 71.0m, 72.0m, 73.0m, 74.0m, 75.0m, 76.0m, 77.0m, 78.0m, 79.0m, 80.0m, 81.0m, 82.0m, 83.0m, 84.0m, 85.0m, 86.0m, 87.0m, 88.0m, 89.0m, 90.0m, 91.0m, 92.0m, 93.0m, 94.0m, 95.0m, 96.0m, 97.0m, 98.0m, 99.0m, 100.0m).
 2. Elevation designations and contours are shown in red. Contours are negative (-) below 0.0m (CD) and positive (+) above 0.0m (CD) unless otherwise indicated.
 3. The locations of bathymetric & topographic contours are approximate & should not be used for detailed survey purposes.

<p>Pacific Western Region</p> <p>Transport Canada Canadian Coast Guard Search and Rescue</p>	<p>AS BUILT JULY 21, 1995</p> <p>Layout revised 93/10/20 By DC</p> <p>Redrawn No. 2 Layout revised 93/08/10 By RSD</p>	<p>VANCOUVER, B.C.</p> <p>KITSILANO</p> <p>COAST GUARD</p> <p>BASE REPLACEMENT</p>	<p>WHARF & DREDGING</p> <p>LAYOUT & SECTIONS</p> <p>N. B. O'NEIL No. 1000, 1000 May, 1993</p> <p>A. F. O'NEIL No. 1000, 1000 May, 1993</p> <p>A. F. O'NEIL No. 1000, 1000 May, 1993</p> <p>A. F. O'NEIL No. 1000, 1000 May, 1993</p>	<p>705049</p> <p>G2 of G14</p>
---	---	--	--	--



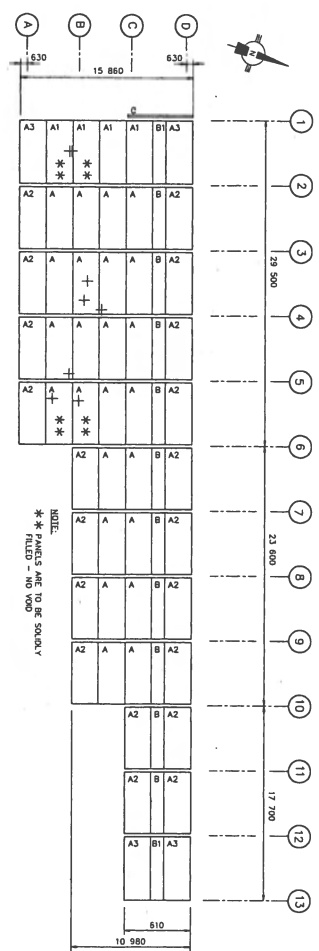
Notes:

- All boiler plate are drawn at 3:1 slope.
- Steel boiler plate are drawn at 1:2.5 slope.
- | Fig. No. | Type | Size | Qty. | Comments |
|----------|----------|----------|------|-----------------|
| 1 | Fender | 100x13mm | 12 | |
| 2 | Boiler | 100x13mm | 12 | |
| 3 | Boiler | 100x13mm | 12 | conc. in-filled |
| 4 | Boiler 1 | 100x13mm | 12 | conc. in-filled |
| 5 | Boiler 2 | 100x13mm | 12 | conc. in-filled |



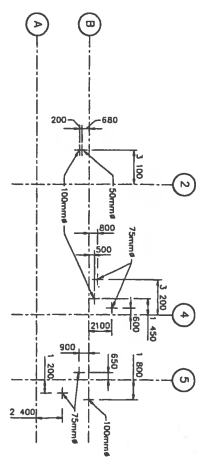
Plan Scale: 1:0.2 P:\N\2001\4526\005 1995-07-13 13:30:22

<p>AS BUILT 2017 21, 1995</p> <p>Moved Company 93/10/27</p> <p>Corrected detail 93/7/20</p> <p>Notes 1, 2 & 3</p> <p>Addendum No. 2 93/06/10</p> <p>Company location & layout revised, fender pile corrected 17, 1995</p>	<p>VANCOUVER, B.C.</p> <p>KITSILANO</p> <p>COAST GUARD</p> <p>BASE REPLACEMENT</p>	<p>DESIGNED BY: G. CHANG</p> <p>CHECKED BY: S. CHANG</p> <p>DATE: 92/11/20</p> <p>DESIGNED BY: M. FINE</p> <p>CHECKED BY: M. FINE</p> <p>DATE: 89/3</p> <p>DESIGNED BY: A. YONG</p> <p>CHECKED BY: A. YONG</p> <p>DATE: 1993</p> <p>DESIGNED BY: A. F. BARRIS</p> <p>CHECKED BY: A. F. BARRIS</p> <p>DATE: 1993</p> <p>PROJECT NO: 705049</p> <p>SCALE: G3 of G14</p>
---	--	---

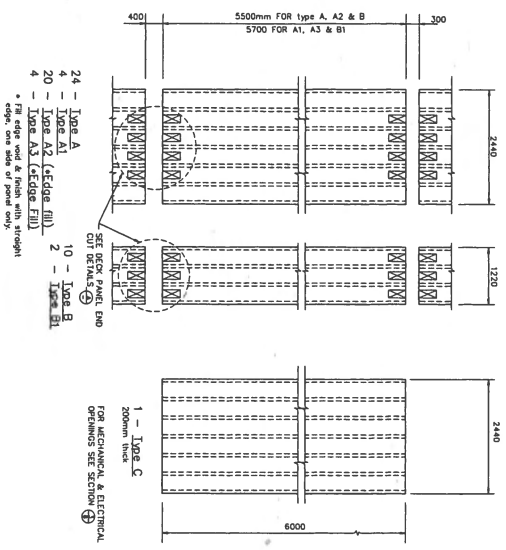


NOTE:
** PANELS ARE TO BE SQUARE
FIELD - 40,000

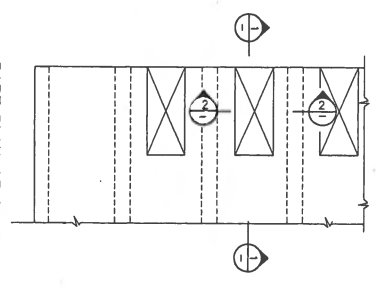
PRECAST SPAN DECK LAYOUT PLAN
1 : 200



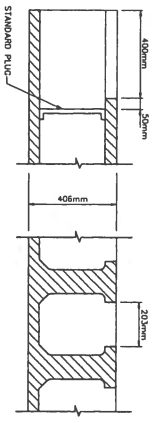
LOCATION PLAN FOR MECHANICAL DRAIN HOLES
1 : 200 (ANY HOLES THROUGH THE PANEL WILL HAVE TO BE APPROVED BY ENGINEER)



PLAN OF PANELS
AS FOUNDED ONE 400mm THICK U.R.G.
1 : 50



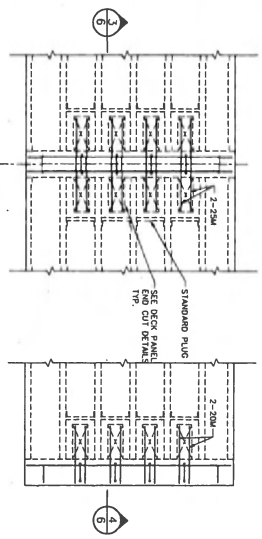
PART PLAN OF PANEL
1 : 10



SECTION 1-1 SECTION 2-2
DECK PANEL END CUT DETAILS
1 : 10

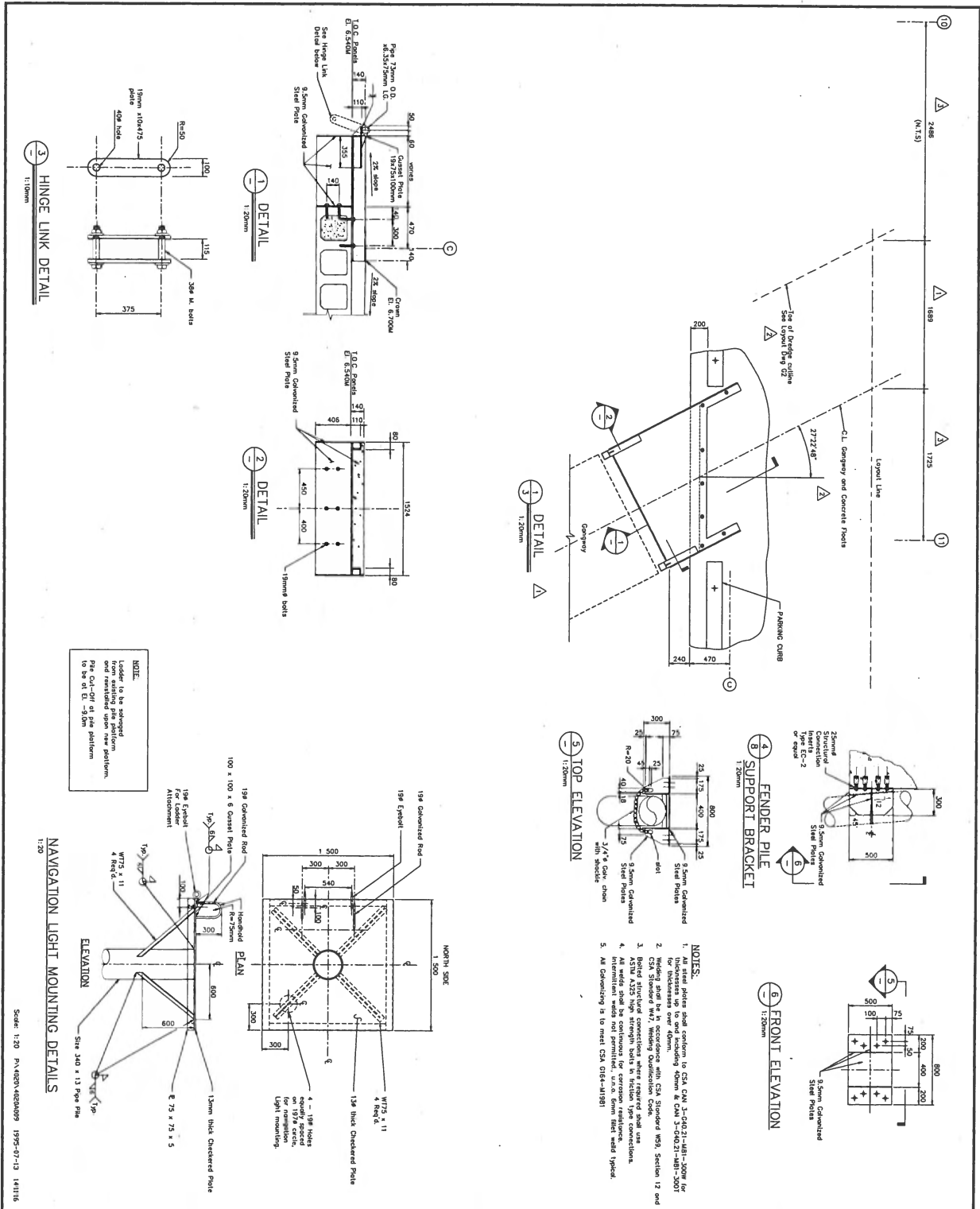
- NOTES:
1. Concrete deck panel shall be designed to carry CS500 highway truck loading - CMV/-CSA S8.
 2. Deck panel concrete shall have a minimum strength of 30 MPa.
 3. Deck panel is assumed to be optimum design, prior approval is required if contractor is to provide deck panel of different depth.
 4. Protection area in smooth rigid form and cut to lengths as required.
 5. All tolerance shall be as specified in CSA231.
 6. Provide 2 covers holes per each panel.

DECK PANEL CONNECTION DETAILS
1 : 25



NOT SCALE 1 : 0.2 P:\K020\K1020\0006_1995-07-13_1652505

<p>Pacific Western Region Transport Canada Canadian Coast Guard Search and Rescue</p>	
<p>AS BUILT JULY 21, 1995 Rebar increased to 23M for 92/7 deck panel connection details</p>	
<p>YANCOUVER, B.C. KITSILANO COAST GUARD BASE REPLACEMENT</p>	
<p>PRECAST PANEL DETAILS</p>	
<p>Drawn: D. CHANG Date: 32/7/16</p>	<p>Checked: B. WONG Date: 9/27/16</p>
<p>Designed: W. TAYLOR Date: May, 1993</p>	<p>Approved: J. YONG Date: May, 1993</p>
<p>705049</p>	
<p>G4 of G14</p>	

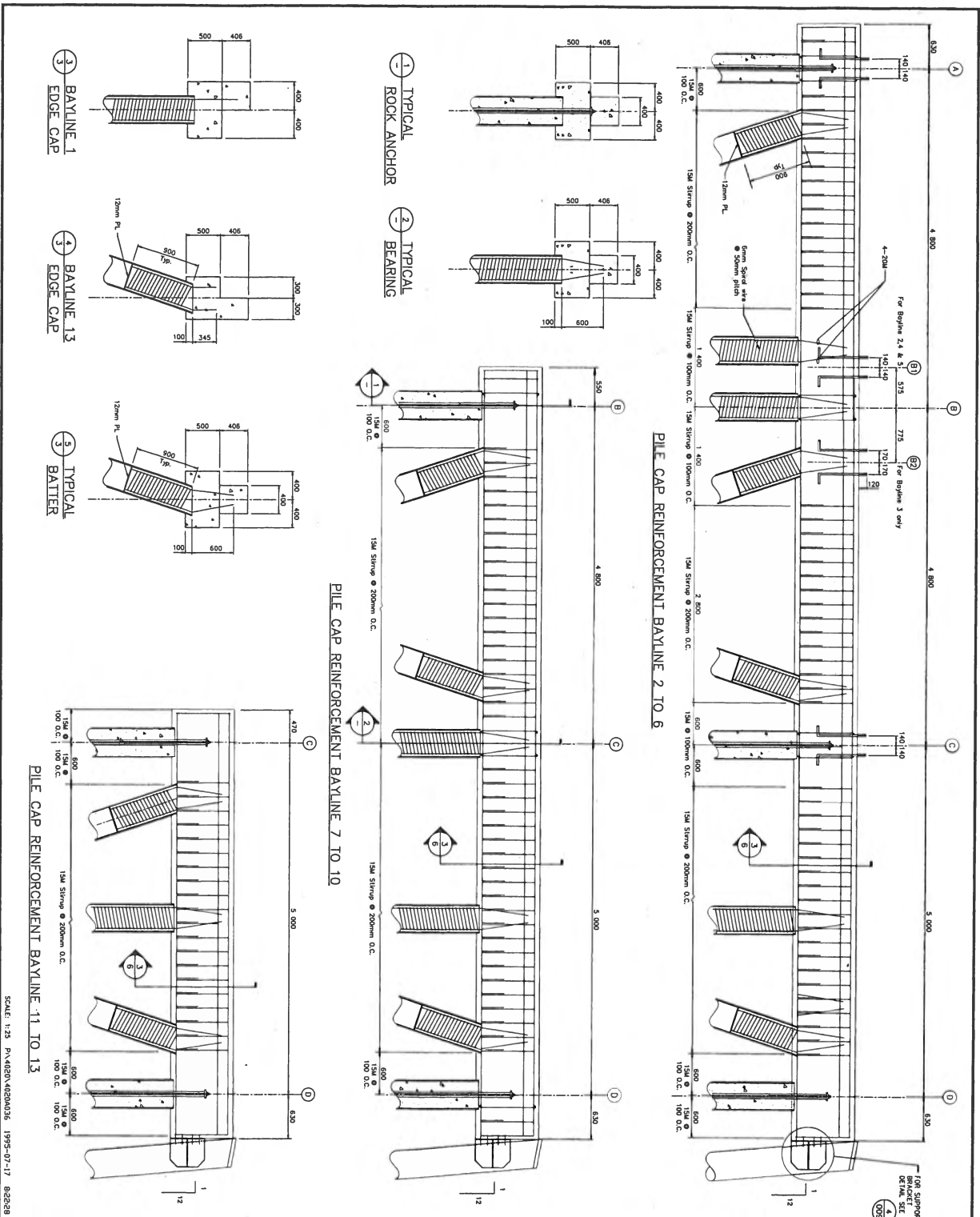


NOTE:
 Loader to be salvaged from existing pile platform and re-used in this system to be at El. -9.5m

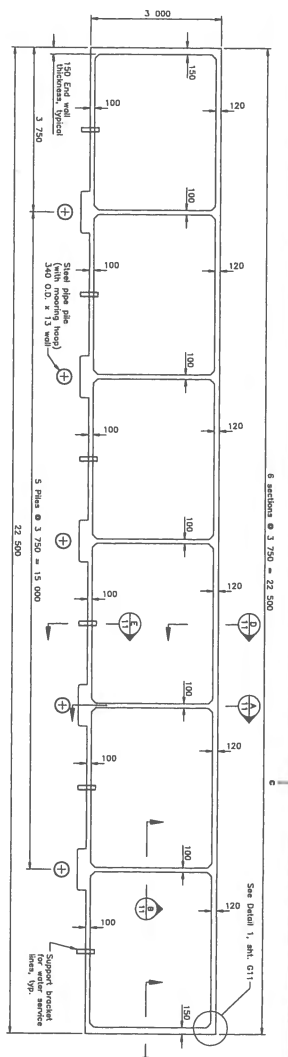
NAVIGATION LIGHT MOUNTING DETAILS

Scale: 1:30 P:\A280\46280499 1995-07-13 14:11:18

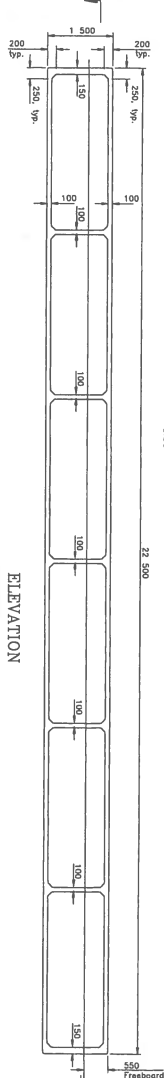
Pacific Western Region Transport Canada Canadian Coast Guard Search and Rescue	
AS BUILT JULY 21, 1995 Detail 1/3 Revised 9/4/02/10 Detail 1/3 Revised 9/1/02/7 Addition No. 2 Construction Input revised by X80 9/1/06/10	
VANCOUVER, B.C. KITSILANO COAST GUARD BASE REPLACEMENT	
GANGWAY SUPPORT AND DETAILS	
Design: D. CHANG Drawn: S. G. F. Eason Appr: J. J. Date: Nov. 1993 Checked: J. Yong Date: May, 1993 Approved: A. Faldut Date: May, 1993	
705049 G7 of G14	



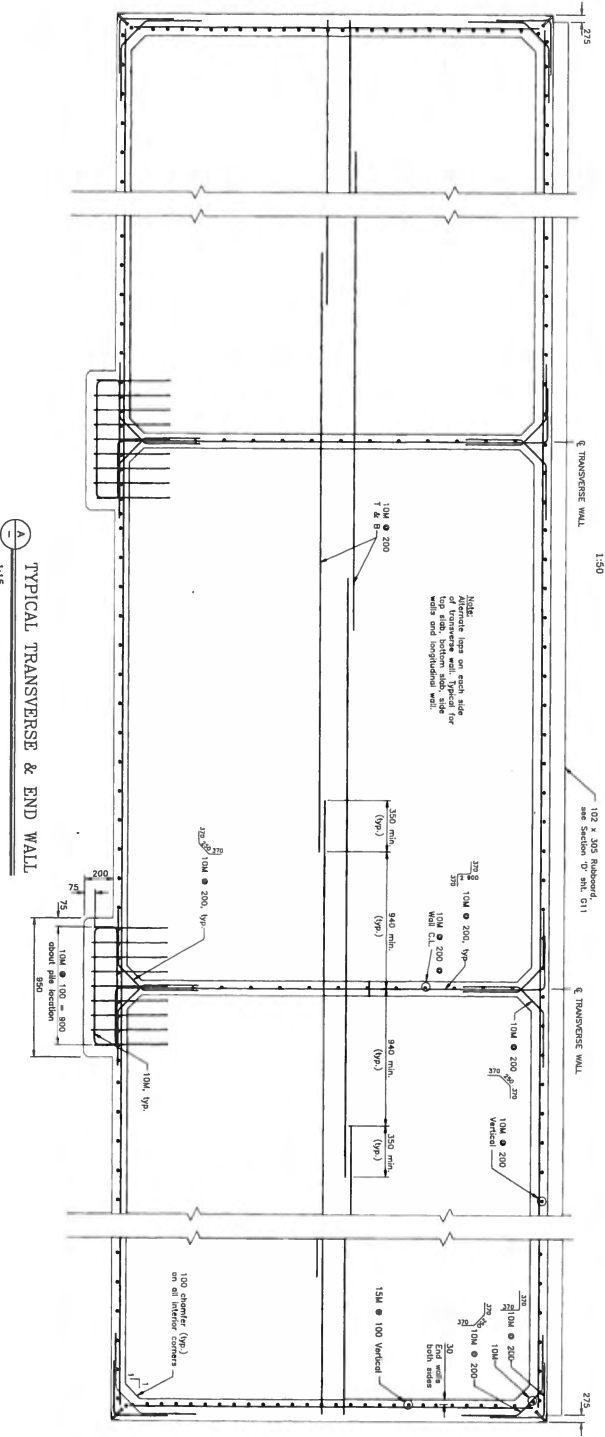
<p>Pacific Western Region</p>	<p>Transport Canada Canadian Coast Guard Search and Rescue</p>
<p>AS BUILT JULY 21, 1995</p>	
<p>PROJECT: VANCOUVER, B.C. KITSILANO COAST GUARD BASE REPLACEMENT</p>	
<p>PILE CAP REINFORCEMENT</p>	
<p>DATE: APRIL 93</p>	
<p>SCALE: 1:25</p>	
<p>705049</p>	
<p>CB of G14</p>	



PLAN - TYPICAL CONCRETE FLOAT (FOUR THUS)



ELEVATION



TYPICAL TRANSVERSE & END WALL

GENERAL NOTES:

1. These Drawings show the completed structure, and do not show about the job site and the construction methods.
2. Concrete shall have a 28 day minimum compressive strength of 40 MPa.
3. All concrete shall be cast and cured in accordance with CAN/CSA A307.
4. Cold and hot weather concrete work shall conform to CAN/CSA A307.
5. Testing of concrete and materials shall be to CAN/CSA A307.
6. Reinforcing bars shall conform to CSA C30.12 Grade 400 MPa.
7. Rebar shall be lap welded in accordance with CAN/CSA A307.
8. No welding of any reinforcing bars will be permitted without written approval of the Engineer.
9. Minimum storm water cover for all reinforcements for slabs and walls.
10. Minimum storm water cover for all reinforcements for slabs and walls.
11. All anchor bolts and other fasteners shall be placed before the concrete is poured.
12. Fabrication, erection, structure design and detailing of all structural steel shall conform to CSA S358 and shall be performed by Certified Welding Inspectors (CWI's) and shall be approved by the Canadian Welding Bureau (CWB) and meet CWB-440.20 for girthed requirements.
13. All steel shall meet CWB-440.20 for girthed requirements.
14. All steel shall meet CWB-440.21 for quality.
15. Other structural steel & msc. steel - 300W Class H or C.
16. Inset and lap of all bolts in accordance with manufacturer's instructions.
17. Approval must be obtained from the Electrical Contractor for location of electrical service line ducts and backlogs prior to concrete pour.

Public Works - Travaux publics
Canada

Pacific Western Region

Transport Canada
Canadian Coast Guard
Search and Rescue

Issued for Construction 3 Aug 93

1:15

4020M012 05/19/93 0933

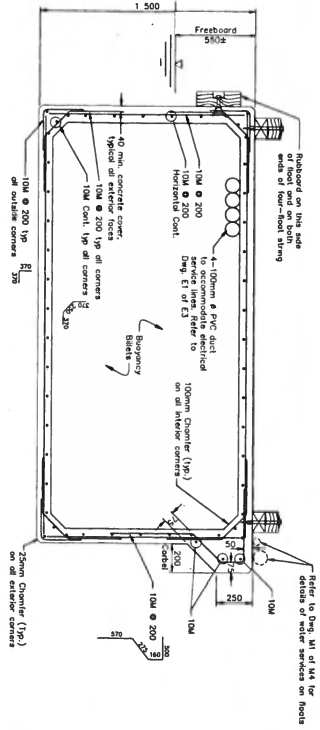
CONCRETE FLOAT - PLAN AND TYPICAL SECTIONS

VANCOUVER, B.C.
KITSILANO
COAST GUARD
BASE REPLACEMENT

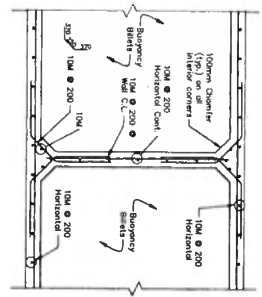
Author: C.S. Blandin, B. Eng.
Drawn: M. McMillan, A.S.E.T.
Checked: M.V. 93
Approved: J. Young, P. Eng.
Date: MAY 93

Project: 705049

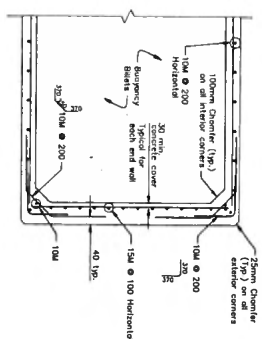
Scale: G10 of G14



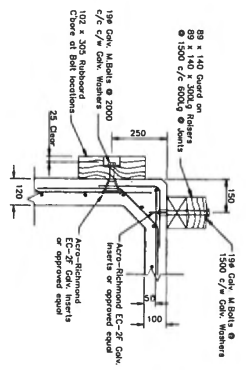
A
FLOAT SECTION
1:15



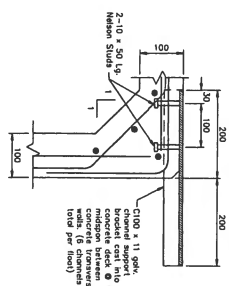
B
TYPICAL TRANSVERSE WALL
1:15



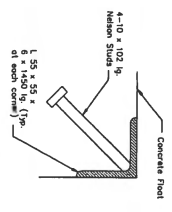
C
END WALL
1:15



D
GUARDRAIL AND RUBBOARD
1:10



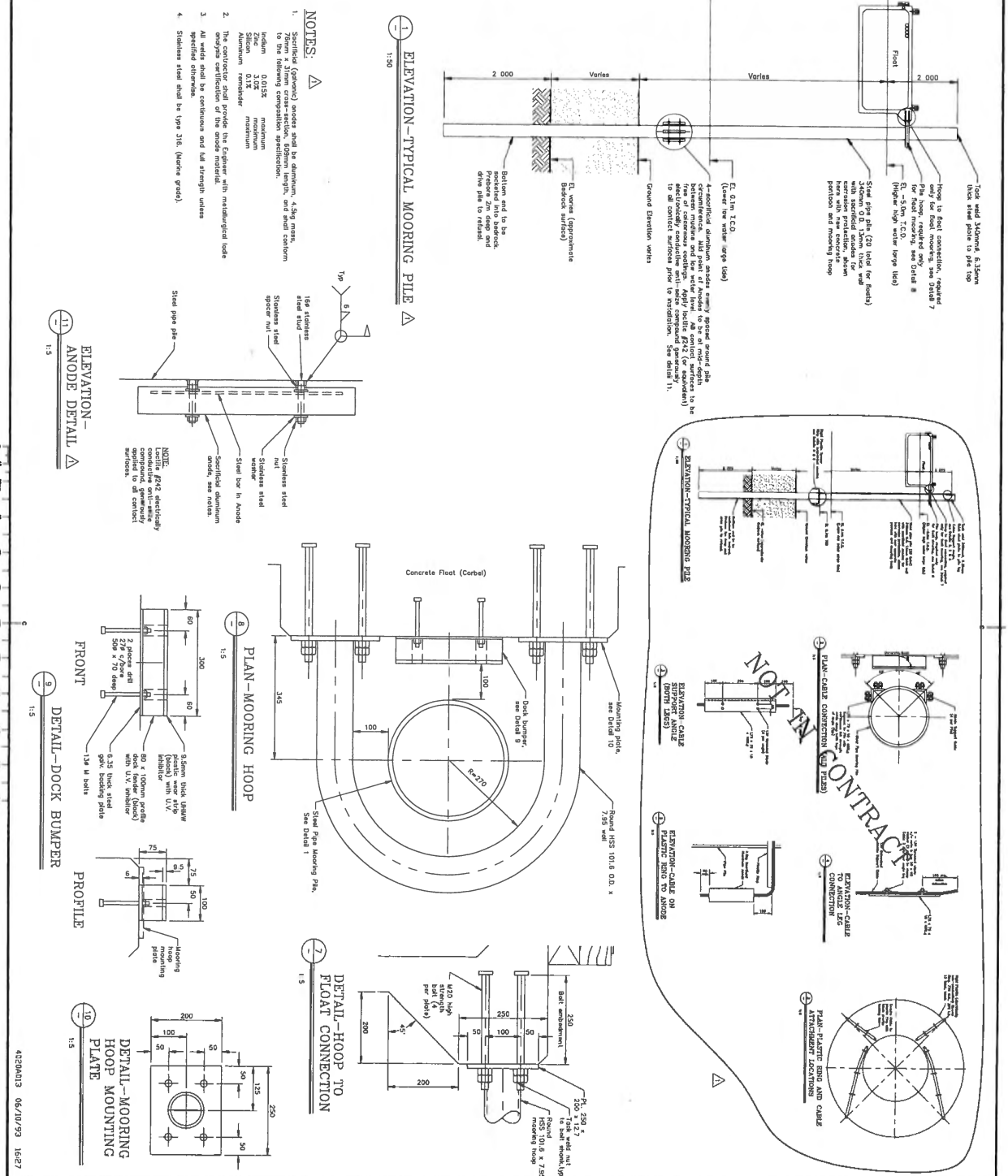
E
SUPPORT BRACKET FOR WATER SERVICE LINES
1:15



F
DETAIL - VERTICAL CORNER PROTECTION
1:2

PLOT SCALE 1:1 PLAN AND ELEVATION 1995-01-17 95553

Pacific Western Region		Transport Canada	
Transport Canada Canadian Coast Guard Search and Rescue			
AS BUILT JULY 21, 1995			
VANCOUVER, B.C. KITSILANO COAST GUARD BASE REPLACEMENT			
CONCRETE FLOAT - PLAN AND TYPICAL SECTIONS			
Designer: C.E. MacDonald, P.Eng. Date: May '93	Designer: M. Macpherson, A.S.C.T. Date: May '93	Designer: J. Young, P.Eng. Date: May '93	Designer: A. Fagan, P.Eng. Date: May '93
Project No: 705049			
G11 of G14			



<p>Public Works Canada</p> <p>Terrace Public Canada</p>	<p>Transport Canada Canadian Coast Guard Search and Rescue</p>	<p>4229A13 06/17/93 1627</p> <p>4229A13 06/17/93 1627</p>	<p>4229A13 06/17/93 1627</p>
---	--	---	------------------------------

VANCOUVER, B.C.
KITSILANO
COAST GUARD
BASE REPLACEMENT

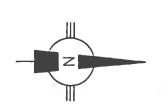
MOORING PILE & FLOAT MOORING HOOP DETAILS

Issued for Construction 3 Aug 93
 Approved: 93/06/78
 Checked: 93/06/78
 Drawn: 93/06/78

Legend:
 A: As Shown
 B: As Shown
 C: As Shown

Prepared by: 93/06/78
 Checked by: 93/06/78
 Drawn by: 93/06/78
 Date: 93/06/78

705049
 G13 of G14

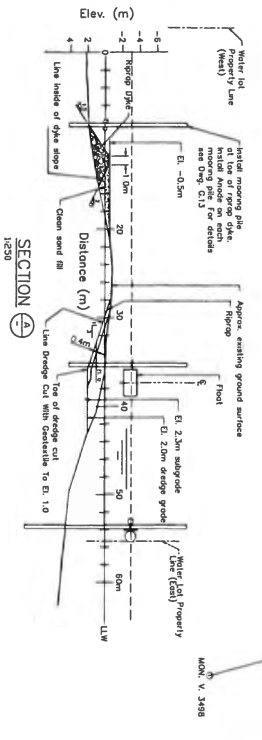
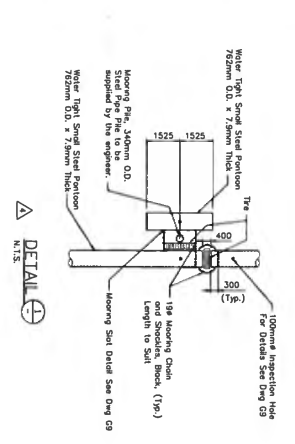


CITY OF VANCOUVER
P A R K I N G L O T

LEGEND

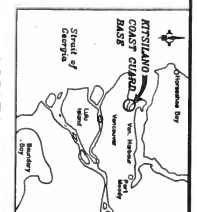
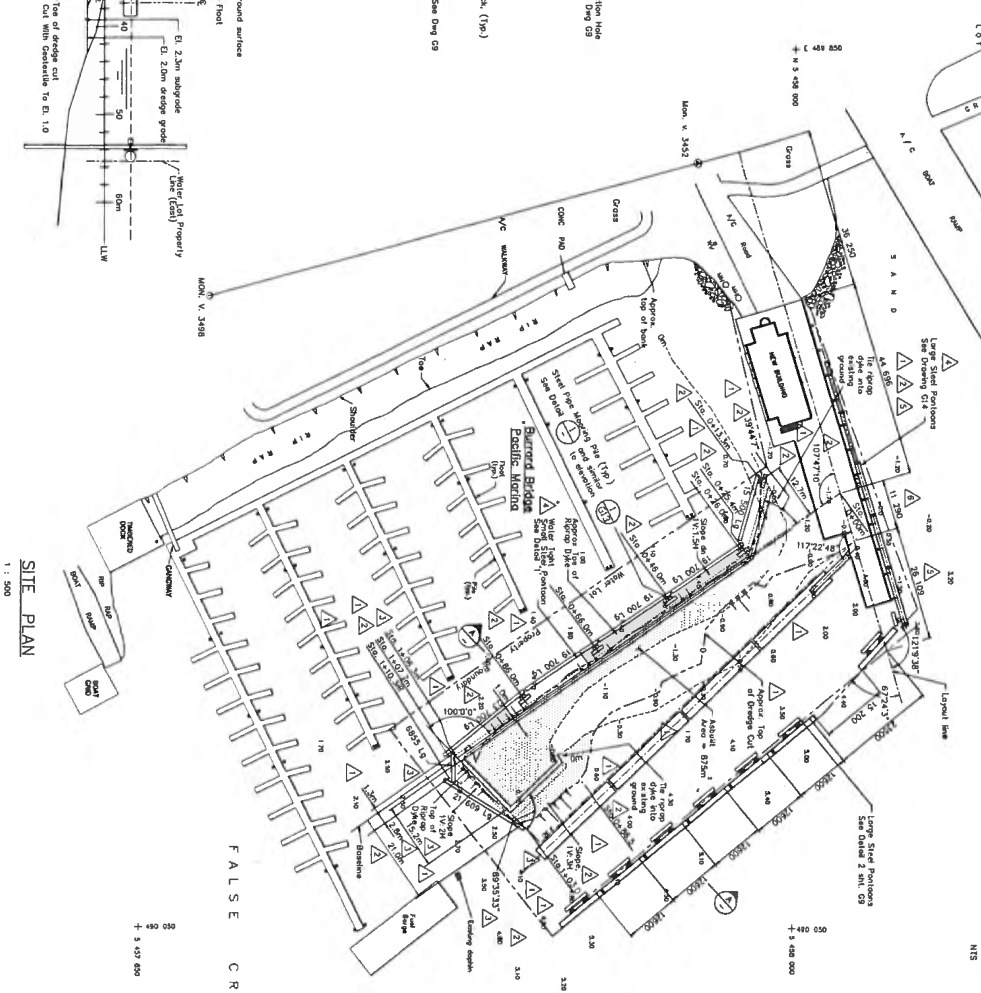
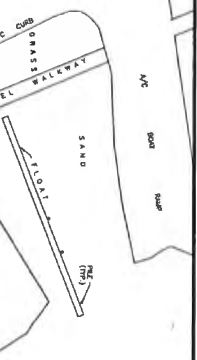
- 1.20 Depth Banding, 3.20m
- Approximate Existing Contour Line
- Approximate Top of Debris Cut
- Top of Debris Cut
- Top of as Built Compensation Area (Sand Fill)
- Approximate Toe of Compensation Area (Riprap Dike)

NOTE:
Date of Survey Feb. 11 1994

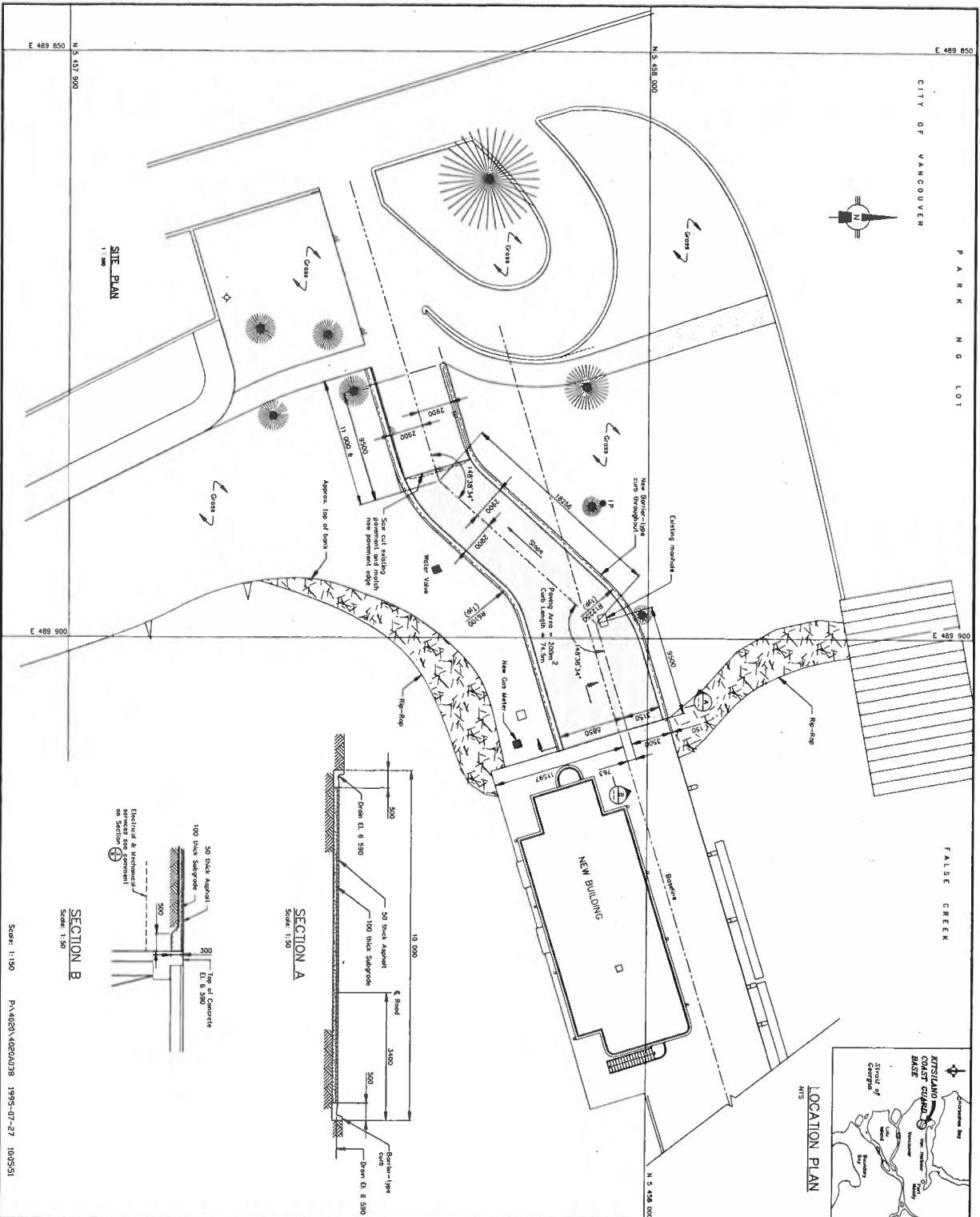


SITE PLAN
1 : 500

PLOT SCALE 1: 500 P:\4\629V\4629A03 1995-07-17 10:30:57



<p>Public Works City of Vancouver Pacific Western Region</p>	<p>Transport Canada Coast Guard Search and Rescue</p>
<p>AS BUILT JULY 21, 1995</p> <ul style="list-style-type: none"> ▲ Abutment compensation 94/04/79 over change - 889 ▲ Steel Pile Retention 94/04/76 ▲ Dike between 94/7/75 ▲ Construction by DC & KOB 94/7/75 ▲ Water Tight Shot 93/11/94 ▲ Pile Test by KOB 93/09/16 ▲ Compensation area south end the ▲ reamed by KOB 93/07/15 ▲ Compensation area ▲ reamed by KOB 93/06/10 ▲ Layout of habitat ▲ reamed by KOB 	<p>HABITAT COMPENSATION AREA</p>
<p>VANCOUVER, B.C. KITSILANO COAST GUARD BASE REPLACEMENT</p>	<p>705049 G14 of G14</p>



<p>Transport Canada Canadian Coast Guard Ships and Rescues</p>		<p>Pacific Western Region</p>	
<p>AS BUILT JULY 21, 1995</p>			
<p>VANCOUVER, B.C. KITSILANO COAST GUARD BASE REPLACEMENT</p>			
<p>NEW ASPHALT VEHICLE APPROACH</p>			
<p>705049</p>			
<p>G15 of G15</p>			