Public Works and Government Services Canada

Requisition Number: EZ899-161815/A

DRAWINGS & SPECIFICATIONS for:

CANADA BORDER SERVICES AGENCY
PACIFIC HIGHWAY PORT OF ENTRY
TRAFFIC OFFICE BUILDING
INTERIOR RENOVATIONS

ISSUED FOR TENDER

APPROVED BY:

ACTING. — Nov. 16/2015.
Regional Manager, AES — Date

2015-11-12
Construction Safety Coordinator — Date

TENDER:

2015-11-12
Project Manager — Date

TABLE OF CONTENTS

SPECIFICATION DIVISION	SECTION		PAGES
INDEX	00 00 10	Table of Contents	3
	00 07 00	Seals Page	1
DIVISION 1 GENERAL REQUIREMENTS	01 11 00	General Instructions	5
	01 14 00	Work Restrictions	4
	01 33 00	Submittal Procedures	4
	01 35 33	Health and Safety Requirements	6
	01 45 00	Quality Control	2
	01 52 00	Construction Facilities	2
	01 61 00	Common Product Requirements	3
	01 71 00	Examination and Preparation	1
	01 73 00	Execution	2
	01 74 11	Cleaning	2
	01 74 19	Waste Management and Disposal	6
	01 77 00	Closeout Procedures	1
	01 78 00	Closeout Submittals	7
DIVISION 2 EXISTING CONDITIONS	02 41 16	Structure Demolition	3
	02 41 99	Demolition for Minor Works	1
DIVISION 3 CONCRETE	03 30 05	Cast-In-Place Concrete Short Form	5
	03 35 00	Concrete Finishing	5
DIVISION 5 METALS	05 12 23	Structural Steel Framing	4
DIVISION 6 WOODS, PLASTICS, COMPOSITES	06 08 99	Rough Carpentry for Minor Works	3
DIVISION 7 THERMAL AND MOISTURE PROTECTION	07 21 16	Blanket Insulation	2
	07 27 00. 01	Air Barrier – Descriptive or Proprietary	4
	07 62 00	Sheet Metal for Flashing and Trim	4
	07 92 00	Joint Sealants	6
DIVISION 8 OPENINGS	08 71 00	Door Hardware	4
DIVISION 9 FINISHES	09 06 00	Room Finish Schedule	1
	09 21 16	Gypsum Board Assemblies	4
	09 22 16	Non Structural Metal Framing	3
	09 30 13	Ceramic Tiling	6
	09 51 99	Acoustical Ceiling for Minor Works	3
	09 65 00	Resilient Flooring for Minor Works	5
	09 91 23	Interior Painting	11

DIVISION 12 FURNISHINGS	12 48 23	Entrance Floor Grilles	2
DIVISION 23 HEATING, VENTILATING, AND AIR CONDITIONING	23 05 00	Common Work Results – Mechanical	4
	23 05 05	Installation of Pipe Work	5
	23 05 13	Common Motor Requirements for HVAC Equipment	3
	23 05 29	Hangers and Supports for HVAC Piping and Equipment	7
	23 05 48	Vibration and Seismic Controls for HVAC Piping and Equipment	3
	23 05 54	Mechanical Identification	6
	23 05 93	Testing, Adjusting, and Balancing for HVAC	4
	23 31 13	Metal Ducts – Low Pressure to 500PA	6
	23 33 00	Air Duct Accessories	4
	23 33 14	Dampers Balancing	2
	23 34 00	HVAC Fans	5
	23 37 20	Louvres, Intakes and Vents	3
DIVISION 26 ELECTRICAL	26 05 00	Common Work Results	22
	26 05 05	Seismic Restraints	3
	26 05 21	Wire and Cables	3
	26 05 32	Outlet Boxes, Conduit Boxes and Fittings	2
	26 05 34	Conduits, Fastenings and Fittings	4
	26 05 50	Lighting	4
APPENDIX A		Electrical Forms	14
APPENDIX B		Interior Finish and Colour Schedule	1

DRAWING LIST

ARCHITECTURAL

A-00 COVER SHEET
A-01 VESTIBULE DEMOLITION
A-02 NEW VESTIBULE & FINISH LEGEND
A-03 DOORS & BEAM CONNECT. DEMO
A-04 NEW DOORS & BEAM CONNECTION
A-05 STAFF WASHROOMS DEMOLITION
A-06 NEW STAFF WASHROOMS
A-07 DETAILS – LOUVER
A-08 DETAILS
A-09 HOARDING PLAN

STRUCTURAL

S-01 GENERAL NOTES & DRAWING LIST
S-02 PHOTOS FOR EXISTING BEAM CONDITION
S-03 PARTIAL PLAN & SECTION FOR EXISTING BEAM REPAIR
S-04 PARTIAL PLAN & SECTION FOR ENTRY VESTIBULE SLAB REPAIR

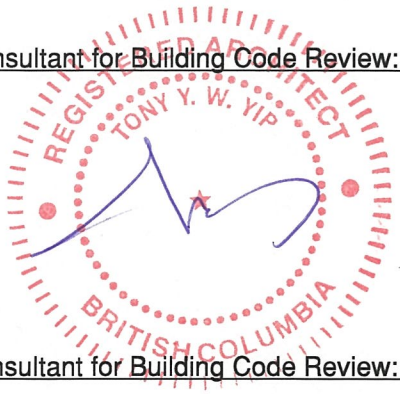
MECHANICAL

M-100 COVER SHEET SITE PLAN, LEGEND & DRAWING LIST
M-200 MECHANICAL VESTIBULE DEMOLITION & NEW
M-201 MECHANICAL STAFF WASHROOMS DEMOLITION AND NEW PLAN

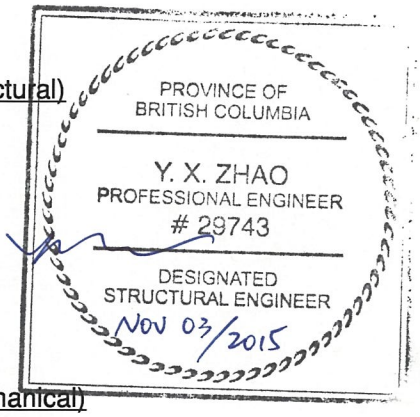
ELECTRICAL

E-100 COVER SHEET SITE PLAN, LEGEND & DRAWING LIST
E-200 ELECTRICAL - VESTIBULE T-109 PLAN
E-201 ELECTRICAL - VESTIBULE T-101, DOORS T-128 AND T-124 DEMOLITION WORKS
E-202 ELECTRICAL - WASHROOMS T-103 AND T-106 DEMOLITION AND NEW PLAN

Consultant for Building Code Review: (Architectural)

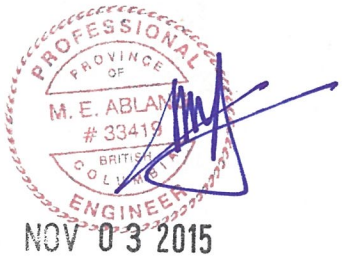


Consultant for Building Code Review: (Structural)



Consultant for Building Code Review: (Mechanical)

Consultant for Building Code Review: (Electrical)



Consultant for Building Code Review: (Architectural)

Consultant for Building Code Review: (Structural)

Consultant for Building Code Review: (Mechanical)

Consultant for Building Code Review: (Electrical)

1.0 GENERAL

1.1 CODES

.1 Perform work in accordance with National Building Code for Canada 2010, Workers' Compensation Board of BC, BC Building Code 2012 and any other code of provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.2 Meet or exceed requirements of specified standards, codes and referenced documents.

1.2 DESCRIPTION OF WORK

.1 Work under this Contract comprises, but is not limited to, the provision of all labour, materials, services and equipment necessary for the structural upgrade and renovation work identified at 28 176th Street, Surrey BC. Work involves: the regrading of the main entry vestibule (including the removal and re-installation of the associated storefront glazing), new tile flooring in the main entry area, new sheet flooring and ventilation in the staff washrooms, minor structural steel upgrades, and under-cutting the bus pre-clearance doors to accommodate settlement issues.

1.3 CONTRACT DOCUMENTS

.1 The Contract documents, drawings and specifications are intended to complement each other.

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

1.4 TIME OF COMPLETION

.1 Commence work immediately upon official notification of acceptance of offer and complete Traffic Office Renovation contract work, including testing, adjusting and commissioning by March 24, 2016.

1.5 HOURS OF WORK

.1 All work which generates excessive noise, including cutting and coring, hammer drills and powder activated fastening shall be executed during the operating hours of low traffic volume prior to 10:00 am on any day.

.2 All work shall be executed during normal office hours between 7:00am and 7:00pm.

.3 Any work required to be performed outside of normal office hours must be arranged with CBSA.

1.6 WORK SCHEDULE

.1 Do not change approved Schedule without notifying Departmental Representative.

.2 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of Departmental Representative.

.3 Carry out work as follows:

.1 Within 10 working days after Contract award, provide a "phasing bar chart" and a schedule showing anticipated progress stages and final completion of the work within the time period required by the Contract documents. Indicate the following:

.1 Submission of shop drawings, product data, MSDS sheets and samples.

.2 Commencement and completion of work of each section of the specifications or trades for each phase as outlined.

.3 Final completion date within the time period required by the Contract documents.

1.7 COST BREAKDOWN

.1 Before submitting the first progress claim, submit a breakdown of the Contract price in detail as directed

by the Departmental Representative and aggregating Contract price. After approval, the cost breakdown will form the basis of progress payments.

.2 General Contractor, Mechanical and Electrical Sub-Contractor should attend meetings with Departmental Representative as required to finalize the breakdown.

1.8 CODE, BYLAWS, STANDARDS

.1 Perform work in accordance with the National Building Code of Canada (NBC) 2010, and other indicated Codes, Construction Standards and/or any other Code or Bylaw of local application.

.2 Comply with applicable local bylaws, rules and regulations enforced at the location concerned.

.3 Meet or exceed requirements of Contract documents, specified standards, codes and referenced documents.

.4 In any case of conflict or discrepancy, the most stringent requirements shall apply.

1.9 REGULATORY REQUIREMENTS

.1 Building Permit

.1 Obtain Certificates, Licenses and other permits required by City of Surrey, provincial or federal authorities to complete the work.

.2 Provide inspection authorities with plans and information required for issue of acceptance certificates.

.3 Furnish inspection certificates in evidence that the work installed conforms with the requirements of the authority having jurisdiction.

1.10 DOCUMENTS REQUIRED

.1 Maintain one copy each of the following at the job site:

.1 Contract drawings.
.2 Contract specifications.
.3 Addenda to Contract documents.
.4 Copy of work schedule.
.5 Reviewed shop drawings.
.6 Change orders.
.7 Other modifications to Contract.
.8 Field test reports.
.9 Reviewed samples.
.10 Manufacturer's installation and application instructions.
.11 One set of record drawings and specifications for "as-built" purposes.
.12 National Building Code of Canada 2010.
.13 Current construction standards of workmanship listed in technical Sections.
.14 Building Safety Plan.

1.11 CONTRACTOR'S USE OF SITE

.1 Use of site:

.1 Exclusive and complete for execution of work.
.2 Assume responsibility for assigned premises for performance of this work.
.3 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative.
.4 Cooperate with and coordinate construction/demolition activities with property manager.

.2 Perform work in accordance with Contract documents. Ensure work is carried out in accordance with approved schedules.

.3 Do not unreasonably encumber site with material or equipment.

1.12 EXAMINATION

.1 Examine site and be familiar and conversant with existing conditions likely to affect work.

1.13 EXISTING SERVICES

.1 Where Work involves breaking into or connecting to existing services, carry out work as directed in section 01 14 00 – Work Restrictions.

.2 Record locations of maintained, re-routed and abandoned service lines.

1.14 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space, and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative of impending installation and obtain his approval for actual location.

1.15 CUTTING AND PATCHING

.1 Cut existing surfaces as required to accommodate new work.

.2 Remove items so shown or specified.

.3 Do not cut, bore, or sleeve load-bearing members.

.4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

.5 Fit work airtight to pipes, sleeves, ducts and conduits.

.6 Conceal pipes, ducts and wiring in raised floors, wall and ceiling construction of finished areas except where indicated otherwise.

.7 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.

.8 Making good is defined as matching construction and finishing materials and the adjacent surfaces such that there is no visible difference between existing and new surfaces when viewed from 1.5 metres in ambient light, and includes painting the whole surface to the next change in plane.

.9 Dust Control:

.1 Protect furnishings and equipment within work area with 0.102 mm thick polyethylene film during construction. Remove film during non- construction hours and leave premises in clean, unencumbered and safe manner for normal daytime function.

.2 Maintain and relocate protection until such work is complete.

1.16 ACCEPTANCE OF SUBTRADES

1 Each trade shall examine surfaces prepared by others and job conditions which may affect his work, and shall report defects to the General Contractor. Commencement of work shall imply acceptance of prepared work or substrate surfaces.

1.17 QUALITY OF WORK

.1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.

.2 The workmanship, erection methods and procedures to meet minimum standards set out in the National Building Code of Canada 2010 and Construction Standards as specified herein.

.3 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative, whose decision is final.

1.18 WORKS COORDINATION

.1 Coordinate work of sub-trades:

.1 Designate one person to be responsible for review of contract documents and shop drawings and managing coordination of work.

.2 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.

.3 Work cooperation:

.1 Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.

.2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.

.3 Ensure disputes between subcontractors are resolved.

.4 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.

.5 Departmental Representative is not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to coordinate Work.

.6 Maintain efficient and continuous supervision.

1.19 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Submit the requested shop drawings, product data, MSDS sheets and samples indicated in each of the technical Sections.

.2 Allow sufficient time for the following:

.1 Review of product data.

.2 Approval of shop drawings.

.3 Review of re-submission.

.4 Ordering of approved material and/or products. Refer to individual technical sections of specifications.

1.20 TESTING AND INSPECTION

.1 Where tests or inspections by designated testing laboratory reveal work is not in accordance with the Contract requirements, Contractor shall pay costs for additional tests or inspections as the Departmental Representative may require to verify acceptability of corrected work.

1.21 AS-BUILT DOCUMENTS

.1 Keep one set of current white prints of all contract drawings and all addenda, revisions, clarifications, change orders, and reviewed shop drawings in the site office; and have them available at all times for review by Departmental Representative.

.2 As the Work progresses, maintain accurate records to show all deviations from the Contract

documents. Note on as-built specifications, drawings and shop drawings as changes occur.

.3 At completion of the Work, transfer all deviations, including those called up by addenda, revisions, clarifications, shop drawings and change order, to a set of Issued for Construction drawings. Submit the 'red-marked' as-built set to the Departmental Representative, in hard copy and in PDF.

1.22 HEALTH AND SAFETY REQUIREMENTS

.1 Assume responsibility as 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.

.4 Submit a site-specific Health and Safety Plan to Departmental Representative for review.

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

.1 Be construed to imply approval by Departmental Representative.
.2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
.3 Relieve Contactor of his legal obligations for provision of health and safety on project.

1.23 SECURITY REQUIREMENTS

.1 Refer to Section 01 16 00.

1.24 FINAL CLEANING

.1 Refer to section 01 74 11 – Cleaning.

1.25 DUST CONTROL

.1 Provide temporary dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of work and public.

.2 Protect furnishings and equipment within work area with 0.102mm thick polyethylene film during construction. Remove film during non-construction hours and leave premises in clean, unencumbered and safe manner for normal daytime function.

.3 Maintain and relocate protection until such work is complete.

1.26 SYSTEM OF MEASUREMENT

.1 The metric system of measure (SI) will be employed on this contract.

END OF SECTION 01 11 00

1.0 GENERAL

1.1 FACILITY OPERATIONS AND SECURITY PROCEDURES

.1 Cooperate with and coordinate construction/demolition activities with Canada Border Services Agency.

1.2 ACCESS AND EGRESS

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.3 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Portions of the existing complex will be occupied by the public and government staff during entire construction period.

.4 Coordinate with Departmental Representative in scheduling operations to minimize conflict and to facilitate use of space.

1.4 EXISTING SERVICES

.1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 3 working days of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends. The maximum number of shut downs is limited to 4 for the duration of the project.

- .1 Optimize and plan shut-downs so that services are restored in time for normal facility operation hours. Coordinate all shut-downs with utility providers, facility users and the property management firm.
- .2 Contractor shall be held responsible for damages to facility equipment as the result of service shut-downs.
- .3 Contractor shall be held responsible for any and all unscheduled shut-downs of building utilities and services.
- .4 Contractor will not be allowed to connect to Departmental Representative's existing data and communication services.
- .5 Submit a "Fire Alarm Bypass" request to Departmental Representative 72 hours in advance for approval.
- .6 Obtain permission from Departmental Representative for access to restricted areas outside the construction zones 24 hours in advance.

.3 Provide for personnel and vehicular traffic.

.4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.5 SPECIAL REQUIREMENTS

.1 Carry out noise generating Work, as per 1.8 Noise Control.

- .1 Means and procedures of controlling and isolating other construction noise affecting occupied areas shall be responsibility of the Contractor and approved by the Departmental Representative.

.2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.3 Keep within limits of work and avenues of ingress and egress.

1.6 SECURITY

.1 All access to secured areas such as all base building electrical and mechanical rooms, roof and roof penthouse, and other normally secured services rooms will need escort by Commissionaires during and after normal office hours.

.2 All construction personnel must wear Government issued picture identification at all times while working on CBSA property.

.3 A Contractor pass will be signed out by each construction crew member at the start of the project. This pass must be worn and be visible at all times while on CBSA Property. This pass shall be surrendered to the CBSA personnel at the end of the project. If a pass is lost during the course of the project, a $100.00 replacement fee shall be paid by the Contractor.

.4 While on CBSA Property, all construction personnel shall remain within the designated work areas. Movement within CBSA restricted areas must be approved and may require escort by the CBSA personnel overseeing the work.

.5 Due to the potential sensitive and personal nature of the interactions between the CBSA staff and the travelling public, construction personnel should make every reasonable effort not to interfere with the border process (including overhearing of conversations).

.6 Construction personnel must remain aware of their surroundings and be accountable for their tools/equipment at all times. At no point should tools be left unattended that are within reach of the travelling public.

.7 As construction personnel are within the CBSA areas, their actions and language content of conversation will be a direct reflection on the CBSA. Be mindful that the travelling public will be aware of your presence and act professionally at all times.

.8 Construction personnel shall not have any interactions with the travelling public.

.9 Construction personnel shall obey uniformed officers regarding operational directions (i.e. removal from the site during a dangerous situation) but shall refrain from taking direction from uniformed officers or PWGSC building maintenance regarding project construction. Should any contractor take direction from a party other than the Departmental Representative, he does so at his own risk.

.10 Construction noise levels that disrupt the processing of travelers shall be conducted during the low volume hours as determined by the CBSA.

.11 Any work which impacts the Operations onsite (traffic, commercial, support staff, etc.) must have one week's notice and must be approved by CBSA. CBSA withholds the right to have work completed at low volume periods (after hours such as 3am on a weekday morning).

.12 Any work which impacts the flow of traffic (bus, regular passengers, or trucks) must be approved by CBSA and must have two weeks' notice.

.13 All deliveries which require escort services against PIL traffic will require a minimum of 24 hrs notice to CBSA so that an escort may be arranged.

1.7 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted within the Traffic Office.

1.8 NOISE CONTROL

.1 Refer to section 01 11 00 clause 1.5 for hours of work when excessive noise and vibration generation is allowed.

.2 Means and procedures of controlling and isolating construction noise affecting occupied areas shall be responsibility of the contractor and approval of Departmental Representative.

.3 Level of work noise must be monitored by Contractor and maintained at a level no greater than 87 dBA, over an eight-hour period.

.4 If work noise level exceeds 87 dBA, reduce noise either by using engineering devices to reduce or by shortening the duration of exposure.

.1 Refer to Table of maximum duration of exposure to sound levels higher than 87dBA permitted by Canada Occupational Health and Safety Regulations:

Sound Level in dBA	Maximum Duration of Exposure in Hours per Employee per 24-Hour Period	Sound Level in dBA	Maximum Duration of Exposure in Hours per Employee per 24-Hour Period
87	8.0	104	0.16
88	6.4	105	0.13
89	5.0	106	0.10
90	4.0	107	0.080
91	3.2	108	0.064
92	2.5	109	0.050
93	2.0	110	0.040
94	1.6	111	0.032
95	1.3	112	0.025
96	1.0	113	0.020
97	0.80	114	0.016
98	0.64	115	0.013
99	0.50	116	0.010
100	0.40	117	0.008
101	0.32	118	0.006
102	0.25	119	0.005
103	0.20	120	0.004

.5 All Hoarding enclosing noise generating activities must be acoustically sealed to structure.
All temporary construction doors to be solid core wood door installed with door seal, door bottom and threshold.

1.3 COMMISSIONAIRE ESCORT

.1 All work within the facility will require full-attendance commissionaires irrespect of working hours. The Contractor shall make minimum 48 hours advance arrangements with PWGSC for access and security. All security costs will be paid for by PWGSC and reimbursed by the contractor.

.2 Security Service charge will apply for all Commissionaire's escort and attendance.

.1 Charge-out hourly rate for regular federal work by Commissionaires BC are as follows:

.1	Regular rate	$29
.2	Regular overtime rate	$40.29
.3	Double overtime rate	$51.58
.4	Stat Holiday rate	$40.28

.2 Overtime is charged after 8 hours, double overtime after 12 hours.

.3 Weekend is not considered as overtime.

.3 Contractor must include cost of escort by Commissionaires in their contract price.

.4 PWGSC will hire and pay for the Commissionaires directly but the Contractor will include for all Commissionaire costs in their contract price. When the final cost is known, PWGSC will then issue a credit change order for that cost.

END OF SECTION 01 14 00

1.0 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.

.11 Do not proceed with work until relevant submissions are reviewed by Departmental Representative.

1.2 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 When specified in the Contract document, submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia of Canada.

.3 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.

.4 Allow 14 days for Departmental Representative's review of each submission, unless noted otherwise.

.5 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.

.6 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.

.7 Accompany submissions with transmittal letter, in duplicate, containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:
- .1 Date and revision dates.
- .2 Project title and number.
- .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.

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

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

.11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 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.

.13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification

requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic copies of manufacturer's 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.

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

.16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.18 Delete information not applicable to project.

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

.20 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.

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

.1 This review shall not mean that 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.

.22 Shop drawings format larger than 11" x17" (275mm x 430mm) must be submitted with hardcopies together with electronic format. Submit sufficient copies such that Departmental Representative will keep 6 copies plus contractor's distribution and maintenance manual.

.23 Electronic submissions will only be reviewed and returned electronically. No hardcopies will be returned to contractor.

1.3 SAMPLES

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

.2 Deliver samples prepaid to Departmental Representative's business address.

.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.

1.4 MOCK-UPS

.1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

1.5 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg format, standard resolution bi-weekly with progress statement and as directed by Departmental Representative.

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

.3 Viewpoints and their locations as reasonably determined by Departmental Representative.

.4 Provide photographic documentation of adjacent existing conditions prior to commencement of construction for determining and accidental damage as a result of contractor's work.

.5 Frequency of photographic documentation: bi-weekly as directed by Departmental Representative.

.1 Upon completion of: demolition, framing and services before concealment of Work, and as directed by Departmental Representative.

1.6 CERTIFICATES AND TRANSCRIPTS

.1 Submit electronic copies of test results and inspection reports required as noted in each section of specifications.

END OF SECTION 01 33 00

1.0 GENERAL

1.1 REFERENCES

.1 Government of Canada.
- .1 Canada Labour Code - Part II
- .2 Canada Occupational Health and Safety Regulations.

.2 National Building Code of Canada (NBC 2010):
- .1 Part 8, Safety Measures at Construction and Demolition Sites.

.3 Canadian Standards Association (CSA as amended):
- .1 CSA Z797-2009 Code of Practice for Access Scaffold
- .2 CSA S269.1-1975 (R2003) Falsework for Construction Purposes
- .3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures

.4 Fire Protection Engineering Services, HRSDC:
- .1 FCC No. 301, Standard for Construction Operations.
- .2 FCC No. 302, Standard for Welding and Cutting.

.5 American National Standards Institute (ANSI):
- .1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.

.6 Province of British Columbia:
- .1 Workers Compensation Act Part 3-Occupational Health and Safety.
- .2 Occupational Health and Safety Regulation

.7 Current B.C. Electrical Code

1.2 RELATED SECTIONS

.1 Submittal Procedures — Section 01 33 00

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 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, 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.

.2 Work effected by submittal shall not proceed until review is complete.

.3 Submit the following:

.1 Health and Safety Plan.
.2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
.3 Copies of incident and accident reports.
.4 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Material Information System (WHMIS) requirements.
.5 Emergency Procedures.

.4 The Departmental Representative will review the Contractor's site-specific project Health and emergency procedures, and provide comments to the Contractor within 2 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 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, Territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.7 HEALTH AND SAFETY COORDINATOR

.1 The Health and Safety Coordinator must:
.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 Health and Safety Plan.
.3 Be on site during execution of work.

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 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.

1.10 WORK PERMITS

.1 Obtain specialty trade permits related to project before start of work.

1.11 FILING OF NOTICE

.1 The General Contractor is to complete and submit a Notice of Project as required by Provincial authorities.

.2 Provide copies of all notices to the Departmental Representative.

1.12 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 a site-specific project Health and Safety Plan based on 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.
- .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.
- .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 Health and Safety Plan as required, and re-submit to the Departmental Representative.

.5 Departmental Representative's review: the review of 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 Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

1.13 EMERGENCY PROCEDURES

.1 List standard operating procedures and measures to be taken in emergency situations. Include an 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 and site staff.

.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 and site staff.

.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 Underground work.
- .5 Work on, over, under and adjacent to water.
- .6 Workplaces where there are persons who require physical assistance to be moved.

.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.

1.14 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information system (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labeling and provision of material 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 documents as per Section 01 33 00.

1.15 ASBESTOS HAZARD

.1 Carry out work or demolition activities involving asbestos in accordance with applicable Provincial regulations.

1.16 REMOVAL OF LEAD-CONTAINING PAINTS

.1 All paints containing TCLP lead concentrations above 5 ppm are classified as hazardous.

.2 Carry out demolition activities involving lead-containing paints in accordance with applicable Provincial regulations.

1.17 ELECTRICAL SAFETY REQUIREMENTS

.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 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 CONFINED SPACES

.1 Carry out work in confined spaces in compliance with Occupational Health and Safety Regulation, Part 9.

1.21 POWDER-ACTUATED DEVICES

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

1.22 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.

1.23 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.

1.24 FIRE PROTECTION AND ALARM SYSTEM

.1 Fire protection and alarm systems shall not be:

.1 Obstructed.

.2 Shut off.

.3 Left inactive at the end of a working day or shift.

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

.3 Be responsible/liable for costs incurred from the fire department, the building owner and the tenants, resulting from false alarms.

1.25 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 advise the Departmental Representative verbally and in writing.

1.26 POSTED DOCUMENTS

.1 Post legible versions of the following documents on site:

.1 Health and Safety Plan.
.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) documents.
.9 Material Safety Data Sheets (MSDS).
.10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

.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.

1.27 MEETINGS

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

1.28 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 non-compliance 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".

END OF SECTION 01 35 33

1.0 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 instructions, 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.

.4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.2 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Contractor.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 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 re-inspection.

1.3 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.4 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.

1.5 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 opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.6 REPORTS

.1 Submit electronic copy of inspection and test reports to Departmental Representative.

.2 Provide copies to subcontractor of work being, inspected or tested or manufacturer or fabricator of material being inspected or tested.

1.7 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

1.8 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 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.

.6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed.

1.9 MILL TESTS

.1 Submit mill test certificates as requested.

1.10 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

.2 Refer to Divisions 23 and 26 for definitive requirements.

END OF SECTION 01 45 00

1.0 GENERAL

1.1 RELATED REQUIREMENTS

1.2 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)
  .1 CCDC 2- 2008, Stipulated Price Contract.

.2 Canada Green Building Council (CAGBC)
  .1 LEED Canada – NC Version 2009 LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.

.3 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB 1. 189-00, Exterior Alkyd Primer for Wood.
  .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.4 Canadian Standards Association (CSA International)
  .1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  .2 CSA-0121-M1978 (R2003), Douglas Fir Plywood.
  .3 CAN/CSA-S269.2 – M1987 (R2001), Access Scaffolding for Construction Purpose.
  .4 CAN/CSA-Z321-96 (R2001), Signs and Symbols for the Occupational Environment.

.5 U.S. Environmental Protection Agency (EPA) / Office of Water
  .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Proceedures.

1.4 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Indicate use of supplemental or other staging area.

.3 Provide construction facilities in order to execute work expeditiously.

.4 Remove from site all such work after use.

1.5 SITE STORAGE/LOADING

.1 Confine work and operations of employees by 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.

.3 Lay down area to be designated by and arranged with CBSA.

1.6 CONSTRUCTION PARKING

.1 Parking to be designated by and arranged with CBSA.

.2 Provide and maintain adequate access to project site.

1.7 FIRST AID

.1 Provide marked and fully stocked first-aid case in a readily available location.

1.8 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.

1.9 SANITARY FACILITIES

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

2. Provide sanitary facilities for the public in accordance with governing regulations and ordinances.

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

1.10 CONSTRUCTION SIGNAGE

.1 No other signs or advertisements, other than warning signs, are permitted on site.

.2 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by Departmental Representative.

1.11 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

END OF SECTION 01 52 00

1.0 GENERAL

1.1 PRODUCTS/MATERIAL AND EQUIPMENT

.1 Use NEW products/material and equipment unless otherwise specified. The term "products" is referred to throughout the specifications.

.2 Use products of 1 manufacturer for material and equipment of the same type or classification unless otherwise specified.

.3 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

.4 Notify Departmental Representative in writing of any conflict between these specifications and manufacturer's instructions. Departmental Representative will designate which document is to be followed.

.5 Provide metal fastenings and accessories in the same texture, colour and finish as base metal in which they occur.

- .1 Prevent electrolytic action between dissimilar metals.
- .2 Use non-corrosive fasteners, anchors and spacers for securing exterior work.
- .3 Fastenings which cause spalling or cracking are not acceptable.
- .4 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .5 Use heavy hexagon heads, semi-finished unless otherwise specified.
- .6 Bolts may not project more than 1 diameter beyond nuts.
- .7 Types of washers as follows:
  - .1 Plain type washers: use on equipment and sheet metal.
  - .2 Soft gasket lock type washers: use where vibrations occur.
  - .3 Resilient washers: use with stainless steel.
- .8 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.
- .9 Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from site.
- .10 Store products in accordance with suppliers' instructions.
- .11 Touch up damaged factory finished surfaces to Departmental Representative's satisfaction.
  - .1 Use primer or enamel to match original.
  - .2 Do not paint over nameplates.

1.2 QUALITY OF PRODUCTS

.1 Products, materials and equipment (referred to as products) incorporated into work shall be new, not damaged or defective, and of the best quality (compatible with the specifications) for the purpose intended. If requested, furnish evidence as to type, source and quality of the products provided.

.2 Defective products will be rejected regardless of previous inspections.

- .1 Inspection does not relieve responsibility, but is precaution against oversight or error.
- .2 Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Retain purchase orders, invoices and other documents to prove that all products utilized in this Contract meet the requirements of the specifications. Produce documents when requested by the Departmental Representative.
- .4 Should any dispute arise as to quality or fitness of products, the decision rests strictly with the Departmental Representative based upon the requirements of the Contract documents.

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

1.3 AVAILABILITY OF PRODUCTS

.1 Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for any items.

.2 If delays in supply of products are foreseeable, notify Departmental Representative of such in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the work.

.3 In event of failure to notify Departmental Representative at the start of work and should it subsequently appear that the work may be delayed for such reason, the Departmental Representative reserves the right to substitute more readily available products of similar character, at no increase in either the Contract price or the Contract time.

1.4 MANUFACTURER'S INSTRUCTIONS

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

.1 Do not rely on labels or enclosures provided with products.

.2 Obtain written instructions directly from the manufacturer.

.2 Notify Departmental Representative in writing of conflicts between the specifications and the manufacturer's instructions so that the Departmental Representative may establish the course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes the Departmental Representative to require removal and reinstallation at no increase in either the Contract price or the Contract time.

1.5 CONTRACTOR'S OPTIONS FOR SELECTION OF PRODUCTS FOR TENDERING

.1 Products are specified by "Prescriptive" specifications: select any product meeting or exceeding specifications.

.2 Products specified under "Acceptable Products": select any one of the indicated manufacturers, or any other manufacturer meeting or exceeding the Prescriptive specifications and indicated Products.

.3 Products specified by performance and referenced standard: select any product meeting or exceeding the referenced standard.

.4 Products specified to meet particular design requirements or to match existing materials: use only material specified Approved Product. Alternative products may be considered provided full technical data is received in writing by Departmental Representative in accordance with "Special Instructions to Tenderers".

.5 When products are specified by a referenced standard or by or Performance specifications, upon request of Departmental Representative obtain from manufacturer an independent laboratory report showing that the product meets or exceeds the specified requirements.

1.6 SUBSTITUTION AFTER CONTRACT AWARD

.1 No substitutions are permitted without prior written approval of the Departmental Representative.

.2 Proposals for substitution may only be submitted after Contract award. Such request must include statements of respective costs of items originally specified and the proposed substitution.

.3 Proposals will be considered by the Departmental Representative if:

.1 Products selected by tenderer from those specified are not available;

.2 Delivery date of products selected from those specified would unduly delay completion of Contract, or

.3 Alternative product to that specified, which is brought to the attention of and considered by Departmental Representative as equivalent to the product specified, and will result in a credit to the Contract amount.

.4 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the project. Pay for design or drawing changes required as result of substitution.

.5 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative and the Contract price will be reduced accordingly.

END OF SECTION 01 61 00

1.0 GENERAL

1.1 REFERENCES

.1 Some construction drawings of existing buildings in pdf format are available for viewing and reference only upon request. The drawings may not necessarily represent as-built conditions. All existing conditions and measurements need to be verified on site.

1.2 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

1.3 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative of impending installation and obtain approval for actual location.

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

1.4 RECORDS

.1 Record locations of maintained, re-routed and abandoned service lines.

END OF SECTION 01 71 00

1.0 GENERAL

1.1 SUBMITTALS

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

.2 Submit written request in advance of cutting or alteration which affects:
- .1 Structural integrity of elements of project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of operational elements.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of Owner or separate contractor.

.3 Include in request:
- .1 Identification of project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work, and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on Work of Owner or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.3 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION

.1 Execute cutting, fitting, and patching including excavation and fill, 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 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.8 Restore work with new products in accordance with requirements of Contract Documents.

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

.10 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material (in accordance with Section 07 84 00 – Firestopping), full thickness of the construction element.

.11 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

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

END OF SECTION 01 73 00

1.0 GENERAL

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

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

.4 Provide on-site containers for collection of waste materials and debris.

.5 Dispose of waste materials and debris off site.

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

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

.8 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

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

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

1.2 FINAL CLEANING

.1 When Work is 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 including that caused by Owner or other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

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

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

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

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

.10 Vacuum clean and dust building interiors affected by work, behind grilles, louvres and screens.

.11 Clean all floor finishes affected by work including entire carpet in 4/F Census space.

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

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

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

END OF SECTION 01 74 11

1.0 GENERAL REQUIREMENTS

1.1 RELATED WORK

.1 Refer to every technical section for waste management and disposal.

1.2 DEFINITIONS

.1 Waste Audit (WA): relates to projected waste generation. Involves controlled separation of waste.

.2 Waste Reduction Workplan (WRW): a written report which addresses opportunities for reduction, re-use or recycling of materials.

.3 Materials Source Separation Program (MSSP): consists of a series of ongoing activities to separate re-usable and recyclable waste material into material categories from other types of waste at point of generation.

1.3 MATERIALS SOURCE SEPARATION

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

- .1 Gypsum board
- .2 Metals
- .3 Wood
- .4 Plastics
- .5 Other materials as indicated in technical sections

.2 Implement Materials Source Separation Program 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.

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

1.4 DIVERSION OF MATERIALS

.1 Create a list of materials to be separated from the general waste stream and stockpiled in separate containers, to the approval of the Departmental Representative and consistent with applicable fire regulations.

- .1 Mark containers
- .2 Provide instructions on disposal practices.

1.5 STORAGE, HANDLING AND APPLICATION

.1 Do work in compliance with Waste Reduction Work plan.

.2 Handle waste materials not re-used, salvaged, or recycled in accordance with appropriate regulations and codes.

.3 Materials in separated condition: collect, handle, store on site, and transport off-site to an approved and authorized recycling facility.

.4 Materials must be immediately separated into required categories for re-use or recycling .

.5 Unless specified otherwise, materials for removal become the Contractor's property .

.6 On-site sale of salvaged/recyclable material is not permitted.

.7 Provide Departmental Representative with receipts indicating quantity of material delivered to landfill.

.8 Provide Departmental Representative with receipts indicating quantity and type of materials sent for recycling.

END OF SECTION 01 74 19

1.0 GENERAL

1.1 SECTION INCLUDES

.1 Administrative procedures preceding preliminary and final inspections of Work.

1.2 RELATED SECTIONS

.1 Section 01 78 00 - Closeout Submittals.

1.3 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an 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 Contractor's Inspection and that corrections have been made.
- .2 Request Departmental Representative's Inspection.
- .3 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.
- .4 Completion: submit written certificate that following have been performed:
  - .1 Work has been completed and inspected for compliance with Contract Documents.
  - .2 Defects have been corrected and deficiencies have been completed.
  - .3 Equipment and systems have been tested, adjusted, and balanced and are fully operational.
  - .4 Certificates required by authorities having jurisdiction.
  - .5 Commissioning of all systems: Final commissioning reports have been submitted to the Departmental Representative.
  - .6 Operation of systems have been demonstrated to Owner's personnel.
  - .7 Work is complete and ready for Final Inspection.

END OF SECTION 01 77 00

1.0 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 45 00 - Quality Control.

.2 Section 01 71 00 – Examination & Preparation.

.3 Section 01 77 00 - Closeout Procedures.

1.2 SUBMISSION

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

.2 Copy will be returned after final inspection, with Departmental Representative's comments.

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

.4 Two weeks prior to Substantial Completion of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals in English.

.5 An electronic copy Interactive Operating and Maintenance Manual System is required as specified under clause 1.3. Provide a USB drive or DVD the Electronic Interactive Operating and Maintenance Manual System to the Departmental Representative.

.6 Hard copies of the Operating and Maintenance Manual System is required as specified under clause 1.4. Provide 4 sets of the Hard Copy Operating and Maintenance Manual to Departmental Representative.

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

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

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

.10 Pay costs of transportation.

1.3 OPERATING AND MAINTENANCE MANUAL SYSTEM

.1 In addition to the printed copies, submit provide an Operating and Maintenance Manual System as specified herein.

.2 System Description and Requirements

.1 All as constructed drawings and operation and maintenance (O&M) manuals listed under the Scope of Work shall be converted, where necessary, into Portable Data File (PDF) format for viewing using the Adobe Acrobat Reader.

.3 O&M data and as constructed drawings shall be classified by their corresponding disciplines, including:

.1 Architectural
.2 Mechanical
.3 Electrical
.4 Under each discipline, data shall be grouped into the following four major categories:

.1 Basic Documents

.1 'Basic Documents' shall, according to the type of services or disciplines, include the full contents of each hard copy of the O&M manuals with the addition of Miscellaneous Maintenance Reports and Records, or as defined by the user. In general the following shall be included unless specifically excluded by the Departmental Representative:
- .1 Introduction
- .2 Consultant/Contractor/Suppliers List
- .3 System Description
- .4 Maintenance and Lubrication Schedules
- .5 Testing and Commissioning (T&C) Reports
- .6 Misc. Reports
- .7 Specifications
- .8 Equipment and/or point schedules as identified in the hard copy documents
- .9 Others as stipulated by the Departmental Representative

.2 All Basic Documents PDF files shall be enhanced with appropriate bookmarks to facilitate searching of information within the document or linking to other relevant documents for references.

.4 'As-Constructed' Drawings

.1 'As-Constructed' drawings shall be red-mark hardcopy sets and 'As-Constructed' drawings shall be scanned a resolution minimum of 300dpi and saved in PDF format. Sprinkler layout 'As-Constructed' shop drawings shall be provided in both DWG and PDF formats.

.5 System Data

.1 Building systems shall be identified by their services, disciplines, function, nature and specific scope. System data shall be classified into the following categories:
- .1 System Description
- .2 Schematic (where applicable)
- .3 Equipment List

.2 Provide hot key buttons, where applicable, for direct access to drawings/data referenced on the schematics. The same shall be applied to listed equipment for direct links to the corresponding equipment data.

.6 Equipment Data

.1 Equipment data shall be classified into the following categories:
- .1 Equipment submittals
- .2 T&C Report
- .3 Maintenance Data
- .4 Maintenance Records
- .5 Photo

.2 Provide a summary screen to list all equipment classified under a specific system. On the summary screen, provide direct links to the corresponding equipment data under each category with addition links to the relevant 'As Constructed' drawings.

.7 The system shall be executed by Professional Engineers with a minimum of 10 years post qualification experience in the field of Building Services Engineering.

.8 The Contractor shall provide a minimum of 3 past job references as proven record of similar undertakings.

1.4 FORMAT HARD COPY MANUALS

.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 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by 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 1:1 scaled CAD files in .dwg format on CD.

1.5 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;
- .1 date of submission;
- .2 names, addresses, and telephone and fax numbers of Contractor, Subcontractors, Suppliers with name of responsible parties;
- .3 schedule of products and systems, indexed to content of volume.
- .4 copy of hardware schedule and paint schedules, complete with the actual manufacturer, supplier and identification names and numbers.
- .5 all extended guarantees, warranties, maintenance bonds, certificates, letters of guarantees, registration cards, as called for in the various sections of the specification.
- .6 complete set of all final reviewed shop drawings.
- .7 certificates of inspection by authorities having jurisdiction.
- .8 test reports and certificates as applicable.
- .9 complete set of as constructed drawings.

.2 For each product or system:
- .1 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.

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

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

.6 Training: Refer to Section 01 91 41 - Demonstration and Training.

1.6 'AS CONSTRUCTED' DRAWINGS AND SAMPLES

.1 In addition to requirements in General Conditions, maintain at the site one record copy of:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to the Contract.
- .5 Reviewed shop drawings, product data, and samples.
- .6 Field test records.
- .7 Inspection certificates.
- .8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

.6 Provide red-mark hardcopies and scan in PDF of all 'As-Constructed' drawings. Provide DWG and PDF format of sprinkler layout shop drawings.

1.7 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of black line opaque drawings, provided by Departmental Representative.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is 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 manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.8 EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control and Division 22 to 25.

.15 Additional requirements: As specified in individual specification sections.

1.9 MATERIALS AND FINISHES

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional Requirements: as specified in individual specifications sections.

1.10 SPARE PARTS

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.11 MAINTENANCE MATERIALS

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in the Operating and Maintenance Manuals.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.12 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

1.13 STORAGE, HANDLING AND PROTECTION

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

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

.4 Store paints and freezable materials in a heated and ventilated room.

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

1.14 WARRANTIES AND BONDS

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

END OF SECTION 01 78 00

1.1 RELATED REQUIREMENTS

.1 Section 02 41 99 Demolition for Minor Works

1.2 REFERENCES

.1 Definitions:

.1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or materials that endanger human health or environment if handled improperly.

.2 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating related, required submittal and reporting requirements.

.3 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill.

.4 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.

.2 Reference Standards:

.1 CSA International

.1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

.2 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S660-08, Standard for Nonmetallic Underground Piping for Flammable and Combustible Liquids.

.2 ULC/ORD-C58.15-1992, Overfill Protection Devices for Flammable Liquid Storage Tanks.

.3 ULC/ORD-C58.19-1992, Spill Containment Devices for Underground Flammable Liquid Storage Tanks.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:

.1 Convene pre-installation meeting 1 week prior to beginning work of this Section with Contractor's Representative and Departmental Representative to:

.1 Verify project requirements.

.2 Verify existing site conditions adjacent to demolition work.

.3 Co-ordination with other construction subtrades.

.2 Ensure key personnel site supervisor, project manager and subcontractor representatives WMC attend.

.3 WMC must provide written report on status of waste diversion activity.

.2 Scheduling:

.1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.

.1 In event of unforeseen delay notify Consultant in writing.

1.4 ACTION & INFORMATIONAL SUBMITTALS

.1 WMC is responsible for fulfilment of reporting requirements.

.2 Prior to beginning of Work on site submit detailed Waste Management Plan and indicate:

.1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.

.2 Schedule of selective demolition.

.3 Number and location of dumpsters.

.4 Anticipated frequency of tippage.

.5 Name and address of waste receiving organizations.

.3 Submit PDF copies of receipts from authorized disposal sites and reuse and recycling facilities for material

removed from site on a bi-weekly basis upon request of Consultant.

.1 Written authorization from Departmental Representative is required to deviate from receiving organizations listed in Waste Reduction Workplan.

1.5 QUALITY ASSURANCE

.1 Regulatory Requirements: Ensure Work is performed in compliance with applicable Provincial and Municipal regulations.

1.6 SITE CONDITIONS

.1 Environmental protection:

.1 Fires and burning of waste or materials is not permitted on site.

.2 Do not bury rubbish waste materials.

.3 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into storm or sanitary sewers.

.1 Ensure proper disposal procedures are maintained throughout project.

.4 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.

.5 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all interior and exterior public areas.

1.7 EXISTING CONDITIONS

.1 If material resembling spray or trowel applied asbestos or other designated substance listed as hazardous be encountered in course of demolition, stop work, take preventative measures, and notify Departmental Representative immediately. Proceed only after receipt of written instructions has been received from Consultant.

.2 Structures to be demolished are based on their condition at time of examination prior to tendering.

2.0 PRODUCTS

2.1 EQUIPMENT

.1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

3.0 EXECUTION

3.1 PREPARATION

.1 Protection of in-place conditions:

.1 Prevent movement, settlement or damage of adjacent structures, services and parts of existing building to remain.

.1 Provide bracing, shoring and underpinning as required.

.2 Repair damage caused by demolition as directed by Departmental Representative

.2 Support affected structures and, if safety of structure being demolished or adjacent structures or services appears to be endangered, take preventative measures, stop Work and immediately notify Departmental Representative

.3 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems which must remain in operation.

.1 Disconnect and cap mechanical services.

.2 Natural gas supply lines: remove in accordance with gas company requirements.

.3 Sewer and water lines: remove or provide temporary support if they are to remain as

indicated on drawings.

.4 Other underground services: remove and dispose of as indicated on drawings.

3.2 DEMOLITION

.1 Do demolition work in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.2 Blasting operations not permitted during demolition.

.3 Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

.4 Prior to start of Work, remove contaminated or hazardous materials as indicated in Hazardous Material Report from site and dispose of at designated disposal facilities in safe manner and in accordance with recommendation in report.

.5 Demolish structural work as indicated on drawings.

.6 Crush concrete generated due to demolition of concrete structure to size suitable for recycling
.1 Where possible identify markets which will accept crushed material as aggregate.

.7 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as work progresses.

.8 At end of each day's work, leave Work in safe and stable condition.

.9 Demolish to minimize dusting. Keep materials wetted as directed by Departmental Representative.

.10 Use natural lighting to do Work where possible.
.1 Shut off lighting except those required for security purposes at end of each day.

3.3 CLEANING

.1 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal 01 35 21 - LEED Requirements.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.2 Divert excess materials from landfill to site approved, and Departmental Representative.

.3 Designate appropriate security resources / measures to prevent vandalism, damage and theft.

END OF SECTION 02 41 16

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Structure Demolition 02 41 16

1.2 REFERENCES

.1 CSA International

.1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

1.3 SITE CONDITIONS

.1 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous is encountered, stop work, take preventative measures, and notify Departmental Representative immediately.

.1 Proceed only after receipt of written instructions have been received from Consultant.

.2 Notify Departmental Representative before disrupting building access or services.

.3 Extent of Demolition - refer to drawings

3.0 EXECUTION

3.1 EXAMINATION

.1 Inspect building with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Notify and obtain approval of utility companies before starting demolition.

.4 Disconnect, cap, plug or divert, as required, existing utilities within the building where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.

.1 Immediately notify Departmental Representative and the Owner concerned in case of damage to any utility or service designated to remain in place.

.2 Immediately notify the Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PREPARATION

.1 Protection of In-Place Conditions:

.1 Prevent movement, settlement, or damage to adjacent structures, and utilities.

.2 Keep noise, dust, and inconvenience to occupants to minimum.

.3 Protect building systems, services and equipment.

.4 Provide temporary dust screens, covers, railings, supports and other protection as required.

3.3 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.

1.0 GENERAL

1.1 RELATED SECTIONS

.1 General Instructions Section 01 11 00

1.2 REFERENCES

.1 CAN/CSA- A3000-08 Cementitious Material Compndium.

.2 CAN/CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction

.3 CAN/CSA-A23.2-09, Methods of Test for Concrete

.4 ASTM C260-01, Air Entraining admixtures for Concrete

.5 ASTM C494/C494M-05, Chemical Admixtures for Concrete

.6 ASTM D1751-04). Specification for Performed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

.7 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction

.8 ANSI/ACI 315-99, Details and detailing of Concrete Reinforcement

.9 CSA G30.3-M1998, Cold Drawn Steel wire for Concrete Reinforcement

.10 CSA G30.5-M1983(R1998), Welded Steel Wire Fabric for Concrete Reinforcement

.11 CSA G30.18-09, Billet Steel Bars for Concrete Reinforcement

.12 CSA W186-M90(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction

.13 CSA0121-08, Douglas Fir Plywood

.14 CSA 0151-04 Canadian Softwood Plywood

.15 Canada Green Building Council (CaGBC)

- .1 LEED Canada-NC Version 1.0-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).
- .2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

1.3 SUBSTITUTES

.1 Substitution of different size bars permitted only upon written approval of Departmental Representative.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 11 00 – General Instructions.

2.0 PRODUCTS

2.1 CONCRETE MATERIALS

.1 Cement: to CAN/CSA- A3000.

.2 Water, fine aggregates, normal density coarse aggregates: to CAN/CSA-A23.1

.3 Air entraining admixture: to CAN/CSA-23.1

.4 Chemical admixtures: to CAN3-A266.1 as approved by Departmental Representative

.5 Shrinkage compensating cementitious grout: consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agent
- .1 compressive strength: 50MPa at 28 days.
- .2 Consistency:
  - .1 Fluid: to ASTM C827. Time of efflux through flow cone (ASTM C939), under 30 s.
  - .2 Flowable: to ASTM C827. Flow table, 5 drops in 3 s, (ASTM C109, applicable portion) 125 to 145%.
  - .3 Plastic: to ASTM C827. Flow table, 5 drops in 3 s, (ASTM C109, applicable portions) 100 to 125%.
  - .4 Dry pack to manufacturer's requirements.

.6 Surface sealers:
- .1 Exterior Pavement areas: to ASTM C309 Liquid Membrane-Forming Compounds for curing Concrete, Type 1

.7 Coloured hardener: natural, mineral aggregate type, non-metallic and colour dry shake surface hardener for wear and abrasion resistance, durable to freeze/thaw cycle and de-icing salts, minimize surface dusting and resistant to oil and grease penetration

.8 Patching compound: cementitious based premixed compound purpose made for patching concrete

2.2 FORMWORK MATERIALS

.1 Formwork Lumber: plywood and wood formwork materials to CAN/CSA-A23.1.

.2 Form release agent: chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing set of film of concrete in contact with form

.3 Form ties: removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25mm diameter in concrete surface

2.3 REINFORCING MATERIALS

.1 Reinforcing bars: billet steel, grade 400R, deformed bars to CAN/CSA G30.18 as indicated.

.2 Welded steel wire fabric: CSA G30.5. Provide in flat sheets only

.3 Chairs, bolsters, bar supports, spacers: adequate for strength and support of reinforcing construction conditions

2.4 CONCRETE ACCESSORIES

.1 Polyethylene damproof membrane:
- .1 To CAN/CGSB-51.34, 0.15 mm polyethylene film
- .2 Joint sealing tape: air resistant pressure sensitive adhesive tape, type recommended by polyethylene film manufacturer, 50 mm wide for lap joints and perimeter seals

.2 Premoulded joint fillers:
- .1 Bituminous impregnated fibre board: to ASTM D1751

2.5 CONCRETE MIXES

.1 Proportion normal density concrete to CAN/CSA A23.1, Clause 4, Alternative 1 using Type GU or GUb General use cement for concrete performance characteristics as indicated on the drawings

.2 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CAN/CSA A23.1, Clause 4. Site mixing equipment, truck or stationary type to conform to CAN/CSA A23.1

.3 Obtain Departmental Representative's approval before using chemical admixtures other than those specified

.4 Use of Calcium chloride not permitted.

2.6 REINFORCING STEEL FABRICATION

.1 Fabricate reinforcing to CAN/CSA A23.1

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

.3 Fabricate steel bar or rod mats welded together to CSA G30.5 using bars to CSA G30.18 grade 400.

3.0 EXECUTION

3.1 WORKMANSHIP

.1 Obtain Departmental Representative's approval before placing concrete. Provide forty-eight (48) hours notice to approved concrete testing agency prior to placing of concrete.

.2 Place concrete in accordance with CAN/CSA A23.1, Clause 7.

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

.4 Obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather, prior to placing of concrete

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

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

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

.8 Anchor bolts/dowels

.1 Use templates to place anchor bolts and dowels to tolerance associated with equipment or materials to be secured. Ensure anchor bots and dowels remain vertical during concrete placing and finishing

.2 With Departmental Representative's approval, grout anchor bolts in preformed holes or holes drilled after concrete has set. Formed holes to be at least 100 mm in diameter. Drilled holes to be minimum 25 mm larger in diameter than bolts used.

.3 Protect anchor bolt holes from water accumulations

.4 Set bolts and fill holes with shrinkage compensating grout

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

3.2 FORMWORK INSTALLATION

.1 Verify lines, levels and wall locations before proceeding with formwork and ensure dimensions agree with drawings.

.2 Construct forms to produce finished concrete conforming to shape, dimensions, locations and levels indicated with tolerances required by CAN/CSA A23.1

.3 Leave framework in place for following minimum periods of time after placing concrete
.1 Two days for sides of foundation walls and footings

.4 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1. Contractor shall be responsible for design, engineering and construction of formwork

3.3 INSERTS

.1 Set sleeves, ties anchor bolts and other inserts, openings and sleeves, in concrete floors and foundation walls, as required by other trades. Sleeves, openings, etc. greater than 100 x 100 mm not indicated on structural drawings must be approved by Departmental Representative.

.2 Check locations and sizes of sleeves, openings, etc. shown on structural drawings with architectural, mechanical and electrical drawings.

.3 If inserts cannot be located as specified, obtain approval of all modifications from Departmental Representative before placing of concrete

3.4 JOINT FILLERS

.1 Locate and form isolation joints as indicated. Install joint filler to manufacturer's instruction.

.2 Unless otherwise indicated, use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces. Extend joint filler from bottom of slab to within 12 mm of finished slab surface.

.3 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalks coincide.

.4 Locate expansion joints in concrete slabs on grade. Fibreboard joints minimum 6 mm thickness.

3.5 DAMPROOF MEMBRANE

.1 Install damproof membrane under concrete slabs within building, lap 150 mm at joints and seal with mastic cement or tape.

.2 Seal punctures using damproof membrane material extending 150 mm past all punctures and sealed with mastic cement or tape.

3.6 PLACING REINFORCEMENT

.1 Place reinforcing steel to CAN/CSA A23.1

.2 Obtain Departmental Representative's approval of reinforcing steel and placing before concrete.

.3 Clean reinforcing before placing concrete

.4 When field bending of reinforcement is approved by Departmental Representative, bend without heat, applying slow and steady pressure.

3.7 FINISHING

.1 Finish concrete to CAN/CSA A23.1, Clause 7. Slope floor to drains or perimeter openings.

.2 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise detailed.

.3 Equipment pads: smooth troweled surface

.4 Exterior paving: finish as per Clause 3.10, para. .2 and .3.

3.8 DEFECTIVE CONCRETE

.1 Remove defective concrete and embedded debris and repair as directed by Departmental Representative.

.2 Fill all honeycombing or voids flush with adjoining surfaces.

3.9 PLAIN FLOOR FINISH

.1 Roll or tamp concrete to force coarse aggregate into concrete mix and then screed.

.2 Float surface with metal floats or with power finishing machine to bring surface to true grade.

.3 Apply coloured hardener to floor slabs where scheduled (CH & S) in accordance with manufacturer's written instructions. Apply in two (2) shakes at a maximum rate of 4 to 5 kg/m^2

.4 Steel trowel to smooth and even surface.

.5 Follow with second steel towelling to produce burnished surface to within 3 mm tolerance when measured in any direction using 3 m straight edge.

.6 Sprinkling of dry cement or dry cement and sand mixture over concrete surfaces is not acceptable.

.7 Saw cut crack-control joints to CAN/CSA A23.1, Clause 7.3.2 or use removable plastic insert strips.

.8 After curing and when concrete floors are dry, seal control joints at junction with vertical surfaces with a self-levelling oil resistant sealing compound.

3.10 INSPECTION AND TESTING

.1 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Departmental Representative.

.2 Costs for testing will be borne by the contractor.

.3 Arrange with testing laboratory to do site testing from each batch of concrete placed or for each major days pour as designated by Departmental Representative.

END OF SECTION 03 30 05

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 03 30 05 — Cast-In-Place Concrete Short Form

.2 Section 09 06 00 — Room Finish Schedule

1.2 REFERENCES

.1 Canada Green Building Council (CaGBC)
- .1 LEED-V4 (Leadership in Energy and Environmental Design)

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
- .2 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

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

.4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1168-A2005, Adhesive & Sealants Applications.

1.3 QUALITY ASSURANCE

.1 Standards: Conform to CAN/CSA-A23.1-M90, for concrete finishes.

.2 Installer Qualifications:
- .1 Work shall be carried out by personnel who are thoroughly trained and experienced in the floor treatment. The installer to provide a list of a minimum of 3 projects performed within 3 years of equivalent complexity and scope as this contract.
- .2 Build mock-up in location directed by the Departmental representative.
- .3 Prior to proceeding, ensure that Mock-up meets all requirements of the Departmental representative.
- .4 Maintain Mock-up during construction in an undisturbed condition as a standard for judging the work. Accepted Mock-up may remain as part of the work.

1.4 SUBMITTALS

.1 Submittals to be in accordance with 01 33 00 Submittal Procedures.

.2 Product Data:
- .1 Provide manufacturer's printed product literature and data sheets for concrete finishes and include product characteristics, performance criteria, physical size, finish and limitations.
  - .1 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29.06-Health & Safety Requirements. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content in g/L.
  - .2 Include application instructions for concrete floor treatments.

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 and storage requirements:

.1 Deliver materials to site in manufacturer's original factory packaging, labeled with manufacturer's name and address.
.2 Store materials in a clean dry area in accordance with manufacturer's instructions.
.3 Keep product from freezing.
.4 Avoid direct contact with this product as it may cause mild to moderate irritation of the eyes and/or skin.
.5 Protect materials during handling and application to prevent damage or contamination.

.3 Packaging Waste Management: Comply with requirements of Section 01 74 21 Construction Waste Management and 01 35 21 LEED Requirements.

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

1.6 ENVIRONMENTAL REQUIREMENTS / PROJECT CONDITIONS

.1 Do not apply product when air, surface, or material temperature is below 35°F (2°C) or above135°F (57°C).

.2 Do not apply to frozen concrete.

.3 Do not use on highly dense or non-porous surfaces.

.4 Allow concrete to cure a minimum of 45 days, or as otherwise acceptable by product manufacturer before commencement of work.

.5 Limit and control dust generated by grinding and polishing procedures in order to prevent potential damage to adjacent surfaces and equipment.

.6 Control the use of water. Remove standing water from completed floor surfaces.

.7 Ensure that penetrating sealers are not applied to concrete floors that are to be polished.

1.7 EXTENDED WARRANTY

1. Provide two (2) year manufacturer's warranty on products and installation against fading and delamination of finished surfaces.

2.0 PRODUCTS

2.1 MATERIALS

.1 Concrete materials shall conform to requirements of Section 03 30 05 -Cast-In-Place Concrete Short Form and CAN/CSA-A23.1-M01.

.2 Curing and Sealing Compound: Surface Sealer: to CAN/CGSB-25.20. Acrylic carnuba wax, Low VOC. Acceptable Products:
.1 "Masterkure N-Seal" by Master Builder Company Limited.
.2 "Cure and Seal" by Target Products Ltd.
.3 "760 Clear Acrylic Sealer" by Elsro Construction Products.
.4 "Buff Hard" by Symons Corporation.
.5 Or approved alternative.

.3 Natural Hardener: Premixed, abrasion resistant non-metallic hardener (Type 1). Acceptable Products:
.1 "Mastercron" by Master Builders Company Limited.
.2 "Diamag 7" by Sternson Limited.
.3 "Non-Metallic Floor Hardener" by Target Products Ltd.

.4 "785 Genflor Non-Metallic Floor Hardener" by Elsro Construction Products.
.5 Or approved alternative.

.4 Non-Shrink Grout (for patching): Acceptable Products:
.1 "Embeco Mortar" by Master Builders Company Limited.
.2 Pre-mixed "Fast-Set Patching Concrete" by Target Products Ltd
.3 "810 Gengrout" by Elsro Construction Products.
.4 "K-510 Krystol Patch/Grout" by Kryton International Inc.
.5 Or approved alternative.

.5 Densifier: Non-flammable non-toxic,water-based formulation used on Portland Cement materials utilizing Quartz-Litium based products. Acceptable Products:
.1 "Crenz Protect" by Crenz Concrete.
.2 "Pentra Sil" by Convergent Concrete.
.3 "Euco Diamond Hard" by The Euclid Chemical Company.
.4 "Liquihard Ultra" Surface Hardener
.5 Or approved alternative.

2.2 EQUIPMENT

1. Equipment to be used for grinding/polishing shall possess at least 600 lbs of head pressure.

2. Equipment to be used for grinding/polishing shall be as recommended by product manufacturer to achieve finish specified.

3. Equipment to be used for densifying and cleaning floor after grinding/polishing procedure has been performed:
.1 Auto-scrubber or equivalent with a head pressure of 150 lbs.
.2 Follow auto-scrubbers manual for cleaning instructions after densifying and conditioning the floor.
.3 Do not allow densifier to remain inside the auto-scrubber after densifying.

2.3 FINISHES

3.0 EXECUTION

3.1 FINISHING-GENERAL

.1 Do concrete finishing work in accordance with CAN/CSA-A23.1-M01, unless otherwise indicated.

.2 Form materials for concrete surfaces which will be exposed to view, or which require smooth and uniform surfaces for applied finishes or other purposes, shall consist of square edged smooth panels of plywood. Panels shall be make in a true plane, clean, free of holes, surface markings and defects. Form release agents and curing agents shall be compatible with applied finishes where applicable. Do not use release agents containing wax or oil in connection with concrete to receive applied coatings.

.3 Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or plains of weakness. If a section cannot be placed continuously, construction joints shall be located as permitted and approved by Departmental Representative. Placing shall be carried out at such a rate that concrete which is being integrated with fresh concrete is still plastic.

3.2 FORMED SURFACES

.1 Inspect concrete surfaces for defects immediately after removal of formwork.

.2 Remove or cut back to a depth of 3/4" (19 mm) from the surface of the concrete all bolts, ties, nails, or other metal that is not required and repair immediately. Patch all cone and sleeve holes flush with concrete surface in strict accordance with manufacture's printed instructions. Grout all steel inserts in strict conformance with grout manufacturer's printed instructions.

.3 Remove imperfections such as bulges, fins, lips, and stains to permanently exposed surfaces as directed by Departmental Representative by chipping or grinding and patch to match adjacent surfaces. Do not proceed with grinding until the concrete has sufficiently hardened to prevent dislodgment of coarse aggregate particles. Allowable limits of grinding to be 1/16" so as to not expose aggregate.

.4 Repair to exposed surfaces or surfaces to receive paint type finishes: Repairs to be carried out under the direction of the Departmental Representative. Blend cement and aggregate so that, when dry, patching mortar will match colour of surrounding. Provide test areas at inconspicuous location to verify mixture and colour match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface. Patch and fill all concrete imperfections such as "blow holes", "honeycomb" and voids as directed.

.5 Strike off smooth and finish tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces with a texture matching the adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise shown.

3.3 HORIZONTAL SURFACES

.1 Where floor drains occur, floors to be level around walls and have a minimum 1:50 uniform pitch to drains, unless indicated otherwise. Stairs and landings shall have positive slopes to provide complete water drainage with no ponding.

.2 Finish horizontal concrete surfaces as follows:

.1 Exposed horizontal surfaces not intended to receive additional concrete: Smooth steel trowel finish or as indicated on the drawings.

.2 Horizontal concrete surfaces intended to receive additional concrete toppings, quarry tile or ceramic tile: Screeded off to true lines and levels shown, roughened to an amplitude of 3/16" (5 mm), cleaned of laitance and loose concrete and left ready to receive finish. Depress slabs to accommodate finish where indicated.

.3 Follow with second steel trowelling to produces smooth burnished surface to within tolerance described in CAN/CSA-A23.1-M90, Cause 22.1.2-Straight-Edge Method for Very Flat Classification Finish 1/8" (3 mm) in 10'-0" (3000 mm) to all floors receiving carpet, resilient flooring, liquid applied flooring, thin-set ceramic tile. All other floors shall be finished to Flat Classification Finish 3/16" (5 mm) in 10'-0" (3000 mm). Floors shall be true to plane as determined by a 10'-0" (3.0 meter) straight-edge placed anywhere on the surfaces in any direction. Check conformance to tolerance limits at any time after the curing period. Where this Section conflicts with other Sections in Division 3, this Section shall govern.

.4 Sprinkling of dry cement or dry cement and sand mixture over concrete surfaces is not acceptable.

.5 Apply curing compound in accordance with manufacturer's instructions to all areas not scheduled to receive further floor finish.

.6 Protect surfaces which will be exposed to direct sunlight during the curing period in accordance with manufacturer's instructions.

3.4 DEFECTIVE WORK

.1 Repair honeycombing, rock packets, chips, spalls and other voids in exposed concrete surfaces, using patching materials as specified to provide a smooth surface. Remove fins and other protrusions in concrete surfaces. Maximum allowable depth of grinding to be 1/16".

.2 Consult with Departmental Representative on the repair of defective concrete surfaces prior to execution of the work.

.3 Patch form tie holes in all exposed concrete surfaces and surfaces designated to receive waterproofing unless otherwise directed.

.4 Where in the opinion of the Departmental Representative, material or workmanship fails to meet the requirements of the specification, such work may be rejected. Work rejected shall be replaced or repaired to the approval of the consultant at no additional cost to the owner.

3.5 PROTECTION

.1 Take every precaution to protect finished surfaces from stains and abrasions. Surfaces and edges likely to be damaged during the construction period shall be especially protected.

.2 Protect work of other sections from damage resulting from work of this Section.

.3 Provide suitable enclosures for collecting grit and dust from sandblasting operation.

.4 Erect barricades to prevent traffic on newly finished surfaces.

.5 Suggested protection in high traffic areas after the sealer has been applied is as follows:

.1 Place cheap colourfast carpet that is breathable (not rubber backed), fuzzy side down or Protect CP board.

.2 Masonite or plywood may then be applied over the carpet/cardboard for further protection.

3.6 ADJUSTING & CLEANING

.1 Progress Cleaning: Clean during progress of the Work in accordance with Section 01 74 11-Cleaning.

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

.3 Repair, remove and clean all drips or smears resulting from the work of this section on exposed, finished surfaces or surfaces to be subsequently finished

END OF SECTION 03 35 00

1.0 GENERAL

1.1 RELATED SECTIONS

.1 Submittal Procedures Section 01 33 00

1.2 REFERENCES

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

- .1 ASTM A 36/A 36M-12, Specification for Structural Steel.
- .2 ASTM A307-12, Specification for Carbon Steel Bolts and Studs, 60,000psi Tensile.
- .3 ASTM A325-10e1, Specification for Structural Bolts, Steel, Heat Treated,120/105 ksi Minimum Tensile Strength.
- .4 ASTM A 325M-13, Specification for High-Strength Bolts for Structural Steel Joints.

.2 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).

- .1 CISC/CPMA 1-73a, Quick-Drying, One-Coat Paint for Use on Structural Steel.
- .2 CISC/CPMA 2-75, Quick-Drying, Primer for Use on Structural Steel.

.3 Canadian Standards Association (CSA International)

- .1 CAN/CSA-G40.20-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel.
- .2 CAN/CSA-G40.21-04 (R2009), Structural Quality Steels.
- .3 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .4 CAN/CSA-S16-09, Design of steel structures, Includes Update No. 1 (2010), Updated No. 2 (2010), Update No. 3 (2013)
- .5 CSA W47.1-03 (R2009), Certification of Companies for Fusion Welding of Steel Structures.
- . CSA W48-06(R2011), Electrodes.
- .7 CSA W55.3-08, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .8 CSA W59-03(R2008), Welded Steel Construction (Metal Arc Welding).

1.3 DESIGN REQUIREMENTS

.1 Provide splices as indicated on drawings where applicable. Unless noted otherwise, all continuous elements called up on the drawings shall be provided with full strength splice either by full strength groove weld or by full strength splice plates on each end of the connection elements.

1.4 SHOP DRAWINGS

.1 Submit shop drawings including fabrication and erection documents and materials list in accordance with Section 01 33 00 – Submittal Procedures. Shop drawings for anchor bolt layout and embedded plate layout shall also be submitted for review.

.2 On erection drawings, indicate all details and information necessary for assembly and erection purposes such as, description of methods, sequence of erection, type of equipment used in erection and temporary bracings.

.3 No fabrication or work shall be commenced until the review and approval of the shop drawings. The contractor shall assume full responsibility for any fabrication and work done prior to review and approval of the shop drawings.

.4 Contractor shall co-ordinate and verify all dimension and locations prior to production of the drawing.

1.5 QUALITY ASSURANCE

.1 Submit 2 copies of mill test reports showing chemical and physical properties and other details of steel to be incorporated into work at least 2 weeks prior to fabrication of structural steel. Mill test reports shall be certified by metallurgists qualified to practice in British Columbia, Canada.

.2 Fabricator of structural steel shall, in addition, provide an affidavit stating that materials and products used in fabrication conform to applicable material and products standards called for by design drawings and specifications.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 11 00 – General Instructions.
SPEC NOTE ENVIRONMENT: The disposal of packaging waste into landfill site demonstrates an inefficient use of natural resources and consumes valuable landfill space.

2.0 PRODUCTS

2.1 MATERIALS

.1 Structural steel: to CAN/CSA-G40.21 Grade as indicated on drawings.

.2 Anchor bolts: ASTM A307 unless noted otherwise on drawings.

.3 Bolts, nuts and washers: to ASTM A 325

.4 Welding materials: to CSA W48 Series and CSA W59 and certified by Canadian Welding Bureau.

.5 Shop paint primer: to CISC/CPMA 1.

.6 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600 g/m2.

2.2 FABRICATION

.1 Fabricate structural steel in accordance with CAN/CSA-S16 and in accordance with reviewed shop drawings.

.2 Welding shall be performed by certified welders. Fabrication shops shall be approved by the Canadian welding bureau to CSA-W47.1 (Division 1 or 2). Certification shall be supplied to the Departmental Representative upon request.

.3 Unless noted otherwise, install all rolled steel sections with mill camber upwards.

.4 Continuously seal members by continuous welds where indicated. Grind smooth.

.5 All areas of galvanized parts shall be grounded off prior to welding. Part 2 coats minimum of zinc rich primer read mix to CAN/CGSB-1.181 after welding.

2.3 SHOP PAINTING

.1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16 except where members to be encased in concrete.

.2 Clean members, remove loose mill scale, rust, oil, dirt and other foreign matter. Prepare surface according to SSPC SP7 brush off blast.

.3 Apply one coat of CISC/CMPD2-75 primer in shop to steel surfaces to achieve minimum dry film thickness of 3 to 4 mils, except:

.1 Surfaces to be encased in concrete.
.2 Surfaces to receive field installed stud shear connections.
.3 Surfaces and edges to be field welded.
.4 Faying surfaces of friction-type connections.
.5 Below grade surfaces in contact with soil.

.4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.

.5 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.

.6 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

3.0 EXECUTION

3.1 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S16.

.2 Welding: in accordance with CSA W59.

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

3.2 CONNECTION TO EXISTING WORK

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

3.3 MARKING

.1 Mark materials in accordance with CAN/CSA G40.20/G40.21. Do not use die stamping. If steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection. Match marking: shop mark for fit and match.

3.4 ERECTION

.1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 and in accordance with reviewed erection drawings.

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

.3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.

.4 Continuously seal members by continuous welds where indicated. Grind smooth.

.5 Install and torque all bolts and drilled anchors in accordance with manufacturer's specifications and procedures.

.6 Any misfit or misalignment must be reported to the Departmental Representative. The contractor shall provide proposed remedial measures to the Departmental Representative for review and approval. Any remedial work on connections must be reviewed and/or redesigned by the connection engineer. Costs of remedial work are at the expense of the contractor.

.7 Do not notch or cut openings in any of the framing members and connection without prior approval from the Departmental Representative.

.8 Provide temporary bracing to structure for stability and safety as required until the completion of the steel structure.

.9 Contractor shall do welding work in strict conformance with the requirements of CSA W59, in particular, preheating requirements and welding restriction in low temperature.

3.5 FIELD QUALITY CONTROL

.1 The Departmental Representative will not be responsible for inspection of the Contractor's work as described in Clause 7.12 of the CISC Code of Standard Practice for Structural Steel. The Contractor is responsible for the accuracy and completeness of his own work and shall verify that the structural steel has been fabricated, erected and finished in accordance with the contract specifications.

.2 Inspection and testing of materials and workmanship will be carried out by an independent testing laboratory approved by Departmental Representative.

.3 Testing requirements are as follows:

.1 Visual Field Inspection and Bolt Torque Testing (Random 10% of Bolts) of all bolted connections.

.2 Non Destructive Testing of Welds: 100% of all welds to be visually inspected.

.4 Welding inspector shall be certified to CSA W178.2 Level 2 or Level 3.

.5 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Departmental Representative.

.6 Submit test reports to Departmental Representative within 1 week of completion of inspection.

.7 Costs of tests shall be borne by the Contractor.

3.6 FIELD PAINTING

.1 Touch up damaged surfaces and surfaces without shop coat with primer to SSPC-SP-6 except as specified otherwise. Apply in accordance with CAN/CGSB 85.10.

END OF SECTION 05 12 23

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 International
- .1 CSA B111- 1974 (R2003), Wire Nails, Spikes and Staples.
- .2 CSA O121- 08, Douglas Fir Plywood.
- .3 CAN/CSA-O141- 05, Softwood Lumber.
- .4 CSA O151- 09, Canadian Softwood Plywood.
- .5 CAN/CSA-O325.0- 07, Construction Sheathing.

.2 National Lumber Grades Authority (NLGA)
- .1 Standard Grading Rules for Canadian Lumber 2000.

.3 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1113- A2007, Architectural Coatings.

1.3 ACTION & 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 rough carpentry work and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 QUALITY ASSURANCE

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

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

.3 Plywood, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA standards.

.4 Sustainable Standards Certification:
- .1 Certified Wood: submit listing of wood products and materials used in accordance with FSC-STD-01-001.

1.5 DELIVERY, STORAGE & HANDLING

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

.2 Storage and Handling Requirements:
- .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect wood from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 .0 PRODUCTS

2.1 MATERIALS

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:

.1 CAN/CSA-O141.
.2 NLGA Standard Grading Rules for Canadian Lumber.
.3 FSC certified.

.2 Furring, blocking, nailing strips, grounds, rough bucks, curbs, fascia backing and sleepers:
.1 Board sizes: "Standard" or better grade.
.2 Dimension sizes: "Standard" light framing or better grade.
.3 Post and timbers sizes: "Standard" or better grade.

.3 Panel Materials:
.1 Douglas fir plywood (DFP): to CSA O121, standard construction.
.1 Urea-formaldehyde free.
.2 Canadian softwood plywood (CSP): to CSA O151, standard construction.
.1 Urea-formaldehyde free.
.3 Plywood, OSB and wood based composite panels: to CAN/CSA-O325.
.1 Urea-formaldehyde free.

.4 Primers: in accordance with manufacturer's recommendations for surface conditions:
.1 Primer: VOC limit 100 g/L maximum to GS-11 and SCAQMD Rule 1113.
.2 Paint: VOC limit 50 g/L maximum to GS-11 SCAQMD Rule 1113.
.3 Coating: VOC limit 100 g/L maximum to GS-11 SCAQMD Rule 1113.

2.2 ACCESSORIES

.1 Exterior wall sheathing paper: to CAN/CGSB-51.32 as indicated on drawings.

.2 Polyethylene film: to CAN/CGSB-51.34,Type 1, 0.15 (6 mils) mm thick.

.3 Air seal: closed cell polyurethane or polyethylene.

.4 Sealants: in accordance with Section 07 92 00 – Joint Sealants.

.5 Fasteners: to CAN/CSA-G164, for interior highly humid areas pressure-preservative, fire-retardant treated lumber.

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

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

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

3.0 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for rough carpentry 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.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Treat surfaces of material with wood preservative, before installation.

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and 1 minute soak on plywood.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

3.3 INSTALLATION

.1 Comply with requirements of NBC, supplemented by the following paragraphs.

.2 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding and other work as required.

.3 Align and plumb faces of furring and blocking to tolerance of 1:600.

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

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

.6 Use caution when working with particle board. Use dust collectors and high quality respirator masks.

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

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

3.4 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.

END OF SECTION 06 08 99

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Gypsum Board Assemblies Section 09 21 16

.2 Non-Structural Metal Framing Section 09 22 16

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C 553-02, Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
- .2 ASTM C 665-01e1, Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- .3 ASTM C 1320-05, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.

.2 Canadian Gas Association (CGA)
- .1 CAN/CGA-B149.1-05, Natural Gas and Propane Installation Code Handbook.
- .2 CAN/CGA-B149.2-05, Propane Storage and Handling Code.

.3 Canadian Standards Association (CSA International)
- .1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.

.4 Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC-S604-M1991, Type A Chimneys.
- .2 CAN/ULC-S702-1997, Standard for Mineral Fibre Insulation

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 data sheet in accordance with Section 01 33 00 - Submittal Procedures.

.3 Manufacturer's Instructions:
- .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 WASTE MANAGEMENT & DISPOSAL

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

2.0 PRODUCTS

2.1 INSULATION

.1 Thermal Batt Insulation: Unfaced fiberglass insulation to ASTM CG65, Type 1 and ASTM E136 R-Value at 51/2", R21, or to fill up width of existing stud wall.

2.2 ACCESSORIES

.1 Insulation clips:
.1 Impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self-locking type.

.2 Nails: galvanized steel, length to suit insulation plus 25 mm, to CSA B111.

.3 Staples: 12 mm minimum leg.

.4 Tape: as recommended by manufacturer.

3.0 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 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.3 Do not compress insulation to fit into spaces.

.4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from CAN/CGA-B149.1 and CAN/CGA-B149.2 Type B and L vents.

.5 Do not enclose insulation until it has been reviewed and approved by Departmental Representative.

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Sheet Metal Flashing & Trim — Section 07 62 00

.2 Gypsum Board Assemblies — Section 09 21 16

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-19.13M-M87, Sealing Compound, One Component, Elastomeric Chemical Curing.
- .2 CAN/CGSB-19.24M-M90, Multi-Component, Chemical Curing Sealing Compound.
- .3 CGSB 19-GP-14M-84, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.2 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

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 WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 33 – Health Safety Requirements.

.3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.

- .1 Existing Substrate Condition: report deviations, as described in PART 3.3 EXAMINATION in writing to Departmental Representative.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.4 QUALITY ASSURANCE

.1 Qualifications:

- .1 Applicator: company specializing in performing work of this section with minimum 5 years documented experience with installation of air/vapour barrier systems.

.2 Mock-Up:

- .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
- .2 Construct typical exterior wall panel, incorporating louvre and door frame, insulation, illustrating materials interface and seals.
- .3 Locate in location as agreed to with Departmental Representative.
- .4 Mock-up may remain as part of finished work.
- .5 Allow 72hours for inspection of mock-up by Departmental Representative before proceeding with air/vapour barrier Work.

.3 Schedule site visits with Departmental Representative, to review Work, at stages listed:

- .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
- .2 Minimum twice during progress of Work at 25% and 60% complete.
- .3 Upon completion of Work, after cleaning is carried out, prior to cover up by other building component.

1.5 DELIVERY STORAGE AND HANDLING

.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 Avoid spillage: immediately notify Departmental Representative if spillage occurs and start clean up procedures.

.4 Clean spills and leave area as it was prior to spill.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Place materials defined as hazardous or toxic waste in designated containers.

.2 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.7 AMBIENT CONDITIONS

.1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.

.3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

1.8 WARRANTY

.1 For sealant and sheet materials the 12 months warranty period is extended to 24 months.

2.0 PRODUCTS

2.1 SELF ADHESIVE MEMBRANE

.1 Membrane composed of high temperature grade SBS modified bitumen and a Tri-laminate woven polyethylene face on the top surface. The self-adhesive bottom surface is protected by a silicone release sheet.
- .1 Water Vapour transmission 202 g/m² /24 hours/ASTM E96/B (Dessicant).
- .2 Dry Tensile Strength 41 lbf/182N MD, 29 lbf/129N CD, ASTM D 828.
- .3 Average Dry Breaking Force 127 lbf/565N MD, 91 lbf/405N CD, ASTM D 5034.
- .4 Accelerated Aging, Pass, ICC-ES AC 48, 25 cycles.
- .5 Cycling and Elongation, Pass, ICC-ES AC48, 100 cycles at -29°C (20°F).
- .6 Application Temperature Minimum 5°C (41°F).
- .7 Flame Spread Index 0, Class A, ASTM E-84.
- .8 Smoke Developed 105, Class A, ASTM E-84.
- .9 Membrane thickness, Minimum 40 mil.
- .10 Air Permeance, Pass, ASTM E 2178 (Maximum 0.02 L/m²s @ 75Pa or 0.004 cfm/ft² @ 1.57pcf) ASTM E 2357 – assembly, Pass.
- .11 Criteria for Water Resistive Barriers, Pass, ICC-ES AV 38.
- .12 Low Temp Flexibility, Pass, ICC-AC38/3.3.4.
- .13 Peel-adhesion to Unprimed Plywood, PASS, ICC-ES AC48, Control 62 lbf/ft-905N/m, After 7 day water immersion 54 lbf/ft-788N/m, After accelerated aging 72 lbf/ft-1051N/m, After UV exposure 77 lbf/ft-1124N/m
- .14 Water Penetration Resistance around Nails, PASS, AAMA 711-05 and ASTM D 1970 modified.

2.2 SEALANTS

.1 Sealants in accordance with Section 07 92 10 - Joint Sealing.

.2 Sealant compatible with membrane as recommended by the manufacturer:
- .1 Silicone Sealant specifically for use with self-adhered membrane.

.3 Primer: recommended by sealant manufacturer as appropriate to application.

.4 Substrate Cleaner: non-corrosive type recommended by sealant manufacturer and compatible with adjacent materials.

2.3 PRIMER

.1 Apply primer to substrate according to manufacturer's specification. Ensure proper adhesion and compatibility to the membrane.

2.4 ACCESSORIES

.1 Provide mechanically fastened stainless steel termination bar with gumlip edge.

3.0 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 GENERAL

.1 Perform Work in accordance with Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification requirements for materials.

3.3 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept work of this section.

.2 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.

.3 Report unsatisfactory conditions to Departmental Representative in writing.

.4 Do not start work until deficiencies have been corrected.

.1 Beginning of Work implies acceptance of conditions.

3.4 PREPARATION

.1 All surfaces to receive the membrane must be thoroughly cleaned so as to have removed all concrete spatter, job dirt, laitance, from release agents, curing compounds, or any other substance which could inhibit the adhesion, and long term performance of the membrane.

.2 All honeycombing in concrete shall be grouted flush prior to application of primer.

.3 Apply primer as per manufacturer's recommendation to all surfaces to receive the membrane. Use a 2 coat application on gypsum board or plywood substrate.

.4 Prepare in accordance with manufacturer's instructions.

.5 Apply a horizontal membrane strip over vertical leg and fasteners of all horizontal cladding supports. Seal top with mastic regular.

.6 Fill all joints or gaps wider than ¼" with galvanized steel sheet steel or wood backing and apply 12" strip of membrane over joints prior to application of the field membrane. Seal all side laps without factory bitumen self-adhering edge and all top laps with mastic.

3.5 APPLICATIONS

.1 Apply in accordance with manufacturer's instructions.

.2 All joints within and between back up walls and window frames shall be sealed according to detail drawings.

.3 Ensure continuity of air barrier. Co-ordinate construction of roof/wall junction to maintain continuity of air barrier from wall to roof. Co-ordinate with construction of exterior walls to maintain continuity of air barrier between various exterior wall construction types.

.4 Shingle laps to drain. Minimum side and end laps as per manufacturer's recommendation with a minimum of 75mm.

Membrane should be adhered onto window frame section as per detail drawings.

.6 Lap and seal air barrier membrane over through-wall flashing at base of wall and at all horizontal wall flashings.

.7 Lap roof membrane flashing over air/vapour barrier membrane at parapets and seal.

.8 Seal all through-wall equipment flanges with air barrier membrane flashing strips; apply mastic to edges.

.9 Seal all metal fabrication flanges with air/vapour barrier membrane flashing strips; apply mastic to edges.

.10 Seal all horizontal drip flashings to air/vapour barrier membrane with minimum 150 mm strips of membrane flashing applied horizontally; apply mastic to edges of flashing membrane.

3.6 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.

3.7 PROTECTION OF WORK

.1 Protect finished work in accordance with Section 01 61 00 - Common Product Requirements.

.2 Do not permit adjacent work to damage work of this section.

.3 Ensure finished work is protected from climatic conditions.

END OF SECTION 07 27 00.01

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Air Barrier - Descriptive or Proprietary Section 07 27 00.01

1.2 REFERENCES

.1 The Aluminum Association Inc. (AAI)
- .1 AAI-Aluminum Sheet Metal Work in Building Construction-2002.
- .2 AAI DAF45-03, Designation System for Aluminum Finishes.

.2 American Society for Testing and Materials International (ASTM)
- .1 ASTM A 167-99 (2004), Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM A 240/A 240M-07e1, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .3 ASTM A 606-04, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
- .4 ASTM A 653/A 653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .5 ASTM A 792/A 792M-06a, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .6 ASTM B 32-04, Standard Specification for Solder Metal.
- .7 ASTM B 370-03, Standard Specification for Copper Sheet and Strip for Building Construction.
- .8 ASTM D 523-89(1999), Standard Test Method for Specular Gloss.
- .9 ASTM D 822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.3 Canada Green Building Council (CaGBC)
- .1 LEED Canada-CI Version 1.0-20079, LEED (Leadership in Energy and Environmental Design): Green Building Rating System and Reference Package For Commercial Interiors.

.4 Roofing Contractors Association of B.C. (RCABC)
- .1 RGC Roofing Practice Manual- Millennium edition.

.5 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .2 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.

.6 Canadian Standards Association (CSA International)
- .1 CSA A123.3-05, Asphalt Saturated Organic Roofing Felt.
- .2 AAMA/WDMA/CSA 101/I.S.2/A440-2008, Standard/Specification for Windows, Doors, and Unit Skylights.
- .3 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.7 Green Seal Environmental Standards
- .1 Standard GS-03-93, Anti-Corrosive Paints.
- .2 Standard GS-11-97, Architectural Paints.
- .3 Standard GS-36-00, Commercial Adhesives.

.8 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.9 South Coast Air Quality Management District (SCAQMD), California State
- .1 SCAQMD Rule #1113-04, Architectural Coatings.

.2 SCAQMD Rule #1168-05, Adhesives and Sealants.

.10 British Columbia Sheet Metal Association (SMACNA-BC)
.1 Architectural Sheet Metal Manual- 6th Edition 2003.

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.
.2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Samples:
.1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colours

.4 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
.1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.4 QUALITY ASSURANCE

1.5 DELIVERY, STORAGE AND HANDLING

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

2.0 PRODUCTS

2.1 PRE-FINISHED SHEET METAL

.1 Zinc coated steel sheet: 1 mm (20ga) thickness, commercial quality to ASTM A 653/A 653M, with Z275 designation zinc coating, finish enamel coated factory applied coating to CGSB 93-GP-3m Class F29, Custom color to match existing green as approved by Departmental Representative.

2.2 PREFINISHED ALUMINUM SHEET

.1 Prefinished aluminum sheet: 0.81mm (20 gauge).

.2 Prefinished Aluminum with factory applied polyvinylidene fluoride.
.1 Class F2S.
.2 Custom Colour selected by Departmental Representative (PVF2) to match paint colour or existing green colour.
.3 Specular gloss: 5 units +/-5 in accordance with ASTM D 523.
.4 Coating thickness: not less than 25 micrometres.
.5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5units or less and erosion rate less than 20 % to ASTM D 822 as follows:
.1 Outdoor exposure period 2500 hours.
.2 Humidity resistance exposure period 5000 hours.
.6 Applications of PVF2 Coating system by means of spray coating after forming and shaping of flashing elements is not acceptable.

2.3 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.
.2 Plastic cement: to CAN/CGSB 37.5.
.1 Maximum VOC limit 50 g/L to SCAQMD Rule 1168.

.3 Underlay for metal flashing: asphalt laminated 3.6 to 4.5 kg kraft paper.

.4 Sealants.
.1 Maximum VOC limit 50 g/L to SCAQMD Rule 1168.

.5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

.6 Fasteners: stainless steel, flat head roofing nails of length and thickness suitable for metal flashing application.

.7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.8 Touch-up paint: as recommended by prefinished material manufacturer.
.1 Maximum VOC limit 50 g/L to SCAQMD Rule 1113.

2.4 FABRICATION

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable RCABC Standards.

.2 Fabricate aluminum flashings and other sheet aluminum work in accordance with AAI-Aluminum Sheet Metal Work in Building Construction.

.3 Form pieces in 2400 mm maximum lengths.
.1 Make allowance for expansion at joints.

.4 Hem exposed edges on underside 12 mm.
.1 Mitre and seal corners with sealant.

.5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 METAL FLASHINGS

.1 Form flashings, copings and fascias to profiles indicated of 1mm, 20ga thick galvanized steel, or aluminum 0.81 (20ga) thick as indicated on drawings.

.2 Caulk perimeter flashings with specified sealant where necessary to make a proper seal.

.3 'S' Lock and caulk end joints in flashing. Provide standing seams with concealed clips at corners. Hem exposed edges of flashing a minimum of 12.5 mm for rigidity.

.4 Provide flashings with edges turned to form a drip. Make proper allowance for expansion and contraction. Face clip flashings with concealed clips (600 mm) on centres.

.5 Provide new baked enamel coated galvanized iron base flashings at vents, chimneys, control joints and skylights.

.6 Carry face metal down exterior face a minimum of 100 mm or as indicated on drawings.

.7 Provide metal base and cap flashings to extend to within 25 mm of roof surface.

.8 At vent stacks, install aluminum vent stacks as manufactured by Menzies Metal Products where supplied by this sub-trade. Include for aluminum metal caps.

3.0 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install sheet metal work in accordance with R.C.A.B.C standards.

.2 Use concealed fastenings except where approved before installation.

.3 Provide underlay under sheet metal.

.1 Secure in place and lap joints 100 mm.

.4 Lock end joints and caulk with sealant.

.5 Install pans, where shown around items projecting through roof membrane.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.4 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 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION 07 62 00

1 .0 GENERAL

1.1 RELATED REQUIREMENTS

.1	Air Barrier – Descriptive or Proprietary	Section 07 27 00.01
.2	Gypsum Board Assemblies	Section 09 21 16
.3	Ceramic Tiling	Section 09 30 13
.4	Resilient Floor for Minor Works	Section 09 65 99
.5	Interior Painting	Section 09 92 13

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM C 919- 12, Standard Practice for Use of Sealants in Acoustical Applications.

.2 ASTM C920-11 Standard Specification for Elastomeric Joint Sealants

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

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

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

.4 Submit duplicate samples of each type of material and colour.

.5 Cured samples of exposed sealants for each color where required to match adjacent material.

.6 Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Instructions to include installation instructions for each product used.

1.4 QUALITY ASSURANCE / MOCK-UPS

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Construct mock-up to show location, size, shape and depth of joints complete with back-up material, primer, caulking and sealant.

.3 Mock-up will be used:
- .1 To judge workmanship, substrate preparation, operation of equipment and material application.

.4 Location to be decided with Departmental Representative.

.5 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with sealant work.

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

1.5 DELIVERY, STORAGE & HANDLING

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

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

.3 Upon completion of Work, after cleaning is carried out.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Environmental Limitations:

.1 Do not proceed with installation of joint sealants under following conditions:

.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.

.2 When joint substrates are wet.

.2 Joint-Width Conditions:

.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

.4 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.

.5 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.6 Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.

2.0 PRODUCTS

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.

.3 Where sealants are qualified with primers use only these primers.

.4 Standard: For interior and exterior work unless otherwise specified, ensure compatibility of sealants being used and other materials in contact with them, meet VOC level of 250 g/L for architectural sealant.

2.2 SEALANT TYPE

.1 S-1

.1 ASTM C920 silicone, acetoxy cure.

.2 Type S.

.3 Class 25.

.4 Grade NS.
.5 Non-yellowing, mildew resistant.

2.3 CAULKING COMPOUND
.1 C-1: ASTM C834, acrylic latex.

.2 C-2: One component acoustical caulking, non-drying, non hardening, synthetic rubber.

2.4 JOINT CLEANER
.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

.2 Primer: as recommended by manufacturer.

3.0 EXECUTION

3.1 PROTECTION
.1 Protect installed Work of other trades from staining or contamination.

3.2 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.

3.3 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.

3.4 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.

3.5 MIXING
.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION
.1 Sealant
.1 Apply sealant in accordance with manufacturer's written instructions and ASTM C919.
.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 Cleanup
.1 Clean adjacent surfaces immediately and leave Work neat and clean.
.2 Remove excess and droppings, using recommended cleaners as work progresses.
.3 Remove masking tape after initial set of sealant.

3.7 CLEANING

.1 Clean adjacent surfaces immediately and leave work clean and neat. Remove excess sealant and droppings using recommended cleaners as work progresses. Remove masking after tooling of joints.

3.8 LOCATIONS

.1 Sanitary Joints:
.1 Pipe Penetrations: Type S-12.

.2 Interior Caulking:
.1 Typical Narrow Joint 6mm, (1/4 inch) or less at Walls and Adjacent Components: Type C-1 and C-2.
.2 Linoleum flooring base connections to walls: Type S-1.
.3 Linoleum flooring connections to water closets and floor drains: Type S-1.

END OF SECTION 07 92 00

1.0 GENERAL

1.1 RELATED REQUIREMENTS

1.2 REFERENCES

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
- .1 ANSI/BHMA A156.21- 2009 , American National Standard for Thresholds.
- .2 ANSI/BHMA A156.22- 2012 , Door Gasketing and Edge Seal Systems.

.2 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
- .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

1.3 HARDWARE/SECURITY COORDINATION

.1 Prior to preparation and submittal of hardware list, door hardware supplier's hardware consultant shall arrange a coordination meeting with the following attendees:
- .1 Hardware supplier's hardware consultant.
- .2 Facility's Building Maintenance Manager.
- .3 Departmental Representative.
- .4 General Contractor.

.2 The final door hardware lists shall reflect all decisions made at said coordination meeting.

1.4 ACTION & 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 door hardware and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples will be returned for inclusion into work.
- .3 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
- .4 After approval samples will be returned for incorporation in Work.

.4 Hardware List:
- .1 Submit contract hardware list.
- .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

.5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.6 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.5 CLOSEOUT SUBMITTALS

1.6 MAINTENANCE MATERIALS SUBMITTALS

.1 Extra Stock Materials:
- .1 Supply maintenance materials in accordance with Section 01 78 00 – Closeout Submittals.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements:
- .1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification

Organization accredited by Standards Council of Canada.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.8 DELIVERY, STORAGE & 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 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 Storage and Handling Requirements:
- .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect door hardware from nicks, scratches, and blemishes.
- .3 Protect prefinished surfaces with wrapping strippable coating.
- .4 Replace defective or damaged materials with new.

1.9 MAINTENANCE

.1 Extra Materials:
- .1 Provide maintenance materials in accordance with Section 01 78 30-Closeout Submittals.

2.0 PRODUCTS

2.1 HARDWARE ITEMS

.1 Use one manufacturer's products only for similar items.

2.2 DOOR HARDWARE

.1 Thresholds: 127mm wide x full width of door opening, extruded aluminum mill finish, serrated surface, with lip and vinyl door seal insert.

.2 Door bottom seals: aluminum alloy channel with a type 6 nylon brush insert.

2.3 MISCELLANEOUS HARDWARE

.1 Indexed key control system: to ANSI/BHMA A156.5, designated by letter E and numeral identifiers, wall mounted, type 50% expandable colour enamel paint finish.

2.4 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.3 Exposed fastening devices to match finish of hardware.

.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.5 Use fasteners compatible with material through which they pass.

2.5 ADDITIONAL DOOR HARDWARE SCHEDULED ELSEWHERE

.1 Refer to Division 26-Electrical for all wiring and conduit for above items.

3.0 EXECUTION

3.1 INSTALLATION

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

.2 Supply manufacturers' instructions for proper installation of each hardware component.

.3 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

.4 Use only manufacturer's supplied fasteners.

.1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

3.2 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to ensure tight fit at contact points with frames.

3.3 DEMONSTRATION

.1 Maintenance Staff Briefing:

.1 Brief maintenance staff regarding:

.1 Proper care, cleaning, and general maintenance of projects complete hardware.

.2 Description, use, handling, and storage of keys.

.3 Use, application and storage of wrenches for door closers locksets and fire exit hardware.

.2 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by door hardware installation.

3.5 DOOR HARDWARE TYPE

.1 THRESHOLDS:

T1 127mm wide x full width of door opening, extended aluminum mill finish, serrated surface, with lip and vinyl seal insert.

.2 GASKETS:

G1 aluminum alloy channel with a type 6 nylon brush insert brush 34.9mm brush depth. Full width of door.

3.6 FINISH HARDWARE SCHEDULE

Door T114

.1 1 Ea Threshold T1

Door T112

.1 1 Ea Threshold T1

Door T124

.1 1 Ea Gasket G1

Door T127
.1 1 Ea Gasket G1

Door T128
.1 I Ea Gasket G1

End OF SECTION 08 71 00

ROOM FINISH SCHEDULE

Traffic Office Building

				WALLS					REMARKS
NO.	ROOM NAME	FLOOR	BASE	WEST WALL	NORTH WALL	EAST WALL	SOUTH WALL	CEILING	
T-101	Vestibule								
T-103	Male Staff Washroom	LIN	LIN					ACT	
T-106	Female Staff Washroom	LIN	LIN					ACT	
T-109	Vestibule	TL	TL	PT	PT	PT	PT		PAINT ALL SIDES
T-110	Pre-Clearance	TL	TL						

LEGENDS

FLOOR
TL Ceramic Tile
LIN Linoleum

BASE
TL Ceramic Tile Base

WALLS
PT Paint, white

CEILINGS
ACT Suspended T-Bar w/ Acoustic Ceiling Tiles

GENERAL NOTES

.1 All wall finishes and wall base to be continuous behind chalkboard, tackboard, projection screen, lockers and benches.
.2 Vertical bulkheads/down drops to be finished same as horizontal U.O.N.
.3 Return wall finishes into window frames at jambs and head U.O.N.
.4 Wall finishes to extend down to floor with applied base over.
.5 All exposed services to be painted as adjacent wall U.O.N.
.6 Refer to Layout Plan for paint color.
.7 All change of flooring in hallways must extend to the room side of the door frame U.O.N.
.8 Refer to drawing for change of flooring, interior elevation, ceiling design and details.
.9 Make good and level existing slab to receive flooring to meet flooring manufacturer's requirement.
.10 Make goods existing walls to paintable condition prior to applying new painting.

END OF SECTION 09 06 00.13

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Non-Structural Metal Framing Section 09 22 16

1.2 REFERENCES

.1 ASTM International

.1 ASTM C 475-02 (2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.2 ASTM C 514-04 (2009e1), Standard Specification for Nails for the Application of Gypsum Board.

.3 ASTM C 557-03 (2009) e1,Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.

.4 ASTM C 840-08, Standard Specification for Application and Finishing of Gypsum Board.

.5 ASTM C 954-07, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

.6 ASTM C 1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.7 ASTM C 1047-09, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.8 ASTM C 1396/C 1396M-09a, Standard Specification for Gypsum Wallboard.

.2 Association of the Wall and Ceilings Industries International (AWCI)

.1 AWCI Levels of Gypsum Board Finish-97.

.3 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102-07, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

1.3 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Storage and Handling Requirements:

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

.2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.

.3 Protect from weather, elements and damage from construction operations.

.4 Handle gypsum boards to prevent damage to edges, ends or surfaces.

.5 Protect prefinished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

.6 Replace defective or damaged materials with new.

1.5 AMBIENT CONDITIONS

.1 Maintain temperature 10 degrees C minimum (21 degrees C maximum) for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

.3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

2.0 PRODUCTS

2.1 MATERIALS

.1 Standard board: to ASTM C 1396/C 1396M regular, 12.7mm thick and 15.9 mm thick, 1200 mm wide x maximum practical length, ends square cut, edges tapered.

.2 Resilient clips and drywall furring: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.

.3 Nails: to ASTM C 514.

.4 Steel drill screws: to ASTM C 1002.

.5 Stud adhesive: to CAN/CGSB-71.25.

.6 Laminating compound: as recommended by manufacturer, asbestos-free.

.7 Casing beads, corner beads, control joints and edge trim: to ASTM C 1047, metal, zinc-coated by hot-dip process, 0.5 mm base thickness, perforated flanges, one piece length per location.

.8 Polyethylene: to CAN/CGSB-51.34, Type 2.

.9 Insulating strip: rubberized, moisture resistant, 3 mm thick cork closed cell neoprene strip, 12 mm wide, with self-sticking permanent adhesive on one face, lengths as required.

.10 Joint compound: to ASTM C 475, asbestos-free.

3.0 EXECUTION

3.1 EXAMINATION

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

- .1 Visually inspect substrate in presence of consultant.
- .2 Inform consultant 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 consultant.

3.2 ERECTION

.1 Do application and finishing of gypsum board to ASTM C 840 except where specified otherwise.

.2 Erect hangers and runner channels for suspended gypsum board ceilings to ASTM C 840 except where specified otherwise.

.3 Install work level to tolerance of 1:1200.

.4 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.

.5 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

.6 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

.7 Install wall furring for gypsum board wall finishes to ASTM C 840, except where specified.

3.3 APPLICATION

.1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.

.2 Apply single layer gypsum board to wood furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.

.1 Application:

.1 Apply gypsum board on ceilings prior to application of walls to ASTM C 840.

.2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.

.3 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.4 Install gypsum board with face side out.

.5 Do not install damaged or damp boards.

.6 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4 INSTALLATION

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant..

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Construct control joints of preformed units set in gypsum board facing and supported independently on both sides of joint.

.6 Provide continuous polyethylene dust barrier behind and across control joints.

.7 Locate control joints at changes in substrate construction at approximate 10 m spacing on long corridor runs at approximate 15 m spacing on ceilings.

.8 Install control joints straight and true.

.9 Construct expansion joints as detailed, at building expansion and construction joints. Provide continuous dust barrier.

.10 Install expansion joint straight and true.

.11 Splice corners and intersections together and secure to each member with 3 screws.

.12 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.13 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI Levels of Gypsum Board Finish:

.1 Levels of finish:

.1 At typical wall and ceiling locations. Level 4: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and edges.

.14 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.15 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

.16 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.17 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by gypsum board assemblies installation.

END OF SECTION 09 21 16

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1	Rough Carpentry for Minor Works	Section 06 08 99
.2	Blanket Insulation	Section 07 21 16
.3	Gypsum Board Assemblies	Section 09 21 16
.4	Acoustical Ceiling for Minor Works	Section 09 51 99

1.2 REFERENCES

.1 ASTM International
- .1 ASTM C 645- 00, Specification for Nonstructural Steel Framing Members.
- .2 ASTM C 754- 00 , Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

.2 Association of Wall and Ceiling Contractors of BC (AWCC)
- .1 Specification Standards Manual

1.3 SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada. Submit Model Schedule of Assurance S-B and S-C at completion of project.
- .2 Indicate system dimensions, framed opening requirements and tolerances, adjacent construction, anchor details anticipated deflection under load, affected related Work, weep drainage network, expansion and contraction joint location and details, and field welding required.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

2.0 PRODUCTS

2.1 MATERIALS

.1 Steel Studs & Steel Stud Furring:
- .1 Conform to CAN/CGSB-7.1-M86, non-loadbearing; C-shape, hot dipped galvanized steel studs with Z180 (G60) zinc coating to ASTM A525-86, roll formed from ASTM A446/A446M-85, Grade A steel.
  Studs to have knurled face and pre-punched pass-through holes for horizontal runs of wiring and piping. Length to suit, no splicing allowed.
- .2 Flange: Depth not less than 32mm , edges bent back 90 deg. and edges hemmed 5mm minimum.
- .3 Widths: As scheduled and indicated.

.4 Gauges: Interior steel stud to be a minimum of 0.88mm (20 gauge).

.5 Colour code steel studs for gauge in accordance with AWCC colour code chart.

.2 Stud Tracks:

.1 Top and bottom runner tracks fabricated from same materials as studs; leg design min. 32mm high, slightly bent in to hold studs; widths to equal stud width.

.2 Use extended leg top track to partitions as required for deflection.

.3 Stud Fasteners: Manufacturer's standard, suitable for intended application.

.4 Furring Channels: Hat section; roll formed from 0.53mm hot dipped galvanized steel having a Z180 (G60) coating to ASTM A525-86, dimensions 68.2 mm or 66.7mm overall width, face width 35 mm by 22.2mm deep, face knurled.

3.0 EXECUTION

3.1 ERECTION

.1 Place studs vertically at on centre as detailed and not more than 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.2 Erect metal studding to tolerance of 1:1000.

.3 Attach studs to bottom and ceiling track using screws crimp method pop rivets.

.4 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.5 Co-ordinate erection of studs with installation of mechanical ducting and louvers or anchorage for work specified in other Sections.

.6 Install heavy gauge single jamb studs at openings.

.7 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.8 Extend partitions to ceiling height except where noted otherwise on drawings.

.9 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use 50 mm leg ceiling tracks.

.10 Provide clearances and isolation felt to ensure no contact between steel stud system and adjacent metal components to eliminate electrolytic action.

3.2 CEILING AND SOFFIT SUSPENSION

.1 Runner Channels:

.1 Space channels at max. 900mm centers and not more than 150mm from boundary walls, interruptions of continuity and change in direction. Provide clearance of at least 25mm at walls.

.2 Run the channels transversely to structural framing members.

.3 Where splices are necessary, lap members at least 200mm and wire each end with 2 loops. Avoid clustering or lining up splices.

.4 Attach to rod hangers by bending hanger sharply under bottom flange of runner and securely wire in place with a saddle tie.

.2 Cross Furring:

.1 Erect furring channels transversely across runner channels, or other supports.

.2 Space furring channels at 400mm centers and not more than 150mm from boundary walls, openings, interruptions in ceiling continuity and change in direction. Provide a clearance of at least 25mm at walls.

.3 Secure furring channels to each support with clips or double 1.22 mm (18 ga.) dia. wire ties. Splice joints by nesting and tying channels together.

.4 Level furring channels to a maximum tolerance of 1:1000.

.3 At openings, including ceiling access panels, in ceiling suspension system that interrupts the main carrying channels of furring channels, reinforce grillage with 19mm cold rolled channels, wire tie to top and parallel to main runner channels, extend 19mm channels minimum 300mm past each end of openings.

3.3 CLEANING

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

END OF SECTION 09 22 16

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Concrete Finishing Section 03 35 00

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI)
- .1 ANSI A108.1-99, Specification for the Installation of Ceramic Tile (Includes ANSI A108.1A-C, 108.4-.13, A118.1-.10, ANSI A136.1).
- .2 CTI A118.3-92, Specification for Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive (included in ANSI A108.1).
- .3 CTI A118.4-92, Specification for Latex Cement Mortar (included in ANSI A108.1).
- .4 CTI A118.5-92, Specification for Chemical Resistant Furan Resin Mortars and Grouts for Tile Installation (included in ANSI A108.1).
- .5 CTI A118.6-92, Specification for Ceramic Tile Grouts (included in ANSI A108.1).

.2 American Society for Testing and Materials International (ASTM)
- .1 ASTM C 144-04, Specification for Aggregate for Masonry Mortar.
- .2 ASTM C 207-06, Specification for Hydrated Lime for Masonry Purposes.
- .3 ASTM C 847-06, Specification for Metal Lath.
- .4 ASTM C 979-05, Specification for Pigments for Integrally Coloured Concrete.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.34-M86 (R1988), Vapor Barrier, Polyethylene Sheet for Use in Building Construction.
- .2 CGSB 71-GP-22M-78 (AMEND.), /Adhesive, Organic, for Installation of Ceramic Wall Tile.
- .3 CAN/CGSB-75.1-M88, Tile, Ceramic.
- .4 CAN/CGSB-25.20-95, Surface Sealer for Floors.

.4 Canada Green Building Council (CaGBC)
- .1 LEED Canada LEED-V4 (Leadership in Energy and Environmental Design)

.5 Canadian Standards Association (CSA International)
- .1 CSA A123.3-05, Asphalt Saturated Organic Roofing Felt.
- .2 CAN/CSA-A3000-03(R2006), Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.6 South Coast Air Quality Management District (SCAQMD), California State
- .1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

.7 Terrazzo Tile and Marble Association of Canada (TTMAC)
- .1 Tile Specification Guide 09 30 00 2009/2010, Tile Installation Manual.
- .2 Tile Maintenance Guide 2000.

1.3 SUBMITTALS

.1 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Include manufacturer's information on:
  - .1 Ceramic tile, marked to show each type, size, and shape required.
  - .2 Chemical resistant mortar and grout (Epoxy and Furan).
  - .3 Cementitious backer unit.
  - .4 Dry-set cement mortar and grout.
  - .5 Divider strip.
  - .6 Elastomeric membrane and bond coat.
  - .7 Reinforcing tape.

.8 Levelling compound.
.9 Latex cement mortar and grout.
.10 Commercial cement grout.
.11 Organic adhesive.
.12 Slip resistant tile.
.13 Waterproofing isolation membrane.
.14 Fasteners.

.2 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
.1 Floor tile: submit duplicate, full size sample of each colour, texture, size, and pattern of tile.
.2 All transition strips and edge protections as specified
.3 Adhere tile samples to 11 mm thick plywood and grout joints to represent project installation.

1.4 QUALITY ASSURANCE

.1 Quality Assurance Submittals:
.1 Manufacturer's Instructions: manufacturer's installation instructions.

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 - Product Requirements.

1.6 AMBIENT CONDITIONS

.1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12 degrees C for 48 hours before, during, and 48 hours after, installation.

.2 Do not install tiles at temperatures less than 12 degrees C or above 38 degrees C.

.3 Do not apply epoxy mortar and grouts at temperatures below 15 degrees C or above 25 degrees C.

1.7 MAINTENANCE

.1 Extra Materials:
.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
.2 Provide minimum 12 pieces of each type and colour of tile required for project for maintenance use. Store where directed.
.3 Maintenance material same production run as installed material.

2.0 PRODUCTS

2.1 INTERIOR FINISH MATERIAL AND COLOUR SCHEDULE

.1 This schedule is attached in Section 09 06 00 and may list specific manufacturers related to patterns and colours upon which the colour scheme for the project is based.

.2 The following material specifications, which are prescriptive in nature, are presented in order to establish a quality of product upon which a price can be tendered.

.3 The Departmental Representative will consider substitute Products which meet or exceed the properties of the specified Product and are similar in material, construction, thickness, colour, texture, and overall quality, provided that proposals are submitted to the Departmental Representative complete with samples and whatever other data the Departmental Representative may require in order to evaluate the proposed substitute Product. If the Departmental Representative approves the proposed substitute Product, the Contractor will have the option of providing Product listed in the Finish schedule or an

approved alternative.

2.2 FLOOR TILE

.1 Porcelain tile: to CAN/CGSB-75-1-M88.
TL
.1 Size: 300mm x 300mm x 10mm
.2 Water Absorption: Conform to ISO 10545-3
.3 Co-efficient of Friction: Conform to ASTM C-1028
.4 Bending Strength: Conform to ISO 10545-4
.5 Abrasion Resistance: Conform to ISO 10545-6
.3 Chemical Resistance: Conform to ISO 10545-13
.4 Frost Resistance: Conform to ISO 10545-12
.4 Usage: High Traffic
.5 Colour & Pattern: Refer to Interior Finish Material and Colour Schedule.

2.3 MORTAR AND ADHESIVE MATERIALS

.1 Cement: to CSA-A5, type 10.

.2 Sand: to ASTM C 144, passing 16 mesh.

.3 Hydrated lime: to ASTM C 207, in accordance with TTMAC Installation Manual.

.4 Latex additive: formulated for use in cement mortar and thin set bond coat.

.5 Water: potable and free of minerals and chemicals which are detrimental to mortar and grout mixes.

.6 Adhesives:
.1 Maximum VOC limit 65 g/L to SCAQMD Rule 1168.

2.4 BOND COAT

.1 In accordance with TTMAC Installation Manual.

2.5 GROUT

.1 Colouring Pigments:
.1 Pure mineral pigments, lime-proof and non-fading, complying with ASTM C 979.
.2 Colouring pigments to be added to grout by manufacturer.
.3 Job coloured grout are not acceptable.
.4 All grouts: Colour as selected by Departmental Representative (premium grades).

.2 Cement Grout: to ANSI A108.1.
.1 Use one part white cement to one part white sand passing a number 30 screen.

.3 Latex Cement Grout: to ANSI A108.1, fast curing, high early strength, polymer-modified, stain resistant, sanded mix for floors, unsanded mix for walls and floors with polished tiles commercial tile grout.

.4 All grout: Colour as selected by Departmental Representative (premium grade).

2.6 ACCESSORIES

.1 Reinforcing mesh: 50 x 50 x 1.6 x 1.6 mm galvanized steel wire mesh, welded fabric design, in flat sheets.

.2 Transition Strips: stainless steel beveled transition, 90mm wide, suitable for wheel chair traffic.

.3 Reducer Strips: purpose made metal extrusion; zinc type; maximum slope of 1:2.

.4 Prefabricated Movement Joints: purpose made, having a Shore A Hardness not less than 60 and elasticity of plus or minus 40 percent when used in accordance to TTMAC Detail 301EJ.

.5 Sealant: in accordance with Section 07 92 00 - Joint Sealants.
.1 Sealants: maximum VOC limit 250 g/L to SCAQMD Rule 1168.

.6 Floor sealer and protective coating: to tile and grout manufacturers' recommendations.

.7 Edge Protection:
.1 For all wall transitions. Stainless steel trapezoid-perforated anchoring leg, which is secured in the mortar bond coat beneath the tile, and an 87° sloped vertical wall section that transfers point loads to the substrate and surface covering while protecting the tile edges from damage.
.2 For all floor tiles transitions. Stainless steel trapezoid-perforated anchoring leg, which is secured in the mortar bond coat and provides edge protection for adjacent tiles, and a self-adhesive backing strip that can be bonded to fixed building elements.

2.7 MIXES

.1 Cement:
.1 Scratch coat: 1 part cement, 1/5 to 1/2 parts hydrated lime to suit job conditions, 4 parts sand, 1 part water, and latex additive where required. Adjust water volume depending on water content of sand.
.2 Slurry bond coat: cement and water mixed to creamy paste. Latex additive may be included.
.3 Mortar bed for floors: 1 part cement, 4 parts sand, 1 part water. Adjust water volume depending on water content of sand. Latex additive may be included.
.4 Mortar bed for walls and ceilings: 1 part cement, 1/5 to 1/2 parts hydrated lime to suit job conditions, 4 parts sand and 1 part water. Adjust water volume depending on water content of sand.
.5 Leveling coat: 1 part cement, 4 parts sand, minimum 1/10 part latex additive, 1 part water including latex additive.
.6 Bond or setting coat: 1 part cement, 1/3 part hydrated lime, 1 part water.
.7 Measure mortar ingredients by volume.

.2 Dry set mortar: mix to manufacturer's instructions.

.3 Organic adhesive: pre-mixed.
.1 Adhesives: maximum VOC limit to SCAQMD Rule 1168.

.4 Mix bond and leveling coats, and grout to manufacturer's instructions.

.5 Adjust water volumes to suit water content of sand.

2.8 PATCHING AND LEVELING COMPOUND

.1 Cement base, acrylic polymer compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.

.2 Have not less than the following physical properties:
.1 Compressive strength - 25 MPa.
.2 Tensile strength - 7 MPa.
.3 Flexural strength - 7 MPa.
.4 Density - 1.9.

.3 Capable of being applied in layers up to 50 mm thick, being brought to feather edge, and being trowelled to smooth finish.

.4 Ready for use in 48 hours after application.

2.9 CLEANING COMPOUNDS

.1 Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

.2 Materials containing acid or caustic material are not acceptable.

3.0 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 WORKMANSHIP

.1 Do tile work in accordance with TTMAC Tile Installation Manual 2009/2010, "Ceramic Tile", except where specified otherwise.

.2 Apply tile or backing coats to clean and sound surfaces.

.3 Fit tile around corners, fitments, fixtures, drains and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.

.4 Maximum surface tolerance 1:800.

.5 Make joints between tile uniform and approximately 1.5 mm wide, plumb, straight, true, even and flush with adjacent tile. Ensure sheet layout not visible after installation. Align patterns.

.6 Lay out tiles so perimeter tiles are minimum 1/2 size.

.7 Sound tiles after setting and replace hollow-sounding units to obtain full bond.

.8 Make internal angles square, external angles rounded.

.9 Use edge protections for all exterior corners and exposed edges.

.10 Install divider strips at junction of tile flooring and dissimilar materials.

.11 Allow minimum 24 hours after installation of tiles, before grouting.

.12 Clean installed tile surfaces after installation and grouting cured.

3.3 FLOOR TILE

.1 Install in accordance with TTMAC details for suitable substrates and applicable conditions.

3.4 FLOOR SEALER AND PROTECTIVE COATING

.1 Apply in accordance with manufacturer's instructions.

3.5 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.6 CLEANING

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

END OF SECTION 09 30 13

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Gypsum Board Assemblies Section 09 21 16

1.2 REFERENCES

.1 ASTM International

.1 ASTM C 635/C 635M- 07, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.

.2 ASTM C 636/C 636M- 08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

.3 ASTM E 1477- 98a (2008), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

.2 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S102- 2007, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

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 ceiling panels and ceiling suspension system and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 33 - Health and Safety Requirements

3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada. The Engineer shall submit Model Letters of Assurance S-B and S-C along with signed and sealed shop drawings.

.2 Submit reflected ceiling plans for special grid patterns as indicated.

.3 Indicate lay-out, insert and hanger spacing and fastening details, splicing method for main and cross runners, change in level details, and acoustical unit support at ceiling fixture lateral bracing and accessories .

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work.

.3 Submit duplicate full size samples of each type of acoustical units.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 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 materials inside, level, under cover. Protect from weather, damage from construction operations and other causes, in accordance with manufacturer's printed instructions.

.3 Handle materials to prevent damage to edges or surfaces. Protect metal accessories and trim from being bent or damaged.

.4 Store and protect acoustic ceiling materials from nicks, scratches, and blemishes.

.5 Replace defective or damaged materials with new.

.3 Develop Construction Waste Management Plan related to Work of this Section.

2.0 PRODUCTS

2.1 COMPONENTS

.1 Acoustic units for suspended ceiling system.
- .1 ASTM E1264 Classification: Type III, Form 2.
- .2 Pattern CE, Fire Class A.
- .3 Flame spread rating of 25 or less in accordance with CAN/ULC-S102.
- .4 Smoke development Classification 50 or less in accordance with CAN/ULC-S102.
- .5 Noise Reduction Coefficient (NRC) designation of 0.55 to ASTM C423.
- .6 Light Reflectance (LR) range of 0.85 to ASTM E 1477.
- .7 CAC Rating: 35.
- .8 Edge type: Square Lay in 9.4 mm (15/16")
- .9 Colour: White.
- .10 Size: 610 mm x 1220 mm
- .11 Shape: flat.
- .12 VOC Formaldehyde: No Added.
- .13 Warranty: Minimum 30 year performance guarantee.

.2 Acoustical Suspension:
- .1 Intermediate duty system to ASTM C 635.
- .2 Basic materials for suspension system: commercial quality cold rolled steel, zinc coated.
- .3 Suspension system: non fire rated, two directional exposed tee bar grid.
- .4 Exposed tee bar grid components: shop painted satin sheen, white colour. Components die cut. Main tee with double web, rectangular bulb and 25 mm rolled cap on exposed face. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection.
- .5 Hanger wire: galvanized soft annealed steel wire, 3.6 mm diameter for access tile ceilings.
- .6 Hanger inserts: purpose made.
- .7 Carrying channels: of size, thickness and weight to carry spans; painted galvanized steel. Where spans exceed 1200mm use channels of adequate strength.
- .8 Accessories: splices, clips, wire ties, retainers and wall moulding flush reveal, to complement suspension system components, as recommended by system manufacturer.
- .9 ULC-approved hold-down clips where noted and required.
- .10 Profile: Standard flat 15"/16" grid.

2.3 ACCESSORIES

.1 Touch-up paint : in accordance with manufacturer's recommendations for surface conditions:
- .1 Paint: VOC limit 250 g/L maximum to and GS-11 and SCAQMD Rule 1113.

3.0 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 prior to acoustical ceiling installation.
- .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 Installation: in accordance with ASTM C 636 except where specified otherwise.

.2 Suspension System:
- .1 Erect ceiling suspension system after work above ceiling has been inspected by Consultants
- .2 Secure hangers to overhead structure using attachment methods as indicated acceptable to Departmental Representative.
- .3 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.
- .4 Lay out system according to reflected ceiling plan. Where not indicated, layout centerline of ceiling both ways, to provide balanced borders at room perimeter with border units not less than 50% of standard unit width
- .5 Install wall moulding to provide correct ceiling height.
- .6 Completed suspension system to support super-imposed loads, such as lighting fixtures diffusers grilles and speakers.
- .7 Support at light fixtures diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .8 Interlock cross member to main runner to provide rigid assembly.
- .9 Ensure finished ceiling system is square with adjoining walls and level within 1:1000.

3.3 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.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by acoustical ceiling installation.

END OF SECTION 09 51 99

1.0 GENERAL

1.1 DOCUMENTS

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

1.2 SECTION INCLUDES

.1 Prepare existing floor slab to receive new floor finish.

.2 Supply and install Linoleum Sheet Flooring and flash cove base.

1.3 RELATED SECTIONS

1.4 REFERENCES

.1 National Floor Covering Association (NFCA) Specification Manual.

.2 ASTM F1913 - 04(2010) Standard Specification for Vinyl Sheet Floor Covering Without Backing.

.3 Fire: ASTM E648 – Class 1; Smoke: ASTM E662 – 450 or less, CAN/ULC S102.2-M88.

.4 ASTM F1861 Standard Specification for Resilient Wall Base.

1.5 QUALITY ASSURANCE

.1 Work to be in accordance with manufacturer's standard specifications and supervised by a certified installer whose work has been approved by the manufacturer of the materials used.

1.6 SUBMITTALS

.1 General: Submit for Consultant's review, in accordance with Section 01 33 00.

.2 Samples: Submit duplicate 300 x 300 mm sample pieces of each type of resilient sheet flooring and, 300 mm long welding rod, 300mm long resilent base.

.3 Submit product literature of Materials, together with the proposed ordering and delivery schedule for all such materials.

.4 Substrate Tests: Submit copies of moisture and alkalinity tests.

.5 Closeout Submittals:

- .1 Submit 4 copies of the following for incorporation into manual specified in Section 01 77 00 Closeout Procedures.
- .2 Maintenance and operations data includes – methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
- .3 Warranty: Warranty documents specified herein.

.6 Replacement Material: After completion of work, deliver to project site and store where directed, replacement materials from same manufactured lot as materials installed, and as follows:

- .1 Sheet Flooring: 3m length x width of roll of sheet of each type, pattern and color installed. Identify each roll.
- .2 All maintenance materials to be in one piece as packaged by the manufacturer.

1.7 WARRANTY

.1 Guarantee: Provide a written guarantee in a form acceptable to Owner, that the work of this Section is guaranteed against shrinking, stretching, creeping, lack of adhesion and failure due to defective products and/or workmanship, for a period of five (5) years from the date of Substantial Performance.

1.8 ENVIRONMENTAL CONDITIONS

.1 Maintain air temperature and structural base temperature at flooring installation areas above 20°C for 72 hours before laying, during and 72 hours after installation.

.2 Moisture: Ensure substrate is within moisture limits and alkalinity limits prescribed by manufacturer.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Deliver and store materials in original containers, with manufacturer's labels and seals intact, in a dry weatherproof building.

.2 Maintain storage room temperature 20 degrees Celsius minimum for 72 hours minimum prior to laying.

1.10 JOB CONDITIONS

.1 Inspect all surfaces prior to start of work and report any unsatisfactory conditions to the Consultant. Starting work shall imply acceptance.

.2 Do not commence installation until moisture tests have been conducted and conditions are found to be acceptable.

.3 Obtain instruction from Consultant before starting work, concerning directions of patterns and grains of resilient coverings.

.4 Consult other trades in advance and make provisions for work of other trades to avoid cutting and patching.

.5 Protect surrounding surfaces from soiling; make good defects.

2.0 PRODUCTS

2.1 MATERIALS

.1 Sheet Linoleum - LN

.1 Homogeneous Sheet Linoleum Flooring to ASTM F2034 for commercial application

.2	Width:	2 meters
.3	Length:	32 meters
.4	Gauge:	2.5 mm
.5	Fire Performance:	ASTM E 648 – Class 1; ASTM E 662 less than 450
.6	Slip Resistance:	ASTM D-2047 – more than 0.6 COF
.7	Location:	Refer to drawing.

.8 Allow:

.1 Same colour for each washroom.

.2 Accessories:

.1 Metal transition / reducing & edge strips tapered to meet abutting materials, colour as selected by Consultant.

.2 Cove caps and 1" radius cove filler strips for cove base for sheet flooring areas.

.3 Primers and Levelers: Compatible types as recommended by flooring and adhesive manufacturers. Leveling and filler compound to be two-component type, consisting of liquid latex and dry-mixed filler, both supplied by same manufacturer.

.4 Adhesives: Waterproof type recommended by flooring manufacturer for the applicable conditions. Use special base adhesive.

.5 Sealer and Wax: Types recommended by resilient flooring manufacturer for material type and location and approved by Owner's Maintenance Department.

3.0 EXECUTION

3.1 INSPECTION

.1 Ensure concrete floors are smooth, dry and free from scale and other foreign matter likely to be detrimental to flooring.

.2 Take moisture and alkalinity tests. Use test method recommended by flooring manufacturer.

.3 Notify Consultant in writing of conditions that may effect finished flooring prior to start of work.

.4 Start of work implies acceptance of substrates.

3.2 PREPARATION

.1 Remove grease, dust and dirt remaining, fill cracks, holes, joints, with approved joint filler and rough grind to eliminate irregularities. Prohibit traffic until filler is cured and dry. Vacuum floor.

.2 Prep floor with concrete leveller as needed especially at location of demolished partition walls. Level floor within the same room.

.3 Carry out any additional preparation or work as may be required, in order to ensure a satisfactory installation, including flush leveled between floor finish changes.

.4 Where required, prime surfaces with primers recommended by adhesives manufacturer.

3.3 INSTALLATION

.1 General:

.1 All primers, where recommended, shall be mandatory.
.2 Provide reference markers. Use chalk or other non-permanent marking devices.
.3 All tools and methods of application shall be strictly in accordance with the manufacturer's printed instruction, unless specified otherwise.
.4 Work shall be installed in accordance with approved manufacturer's standard specifications, supervised by a certified installer whose work has been approved by the manufacturer of the materials being used.
.5 At completion, all flooring shall be completely adhered to the substrate throughout and free of bumps caused by installation over improperly prepared substrate and/or loose particles covering the substrate.
.6 Work shall be subject to nominal inspection of the manufacturer's representative during and after installation.

.2 Sheet Flooring:

.1 Apply adhesive uniformly using recommended trowel. Do not spread more adhesive than can be covered by flooring before initial set takes place.
.2 Lay flooring to produce a minimum number of seams. Border widths minimum 1/3 width of full material.
.3 Double cut sheet joints and continuously seal. Heat weld seams according to manufacturer's printed instructions.
.4 As installation progresses, and after installation, roll flooring with 45 kg minimum roller to ensure full adhesion.
.5 Cut flooring neatly around fixed objects. Continue flooring over areas that will be under built-in furniture.
.6 Terminate flooring at interior of door in openings where adjacent floor finish or colour is dissimilar.
.7 Install edge strips at unprotected or exposed edges where flooring terminates.
.8 Install continuous bead of clear silicone sealant at joint where flooring terminates against walls prior to installing rubber base.
.9 Install flooring to pattern and direction as directed by consultant. Distribute variation in shade of pattern of production run to obtain uniform effect. Abrupt variations will not be permitted.

.10 Caulk joint between flooring and steel floor plates, door frames, window frames and other similar conditions.

.11 Without damaging surfaces, remove any excess adhesive from the flooring and wall surfaces as the work proceeds.

.3 Base

.1 Apply to walls in continuous full lengths, using special base adhesive, with top uniform and level, to variation of 1:1000, and bottom of base uniformly tight to flooring with no gaps.

.2 Use pre-molded units at all external corners, with mitre cut internal corners.

.3 Joints to be plain, tight butt, inconspicuously placed where possible.

.4 Use 3 kg hand rollers to ensure base is firmly embedded in adhesive.

.5 Accurately scribe to frames, fitments and other obstructions.

.6 Install base on walls, columns, cabinets and fitments of rooms where base is scheduled or shown.

.7 Install toeless type at carpeted areas.

.4 Edge Strip:

.1 Apply edge strip at exposed edges of resilient flooring.

3.4 CLEANING AND WAXING

.1 Remove excess adhesive from floor, base and other surfaces without damage.

.2 Clean, seal and wax floor and base surfaces to flooring manufacturer's printed instructions.

3.5 PROTECTION

.1 Do not allow loads or traffic on flooring for at least 48 hours after installation.

.2 Do not flood with water for at least two (2) weeks after installation.

.3 Protect installed flooring in a manner recommended by flooring manufacturer against damage from rolling loads, the work of other trades, and including the placement of fixtures and furnishings.

.4 Provide manufacturer-recommended regular maintenance, until the date of Substantial Performance.

END OF SECTION 09 65 00

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Gypsum Board Assemblies — Section 09 21 16

.2 Room Finish Schedule — Section 09 06 00

1.2 REFERENCES

.1 Department of Justice Canada (Jus)
- .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33

.2 Environmental Protection Agency (EPA)
- .1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.4 Master Painters Institute (MPI)
- .1 MPI Architectural Painting Specifications Manual, latest edition.

.5 National Fire Code of Canada - 1995

.6 Society for Protective Coatings (SSPC)
- .1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

.7 Transport Canada (TC)
- .1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.3 QUALITY ASSURANCE

.1 Qualifications:
- .1 Contractor: minimum of five years proven satisfactory experience. Provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
- .2 Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
- .3 Apprentices: working under direct supervision of qualified trade's person in accordance with trade regulations.

.2 Conform to the standards contained in the Master Painters Institute Architectural Painting Specification Manual, latest edition (hereafter referred to as MPI Painting Specification Manual) for all painting products including preparation and application of materials. MPI Painting Specification Manual as issued by the local MPI Accredited Quality Assurance Association having jurisdiction.

.3 All paint manufacturers and products used shall be as listed under the "Approved Products" section of the MPI Painting Specification manual.

.4 Other paint materials shall be the highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and shall be compatible with other coating materials as required.

.5 Single-Source Responsibility: provide primers and undercoat paint produced by the same manufacturer as the finish coat.

.6 All painting and decorating work shall be inspected by Paint Inspection Agency (inspector)

acceptable to the specifying authority and the local MPI Accredited Quality Assurance Association. The painting contractor shall notify the Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of the project painting specification, plans and elevation drawings (including pertinent details) as well as a Finish Schedule.

.8 All surfaces requiring painting or repainting shall be inspected by the inspection agency who shall advise on all aspects of painting work including preparation, notifying the Consultant, the Contractor and the Trade Contractor of any defects or problems prior to commencing painting work or after the prime coat shows defects in the substrate, and as the work progresses.

.9 Standard of Acceptance:
- .1 Wall: No defects visible from a distance of 1000mm at 90° to surface.
- .2 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.4 SCHEDULING

.1 Submit work schedule for various stages of painting to Departmental Representative for review. Submit schedule minimum of 48 hours in advance of proposed operations.

.2 Obtain written authorization from Departmental Representative for changes in work schedule.

.3 Schedule painting operations to prevent disruption of occupants.

1.5 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 two 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 triplicates 200 x 300 mm sample panels of each paint, stain, or clear coating with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
  - .1 3 mm plate steel for finishes over metal surfaces.
  - .2 10 mm hardboard plywood for finishes over wood surfaces.
  - .3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
  - .4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
- .2 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface. 50mm concrete block for finishes over concrete or concrete masonry surfaces.
- .3 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
  - .1 Lead, cadmium and chromium: presence of and amounts.
  - .2 Mercury: presence of and amounts.
  - .3 Organochlorines and PCBs: presence of and amounts.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

.6 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:
.1 Product name, type and use.
.2 Manufacturer's product number.
.3 Colour numbers.
.4 MPI Environmentally Friendly classification system rating.

1.6 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 with temperature range 7 degrees C to 30 degrees C.

.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 Fire Safety Requirements:
.1 Provide one Type ABC fire extinguisher adjacent to storage area.
.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
.3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.7 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:
.1 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
.2 Provide continuous ventilation for seven days after completion of application of paint.
.3 Coordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
.4 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
.5 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless pre-approved written approval by Paint Inspection Agency Authority and product manufacturer, perform no painting when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.

.4 The relative humidity is under 85% or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:

.1 Allow new concrete and masonry to cure minimum of 28 days.

.2 15% for wood.

.3 12% for plaster and gypsum board.

.3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".

.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 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.

.4 Additional interior application requirements:

.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

.2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

1.8 GUARANTEE

.1 Furnish either the local *MPI* Accredited Quality Assurance Association's two (2) year guarantee, or, alternatively, a 100% two (2) year Maintenance Bond - both in accordance with *MPI* Painting Manual requirements. The Maintenance Bond shall warrant that all painting work has been performed in accordance with *MPI* Painting Manual requirements.

.2 Painting and decorating Subcontractors choosing the Maintenance Bond option shall provide a maintenance bond consent from a reputable surety company licensed to do business in Canada. Cash or certified check are not acceptable in lieu of surety consent.

2.0 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 Only qualified products with E2 "Environmentally Friendly" rating are acceptable for use on this project.

.4 Conform to latest MPI requirements for interior painting work including preparation and priming.

.5 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.

.6 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.

.7 Provide paint products meeting MPI "Environmentally Friendly" E2 ratings based on VOC (EPA Method 24) content levels.

.8 Use MPI listed materials having minimum E2 rating where indoor air quality (odour) requirements exist.

.9 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:
- .1 Water-based.
- .2 Non-flammable.
- .3 Manufactured without compounds which contribute to ozone depletion in the upper atmosphere.
- .4 Manufactured without compounds which contribute to smog in the lower atmosphere.
- .5 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.

.10 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

.11 Flash point: 61.0 degrees C or greater for water-borne surface coatings and recycled water-borne surface coatings.

.12 Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings does not release:
- .1 Matter in undiluted production plant effluent generating 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to natural watercourse or sewage treatment facility lacking secondary treatment.
- .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to natural watercourse or a sewage treatment facility lacking secondary treatment.

.13 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes to meet minimum "Environmentally Friendly" E2 rating.

.14 Recycled water-borne surface coatings must not contain:
- .1 Lead in excess of 600.0 ppm weight/weight total solids.
- .2 Mercury in excess of 50.0ppm weight/weight total product.
- .3 Cadmium in excess of 1.0ppm weight/weight total product.
- .4 Hexavelant chromium in excess of 3.0 ppm weight/weight total product.
- .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

2.2 COLOURS

.1 Refer to Interior Finish Material and Colour Schedule, Section 09 06 00 Finish Schedule and drawings for identification and location of colours.

.2 Interior Finish Material and Colour Schedule:
- .1 This schedule will be issued as a separate document and may list specific manufacturers

related to patterns and colours upon which the colour scheme for the project is based.

.2 The following material specifications, which are prescriptive in nature, are presented in order to establish a quality of product upon which a price can be tendered.

.3 The Departmental Representative will consider substitute Products which meet or exceed the properties of the specified Product and are similar in material, construction, thickness, colour, texture, and overall quality, provided that proposals are submitted to the Departmental Representative complete with samples and whatever other data the Departmental Representative may require in order to evaluate the proposed substitute Product. If the Departmental Representative approves the proposed substitute Product, the Contractor will have the option

.3 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from Departmental Representative for tinting of painting materials.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Use and add thinner in accordance with paint manufacturer's recommendations.Do not use kerosene or similar organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 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	Max.5	Max.10
Finish (flat) 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 7 -High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as indicated.

2.5 INTERIOR PAINTING SYSTEMS – NEW CONSTRUCTION

.1 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:

.1 INT 9.2B – High Performance Architectural Latex gloss level 3 finish for wall typical, gloss level 1 for ceiling.

2.6 INTERIOR REPAINTING SYSTEMS

.1 Plaster and gypsum board: : gypsum wallboard, drywall, "sheet rock type material", and textured

finishes.

.1 INT 9.2B – High Performance Architectural Latex gloss level 3 finish for wall typical, gloss level 1 for ceiling.

2.7 SOURCE QUALITY CONTROL

.1 Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility which has been accredited by Standards Council of Canada.

.1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.

.2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.

.3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

3.0 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.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:

.1 Stucco, plaster and gypsum board: 12%.

.2 Concrete: 12%.

.3 Clay and Concrete Block/Brick: 12%.

.4 Wood: 15%.

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 passing pedestrians, building occupants and general public in and about the building.

.2 Surface Preparation:

.1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and

re-installed after painting is completed.

.2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.

.3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:

.1 Remove dust, dirt, and other surface debris by wiping with dry, clean cloths or compressed air.

.2 Wash surfaces with a biodegradable detergent and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.

.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.

.4 Allow surfaces to drain completely and allow to dry thoroughly.

.5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.

.6 Use trigger operated spray nozzles for water hoses.

.7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.5 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.

.6 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.

.7 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. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes or vacuum cleaning.

.8 Touch up of shop primers with primer as specified.

.9 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

3.5 APPLICATION

.1 Method of application to be as approved by Departmental Representative. Apply paint by brush, roller, air or airless sprayer. 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.

.9 Finish closets and alcoves as specified for adjoining rooms.

.10 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.

.2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.5 Do not paint over nameplates.

.6 Keep sprinkler heads free of paint.

.7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.8 Paint fire protection piping red.

.9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
.10 Paint natural gas piping yellow.

.11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.12 Do not paint interior transformers and substation equipment.

3.7 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area

3.8 FIELD QUALITY CONTROL

.1 Interior painting and decorating work shall be inspected by a Paint Inspection Agency (inspector) acceptable to the specifying authority and local Painting Contractor's Association. Painting contractor shall notify Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of project painting specification, plans and elevation drawings (including pertinent details) as well as a Finish Schedule.

.2 Interior surfaces requiring painting shall be inspected by Paint Inspection Agency who shall notify Departmental Representative and General Contractor in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.

.3 Where "special" painting, coating or decorating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Departmental Representative.

.4 Standard of Acceptance:

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area

.5 Field inspection of painting operations to be carried out be independent inspection firm as designated by Departmental Representative.

.6 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.7 Cooperate with inspection firm and provide access to areas of work.

.8 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

3.9 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and patter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

3.10 PAINT COLOUR SCHEDULE

.1 To be issued as a separate document. Refer to Item 2.2 Colours of this section.

END OF SECTION 09 91 23

1.0 GENERAL

1.1 RELATED SECTIONS

.1 Section 03 30 05 - Cast-in-Place Concrete Short Form

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.2 The Aluminum Association

.3 The Carpet and Rug Institute (CRI)

.4 The National Floor Safety Institute (NFSI)

1.3 SUBMITTALS

.1 General: Submit the following in accordance with the conditions of contract and Division 1 specification section 01 33 00.

.2 Product data for frame specified including manufacturer's specifications and installation instructions.

.3 Shop drawings in sufficient detail showing layout of frame specified including details indicating construction relative to materials, direction of traffic, spline locations, profiles, anchors and accessories.

.4 Maintenance data in the form of manufacturer's printed instructions for cleaning and maintaining floor mats.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer.

1.5 PROJECT CONDITIONS

.1 Field measurements: Check actual openings for mats by accurate field measurements before fabrication. Record actual measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

.2 For recess application coordinate frame installation with concrete construction to ensure recess and frame anchorage are accurate and that the base is level and flat. Defer frame installation until building enclosure is complete and related interior finish work is in progress.

2.0 PRODUCTS

2.1 MATERIALS

.1 Aluminum – ASTM B 221, alloys 6063-T5, 6063-T6 for extrusions.

.2 Architectural Bronze – ASTM B 455, copper/zinc alloy C38500 for extrusions.

2.2 MAT FRAMES

.1 TNG Tapered Angle Frame shall be a 1/2" (12.7mm) deep recessed frame in 6063-T5 aluminum alloy. Frame colour shall be supplied in standard mill or one of 9 optional colours as offered by manufacturer. (Custom colours are available.) Choose from anodized or heavy-duty powder coat

finish.

3.0 EXECUTION

3.1 EXAMINATION

.1 Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

.2 Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

.1 Install the work of this section in strict accordance with the manufacturer's recommendations.

.2 Set mat at height recommended by manufacturer for most effective cleaning action.

.3 Coordinate top of mat surface with bottom of doors that swing across to provide ample clearance between door and mat.

3.3 CLEANING

.1 It is important to the life cycle of the entrance mat that a maintenance schedule be developed which includes regular vacuuming and extraction that correctly matches the amount of traffic the mat incurs.

3.4 DELIVERY, STORAGE, AND HANDLING

.1 After completing required frame installation and concrete work, provide temporary filler of plywood or fibreboard in recess, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and project is near time of substantial completion..

.2 Defer installation of floor mats until time of substantial completion of project.

END OF SECTION 12 48 23

1.0 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 78 00 - Closeout Submittals

.3 Section 09 91 23 - Interior Painting

.4 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC

1.2 EQUIPMENT LIST

.1 Complete list of equipment and materials to be used on this project and forming part of tender documents by adding manufacturer's name, model number and details of materials, and submit for approval.

.2 Submit for approval within 48 h after award of contract.

1.3 TRIAL USAGE

.1 Departmental Representative may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:

Washroom exhaust fans and controls.

1.4 PROTECTION OF OPENINGS

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.5 PAINTING

.1 To Section 09 91 23 - Interior Painting.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

1.6 INSPECTION OF WORK

.1 Departmental Representative shall inspect all work prior to it being concealed. All piping below ground must be approved prior to covering.

.2 All work shall be approved by all authorities having jurisdiction.

.3 All openings shall be sealed appropriately in particular in fire rated walls and floors. Sealing shall be inspected prior to covering.

1.7 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 30 - Closeout Submittals.

.2 Operation and maintenance manual to be approved by, and final copies deposited with, Departmental Representative before final inspection.

.3 Operation data to include:

.1 Control schematics for each system including environmental controls.

.2 Description of each system and its controls.

.3 Description of operation of each system at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for each system and each component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.4 Maintenance data shall include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.5 Performance data to include:

.1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified elsewhere.

.4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.6 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless so directed by Departmental Representative.

.2 Make changes as required and re-submit as directed by Departmental Representative.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual when need for same becomes apparent during demonstrations and instructions specified above.

1.8 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop drawings and product data shall show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances. eg. access door swing spaces.

.3 Shop drawings and product data shall be accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify as to current model production.

.5 Certification of compliance to applicable codes.

.4 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

1.9 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

1.10 AS-BUILT DRAWINGS

.1 Site records:

.1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of the work. Mark there on all changes as work progresses and as changes occur. This shall include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection at all times.

.2 As-built drawings:

.1 Prior to start of Testing, Adjusting and Balancing (TAB), finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).

.3 Submit to Departmental Representative for approval and make corrections as directed.

.4 TAB to be performed using as-built drawings.

.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.3 Submit copies of as-built drawings for inclusion in final TAB report.

1.11 WASTE MANAGEMENT AND DISPOSAL

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

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

.3 Separate for reuse and recycling and place in designated containers Steel Metal Plastic_ waste in accordance with Waste Management Plan. Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.

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

.5 Handle and dispose of hazardous materials in accordance with CEPA , TDGA , Regional and Municipal regulations.

.6 Fold up metal banding, flatten and place in designated area for recycling.

.7 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

2.0 PRODUCTS

Not Used.

3.0 EXECUTION

Not Used.

END OF SECTION

1.0 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 74 11 - Cleaning

.2 Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment

.3 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

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

1.3 WASTE MANAGEMENT AND DISPOSAL

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

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

.3 Separate for reuse and recycling and place in designated containers Steel Metal Plastic_ waste in accordance with Waste Management Plan. Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.

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

.5 Handle and dispose of hazardous materials in accordance with CEPA , TDGA , Regional and Municipal regulations.

.6 Fold up metal banding, flatten and place in designated area for recycling.

.7 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

2.0 PRODUCTS

Not used.

3.0 EXECUTION

3.1 CONNECTIONS TO EQUIPMENT

.1 In accordance with manufacturer's instructions unless otherwise indicated.

.2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.

.3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

3.2 CLEARANCES

.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.

.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer or as indicated (whichever is greater) without interrupting operation of other system, equipment, components.

3.3 DRAINS

.1 Install piping with grade in direction of flow except as indicated.

.2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.

.3 Pipe each drain valve discharge separately to above floor drain. Discharge to be visible.

.4 Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

.5 Performance Verification:

.1 Test to ensure trap on existing floor drain is fully and permanently primed.

.2 Ensure fixtures are properly anchored, connected to system and effectively vented.

.3 Affix applicable label (storm, sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

3.4 AIR VENTS

.1 Install manual air vents at high points in piping systems.

.2 Install isolating valve at each automatic air valve.

.3 Install drain piping to approved location and terminate where discharge is visible.

3.5 DIELECTRIC COUPLINGS

.1 General: Compatible with system, to suit pressure rating of system.

.2 Locations: Where dissimilar metals are joined.

.3 NPS 2 and under: isolating unions or bronze valves.

.4 Over NPS 2: Isolating flanges.

3.6 PIPEWORK INSTALLATION

.1 Screwed fittings jointed with Teflon tape.

.2 Protect openings against entry of foreign material.

.3 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.

.4 Assemble piping using fittings manufactured to ANSI standards.

.5 Saddle type branch fittings may be used on mains if branch line is no larger than half the size of main.

.1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.

.6 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

.7 Install concealed pipework to minimize furring space, maximize headroom, conserve space.

.8 Slope piping, except where indicated, in direction of flow for positive drainage and venting.

.9 Install, except where indicated, to permit separate thermal insulation of each pipe.

.10 Group piping wherever possible and as indicated.

.11 Ream pipes, remove scale and other foreign material before assembly.

.12 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.

.13 Provide for thermal expansion as indicated.

.14 Valves:

.1 Install in accessible locations.

.2 Remove interior parts before soldering.

.3 Install with stems above horizontal position unless otherwise indicated.

.4 Valves accessible for maintenance without removing adjacent piping.

.5 Install globe valves in bypass around control valves.

.6 Use gate valves at branch take-offs for isolating purposes except where otherwise specified.

.7 Install butterfly valves between weld neck flanges to ensure full compression of liner.

.8 Use chain operators on valves NPS 2-1/2 and larger where installed more than 2400 mm above floor in Mechanical Rooms.

.15 Check Valves:

.1 Install silent check valves on discharge of pumps and in vertical pipes with downward flow and elsewhere as indicated.

.2 Install swing check valves in horizontal lines on discharge of pumps and elsewhere as indicated.

3.7 SLEEVES

.1 General: Install where pipes pass through masonry, concrete structures, fire rated assemblies, and elsewhere as indicated.

.2 Material: Schedule 40 black steel pipe.

.3 Construction: Foundation walls and where sleeves extend above finished floors to have annular fins continuously welded on at mid-point.

.4 Sizes: 6 mm minimum clearance between sleeve and un-insulated pipe or between sleeve and insulation.

.5 Installation:

.1 Concrete, masonry walls, concrete floors on grade: Terminate flush with finished surface.

.2 Other floors: Terminate 25 mm above finished floor.

.3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.

.6 Sealing:

.1 Foundation walls and below grade floors: Fire retardant, waterproof non-hardening mastic.

.2 Elsewhere: Provide space for fire-stopping. Maintain fire rating integrity.

.3 Sleeves installed for future use: Fill with lime plaster or other easily removable filler.

.4 Ensure no contact between copper pipe or tube and sleeve.

3.8 ESCUTCHEONS

.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.

.2 Construction: One piece type with set screws. Chrome or nickel plated brass or type 302 stainless steel.

.3 Sizes: Outside diameter to cover opening or sleeve. Inside diameter to fit around pipe or outside of insulation if so provided.

3.9 PREPARATION FOR FIRESTOPPING

.1 Material and installation within annular space between pipes, ducts, insulation and adjacent fire separation to Section 07 84 00 - Firestopping.

.2 Uninsulated unheated pipes not subject to movement: No special preparation.

.3 Uninsulated heated pipes subject to movement: Wrap with non-combustible smooth material to permit pipe movement without damaging firestopping material or installation.

.4 Insulated pipes and ducts: Ensure integrity of insulation and vapour barriers.

3.10 FLUSHING OUT OF PIPING SYSTEMS

.1 Before start-up, clean interior of piping systems in accordance with requirements of Section 01 74 11 - Cleaning supplemented as specified in relevant sections of Division 23.

.2 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.11 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

.1 Advise Departmental Representative 48 hours minimum prior to performance of pressure tests.

.2 Pipework: Test as specified in relevant sections of Division 23.

.3 Maintain specified test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant sections of Division 23.

.4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.

.5 Conduct tests in presence of Departmental Representative.

.6 Pay costs for repairs or replacement, retesting, and making good. Departmental Representative to determine whether repair or replacement is appropriate.

.7 Insulate or conceal work only after approval and certification of tests by Departmental Representative.

3.12 EXISTING SYSTEMS

.1 Connect into existing piping systems at times approved by Departmental Representative.

.2 Request written approval 10 days minimum, prior to commencement of work.

.3 Be responsible for damage to existing plant by this work.

.4 Ensure daily clean-up of existing areas.

END OF SECTION

1.0 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 19 - Construction/Demolition Waste Management And Disposal.

.3 Section 01 78 00 - Closeout Submittals.

.4 Section 09 91 23 - Interior Painting.

.5 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

1.2 REFERENCES

.1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)

ASHRAE 90.1-[01], Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA cosponsored; ANSI approved; Continuous Maintenance Standard).

.2 Electrical Equipment Manufacturers' Association Council (EEMAC)

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

Material Safety Data Sheets (MSDS).

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 – Construction / Demolition Waste Management and Disposal, and with the Waste Reduction Workplan.

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

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Departmental Representative.

.5 Divert unused paint material from landfill to official hazardous material collections site approved by Departmental Representative

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

2.0 PRODUCTS

2.1 GENERAL

.1 Motors: high efficiency, in accordance with local Hydro company standards and to ASHRAE 90.1.

2.2 MOTORS

.1 Provide motors for mechanical equipment as specified.

.2 Motors under 373 W (1/2 HP) : speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 120 V, unless otherwise specified or indicated.

.3 Motors 373 W (1/2 HP) and larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40°C, 3 phase, 208 V, unless otherwise indicated.

2.3 TEMPORARY MOTORS

.1 If delivery of specified motor will delay completion or commissioning work, install motor approved by Departmental Representative for temporary use. Work will only be accepted when specified motor is installed.

2.4 DRIVE GUARDS

.1 Provide guards for unprotected drives.

.2 Provide means to permit lubrication and use of test instruments with guards in place.

.3 Install belt guards to allow movement of motors for adjusting belt tension.-

.4 Guard for flexible coupling:

.1 "U" shaped, minimum 1.6 mm thick galvanized mild steel.

.2 Securely fasten in place.

.3 Removable for servicing.

.5 Unprotected fan inlets or outlets:

.1 Wire or expanded metal screen, galvanized, 19 mm mesh.

.2 Net free area of guard: not less than 80% of fan openings.

.3 Securely fasten in place.

.4 Removable for servicing.

3.0 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 datasheet.

3.2 INSTALLATION

.1 Fasten securely in place.

.2 Make removable for servicing, easily returned into, and positively in position.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.

.2 Provide 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 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.4 CLEANING

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

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

1.0 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 19 - Construction/Demolition Waste Management And Disposal.

.3 Section 23 05 48 – Vibration and Seismic Controls for HVAC piping and Equipment

1.2 REFERENCES

.1 American National Standards Institute/ American Society of Mechanical Departmental Representatives (ANSI/ASME)

.1 ANSI/ASME B31.1-01, Power Piping, (SI Edition).

.2 American Society for Testing and Materials (ASTM)

.1 ASTM A125-1996, Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A307-00, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A563-00, Specification for Carbon and Alloy Steel Nuts.

.3 Factory Mutual (FM)

.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP58-1993, Pipe Hangers and Supports - Materials, Design and Manufacture.

.2 MSS SP69-1996, Pipe Hangers and Supports - Selection and Application.

.3 MSS SP89-1998, Pipe Hangers and Supports - Fabrication and Installation Practices.

.5 Underwriter's Laboratories of Canada (ULC)

1.3 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 DESIGN REQUIREMENTS

.1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.

.2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP58.

.3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.

.4 Design hangers and supports to support systems under all conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.

.5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment to be in accordance with MSS SP58.

1.5 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

1.6 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal

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

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

.3 Separate for reuse and recycling and place in designated containers Steel Metal Plastic_ waste in accordance with Waste Management Plan.

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

.5 Handle and dispose of hazardous materials in accordance with CEPA , TDGA , Regional and Municipal regulations.

.6 Fold up metal banding, flatten and place in designated area for recycling.

2.0 PRODUCTS

2.1 GENERAL

.1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP58.

.2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.2 PIPE HANGERS

.1 Finishes:

.1 Pipe hangers and supports: galvanized or painted with zinc-rich paint after manufacture.

.2 Use electro-plating galvanizing process.

.3 Ensure steel hangers in contact with copper piping are copper plated epoxy coated.

.2 Upper attachment structural: Suspension from lower flange of I-Beam.

.1 Cold piping NPS 2 maximum: Malleable iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip - Grinnell/Anvil fig. 61.

.2 Rod: 13 mm UL listed

.3 Cold piping NPS 2 1/2 or greater, all hot piping: Malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed to MSS-SP58 and MSS-SP69 - Grinnell/Anvil fig. 292.

.3 Upper attachment structural: Suspension from upper flange of I-Beam.

.1 Cold piping NPS 2 maximum: Ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed to MSS SP69 - Grinnell/Anvil Fig. 61.

.2 Cold piping NPS 2 1/2 or greater, all hot piping: Malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut UL listed - Grinnell/Anvil fig. 227.

.4 Upper attachment to concrete.

.1 Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter - Grinnell/Anvil, plate fig. 49, socket fig. 290, expansion case fig. 117.

.2 Concrete inserts: wedge shaped body with knockout protector plate UL listed to MSS SP69 - Hilti Model HSL or HVA.

.5 Hanger rods: threaded rod material to MSS SP58.

.1 Electro-galvanized/cadmium plated continuous threaded rod.

.2 Ensure that hanger rods are subject to tensile loading only.

.3 Provide linkages where lateral or axial movement of pipework is anticipated.

.4 Do not use 22 mm or 28 mm rod.

.5 Grinnell/Anvil fig. 146 or Myatt fig. 434

.6 Pipe attachments: material to MSS SP58.

.1 Attachments for steel piping: carbon steel black galvanized.

.2 Attachments for copper piping: copper plated black steel.

.3 Use insulation shields for hot pipework.

.4 Oversize pipe hangers and supports.

2.3 INSULATION PROTECTION SHIELDS

.1 Cold piping NPS 2 and under: protection shield with pipe insulation under shield with uninterrupted vapour barrier – Kingspan "K Block" – high density (64 kg/m³) insulation. Length designed for maximum 3 m span.

.2 Cold piping NPS 2-1/2 and over: protection shield with high density insulation under shield with uninterrupted vapour barrier – Kingspan "K Block" – high density insulation.

.3 Hot piping NPS 3 and under: protection shield with pipe insulation under shield with uninterrupted vapour barrier – Kingspan "K Block" – high density insulation

.4 Hot piping NPS 4 and over: Curved plate 300 mm long, with edges turned up protective welded-in centre plate saddle with insulation under saddle - Grinnell/Anvil fig. 160 to 166.

.5 Carbon steel to comply with MSS SP69.

2.4 WALL SUPPORTS

.1 Horizontal pipe adjacent to wall:

.1 Angle iron wall brackets with specified hangers.

.2 Vertical pipe adjacent to wall.

.1 Exposed pipe wall support for lateral movement restraint - Grinnell/Anvil fig. 262 or 263.

.2 Channel type support - Burndy, Canadian Strut, Cantruss or Unistrut - (arrangement to be acceptable to B.C. Boiler Inspection Department).

2.5 FLOOR SUPPORTS

.1 Horizontal pipe.

.1 As specified.

.2 Vertical pipe.

.1 Mid-point of risers between floor slabs - adjustable fabricated steel supports. Refer to Section 23 05 48 Seismic Restraints.

2.6 EQUIPMENT SUPPORTS

.1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of Section 05 12 23 - Structural Steel for Buildings. Submit calculations with shop drawings.

2.7 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

.1 Provide templates to ensure accurate location of anchor bolts.

2.8 OTHER EQUIPMENT SUPPORTS

.1 Submit structural calculations with shop drawings.

3.0 EXECUTION

3.1 INSTALLATION

.1 Install in accordance with manufacturer's instructions and recommendations.

.2 Vibration Control Devices:

.1 Install on piping systems at pumps, boilers, chillers, cooling towers, elsewhere as indicated.

.3 Clevis plates:

.1 Attach to concrete with 4 minimum concrete inserts, one at each corner.

.4 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

3.2 HANGER SPACING

.1 Plumbing piping: most stringent requirements of Canadian Plumbing Code Provincial Code authority having jurisdiction.

.2 Fire protection: to applicable fire code.

.3 For Gas Piping refer to Gas Code CAN/CGA-B149.1.

.4 Fuel oil piping: up to NPS 1/2: every 1.8 m.

.5 Copper piping: up to NPS 1/2: every 1.5 m.

.6 Flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.

Maximum Pipe Size: NPS	**Rod Diameter mm (ins)**	**Maximum Spacing Steel Pipe m (ft)**	**Maximum Spacing Copper Pipe m (ft)**
½	10 (3/8)	1.8 (6)	1.5 (5)

Maximum Pipe Size: NPS	Rod Diameter mm (ins)	Maximum Spacing Steel Pipe m (ft)	Maximum Spacing Copper Pipe m (ft)
¾, 1	10 (3/8)	2.4 (8)	1.8 (6)
1¼ , 1½	10 (3/8)	3.0 (10)	1.8 (6)

.7 Within 300 mm of each elbow.

.8 Pipework greater than NPS 12: to MSS SP69.

3.3 HANGER INSTALLATION

.1 Install / offset hanger so that rod is vertical under operating conditions.

.2 Adjust hangers to equalize load.

.3 Install hanger to provide minimum 12 mm (½") clear space between finished covering and adjacent work.

.4 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

.5 Support vertical piping at every other floor.

.6 Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

.7 Where practical, support riser piping independently of connected horizontal piping.

.8 Install plastic inserts between steel studs and piping.

.9 For beam clamps, extend hanger rod tight to underside of beam with top bolt and washer.

3.4 INSERTS

.1 Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams wherever practicable.

.2 Set inserts in position in advance of concrete work. Provide reinforcement rod in concrete for inserts carrying piping over 100 mm (4") or ducts over 1500 mm (60") wide.

.3 Where concrete slabs form finished ceiling, finish inserts, flush with slab surface.

.4 Where inserts are omitted, drill through concrete slab from below and provide rod with recessed square plate and nut above slab, in concealed locations.

.5 Provide a test mock up for review.

.6 Provide inserts for above chillers, pumps and sump pumps to permit equipment servicing. Provide an eyebolt.

.7 Inserts shall be installed in accordance with manufacturers recommendations and in no case closer than 2.1 m (7 ft.) apart.

3.5 HORIZONTAL MOVEMENT

.1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.

.2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.6 FINAL ADJUSTMENT

.1 Adjust hangers and supports:

.1 Ensure that rod is vertical under operating conditions.

.2 Equalize loads.

.2 Adjustable clevis:

.1 Tighten hanger load nut securely to ensure proper hanger performance.

.2 Tighten upper nut after adjustment.

.3 C-clamps:

.1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

.4 Beam clamps:

.1 Hammer jaw firmly against underside of beam.

END OF SECTION

1.0 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 74 19 - Construction/Demolition Waste Management And Disposal

.3 Section 23 05 93 - Testing, Adjusting and Balancing of HVAC

1.2 REFERENCES

.1 National Fire Protection Association (NFPA)

.1 NFPA 13-2010, Installation of Sprinkler Systems.

.2 National Building Code of Canada (NBC)

.3 SMACNA "Seismic Restraint Manual Guidelines for Mechanical Systems" (second edition), Seismic Hazard Level SHL A

1.3 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 SHOP DRAWINGS

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

.2 Provide separate shop drawings for each isolated system shop drawings complete with performance and product data.

.3 Provide detailed drawings of all seismic control measures for equipment and piping.

1.5 WASTE MANAGEMENT AND DISPOSAL

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

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

.3 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan. Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.

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

.5 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.

.6 Fold up metal banding, flatten and place in designated area for recycling.

.7 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

2.0 PRODUCTS

2.1 GENERAL

.1 Size and shape of bases type and performance of vibration isolation to be as indicated.

2.2 HANGERS

.1 Colour coded springs, rust resistant, painted box type hangers. Arrange to permit hanger box or rod to move through a 30o arc without metal to metal contact.

.2 Type H2 - stable spring, elastomeric washer, cup with moulded isolation bushing which passes through hanger box.

.3 Performance: as indicated.

2.3 SEISMIC CONTROL MEASURES

.1 Static equipment:

.1 Anchor equipment to equipment supports. Anchor equipment supports to structure.

.2 Suspended equipment:

.1 Use one or more of following methods depending upon site conditions and or as indicated:

.1 Install tight to structure.

.2 Cross brace in all directions.

.3 Brace back to structure.

.4 Cable restraint system.

.3 Seismic restraints:

.1 Cushioning action to be gentle and steady.

.2 Shall never reach metal-like stiffness.

.2 Vibration isolated equipment:

.1 Seismic control measures not to jeopardize noise and vibration isolation systems. Provide 6 to 9 mm clearance during normal operation of equipment and systems between seismic restraint and equipment.

.2 Incorporate seismic restraints into vibration isolation system to resist complete isolator unloading.

.3 As indicated.

.3 Piping systems:

.1 Fire protection systems: to NFPA 13.

.2 All piping systems: hangers longer than 300 mm; brace at each hanger.

.3 To be compatible with requirements for anchoring and guiding of piping systems.

.4 Bracing methods:

.1 Approved by Departmental Representative.

.2 Structural angles or channels.

.3 Cable restraint system incorporating grommets, shackles and other hardware to ensure alignment of restraints and to avoid bending of cables at connection points. Incorporate neoprene into cable connections to reduce shock loads.

3.0 EXECUTION

3.1 INSTALLATION

.1 Seismic control measures to meet requirements of NBC.

.2 Install vibration isolation equipment in accordance with manufacturer's instructions and adjust mountings to level equipment.

.3 Ensure piping, ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduit and ducting passage through walls and floors do not transmit vibrations.

.4 Unless indicated otherwise, support piping connected to isolated equipment with spring mounts or spring hangers with 25 mm minimum static deflection as follows:

.1 Up to NPS4: first 3 points of support. NPS5 to NPS8: first 4 points of support. NPS10 and Over: first 6 points of support.

.2 First point of support shall have a static deflection of twice deflection of isolated equipment, but not more than 50 mm.

.5 Where isolation is bolted to floor use vibration isolation rubber washers.

.6 Block and shim level bases so that ductwork and piping connections can be made to a rigid system at the operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.

.7 All seismic control works shall be reviewed and certified by a seismic engineer registered in BC and shall be retained by the contractor.

END OF SECTION

1.0 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 74 19 - Construction/Demolition Waste Management and Disposal

.3 Section 09 91 23 - Interior Painting

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.60-97, Interior Alkyd Gloss Enamel.

.2 CAN/CGSB-24.3-92, Identification of Piping Systems.

.2 National Fire Protection Association

.1 NFPA 13-2007, Installation of Sprinkler Systems.

1.3 PRODUCT DATA

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

.2 Product data to include paint colour chips, other products specified in this section.

1.4 SAMPLES

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

.2 Samples to include nameplates, labels, tags, lists of proposed legends.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal

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

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

.3 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan.

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

.5 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.

.6 Fold up metal banding, flatten and place in designated area for recycling.

2.0 PRODUCTS

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

.1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.

.2 Lettering and numbers to be raised or recessed.

.3 Information to include, as appropriate:

.1 Equipment: Manufacturer's name, model, size, serial number, capacity.

.2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

.1 Match new system nameplates to existing.

.2 Colours:

.1 Black letters, white background (except where required otherwise by applicable codes).

.3 Construction:

.1 3mm thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.

.4 Sizes:

.1 Conform to following table:

Size # mm	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

.2 Use maximum of 25 letters/numbers per line.

.5 Locations:

.1 Terminal cabinets, control panels: Use size # 5.

.2 Equipment in Mechanical Rooms: Use size # 9.

.6 Identification for PWGSC Preventive Maintenance Support System (PMSS):

.1 Use arrangement of Main identifier, Source identifier, Destination identifier.

.2 Equipment in Mechanical Room:

.1 Main identifier: Size #9.

.2 Source and Destination identifiers: Size #6.

.3 Terminal cabinets, control panels: Size #5.

.7 Equipment elsewhere: Sizes as appropriate.

2.3 EXISTING IDENTIFICATION SYSTEMS

.1 Where existing identification system does not cover for new work, use identification system specified this section.

.2 Before starting work, obtain written approval of identification system from Departmental Representative.

2.4 PIPING SYSTEMS GOVERNED BY CODES

.1 Apply existing identification system to new work.

2.5 IDENTIFICATION OF PIPING SYSTEMS

.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

.2 Pictograms:

.1 Where required, to Workplace Hazardous Materials Information System (WHMIS) regulations.

.3 Legend:

.1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.

.4 Arrows showing direction of flow:

.1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.

.2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.

.3 Use double-headed arrows where flow is reversible.

.5 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

.2 Length to accommodate pictogram, full length of legend and arrows.

.6 Materials for background colour marking, legend, arrows:

.1 Pipes and tubing 20 mm and smaller: Waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 All other pipes: Pressure sensitive plastic-coated cloth vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100%RH and continuous operating temperature of 150oC and intermittent temperature of 200oC.

.7 Colours and Legends:

.1 Where not listed, obtain direction from Departmental Representative.

.2 Colours for legends, arrows: To following table:

Background colour:	Legend, arrows:
Yellow	BLACK
Green	WHITE
Red	WHITE

.3 Background colour marking and legends for piping systems:

Contents	Background colour marking	Legend
** Add design temperature		
++ Add design temperature and pressure		
Hot water heating supply	Yellow	HEATING SUPPLY
Hot water heating return	Yellow	HEATING RETURN

2.6 IDENTIFICATION DUCTWORK SYSTEMS

.1 50 mm high stencilled letters and directional arrows 150 mm long x 50 mm high.

.2 Colours: Black, or co-ordinated with base colour to ensure strong contrast.

2.7 VALVES, CONTROLLERS

.1 Brass tags with 12 mm stamped identification data filled with black paint.

.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

2.8 CONTROLS COMPONENTS IDENTIFICATION

.1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.

.2 Inscriptions to include function and (where appropriate) fail-safe position.

2.9 LANGUAGE

.1 Identification to be in English and French.

3.0 EXECUTION

3.1 TIMING

.1 Provide identification only after all painting specified Section 09 91 23 - Interior Painting has been completed.

3.2 INSTALLATION

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Provide ULC and CSA registration plates as required by respective agency.

.3 Identify systems, equipment to conform to PWGSC PMSS.

3.3 NAMEPLATES

.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

.3 Protection

.1 Do not paint, insulate or cover in any way.

3.4 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

.1 Adjacent to each change in direction.

.2 At least once in each small room through which piping or ductwork passes.

.3 On both sides of visual obstruction or where run is difficult to follow.

.4 On both sides of separations such as walls, floors, partitions.

.5 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.

.6 At beginning and end points of each run and at each piece of equipment in run.

.7 At point immediately upstream of major manually operated or automatically controlled valves, dampers, etc. Where this is not possible, place identification as close as possible, preferably on upstream side.

.8 Identification to be easily and accurately readable from usual operating areas and from access points.

.9 Position of identification to be approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 VALVES, CONTROLLERS

.1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S"hooks.

.2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Departmental Representative. Provide one copy (reduced in size if required) in each operating and maintenance manual.

.3 Number valves in each system consecutively.

END OF SECTION

1.0 GENERAL

1.1 GENERAL

.1 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

1.2 QUALIFICATIONS OF TAB PERSONNEL

.1 Names of personnel it is proposed to perform TAB to be submitted to and approved by Departmental Representative within 90 days of award of contract.

.2 Provide documentation confirming qualifications, successful experience.

1.3 PURPOSE OF TAB

.1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads

.2 Adjust and regulate equipment and systems so as to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.

.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.4 EXCEPTIONS

.1 TAB of systems and equipment regulated by codes, standards to be to satisfaction of authority having jurisdiction.

1.5 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule so as to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.6 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

.2 Follow special start-up procedures specified elsewhere in Division 23.

1.7 OPERATION OF SYSTEMS DURING TAB

.1 Operate systems for length of time required for TAB and as required by Departmental Representative for verification of TAB reports.

1.8 START OF TAB

.1 Notify Departmental Representative 7 days prior to start of TAB.

.2 Start TAB when building is essentially completed, including:

.1 Installation of ceilings, doors, windows, other construction affecting TAB.

.2 Application of weatherstripping, sealing, caulking.

.3 All pressure, leakage, other tests specified elsewhere Division 23.

.4 All provisions for TAB installed and operational.

.5 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:

.1 Proper thermal overload protection in place for electrical equipment.

.2 Air systems:

.1 Filters in place, clean.

.2 Duct systems clean.

.3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.

.4 Correct fan rotation.

.5 Fire, smoke, volume control dampers installed and open.

.6 Access doors, installed, closed.

.7 Outlets installed, volume control dampers open.

1.9 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:

.1 Other HVAC systems: plus 5 %, minus 5 %.

1.10 ACCURACY TOLERANCES

.1 Measured values to be accurate to within plus or minus 2 % of actual values.

1.11 INSTRUMENTS

.1 Prior to TAB, submit to Departmental Representative list of instruments to be used together with serial numbers.

.2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

.3 Calibrate within 3 months of TAB. Provide certificate of calibration to Departmental Representative.

1.12 SUBMITTALS

.1 Submit, prior to commencement of TAB:

.1 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.13 PRELIMINARY TAB REPORT

.1 Submit for checking and approval of Departmental Representative, prior to submission of formal TAB report, sample of rough TAB sheets. Include:

.1 Details of instruments used.

.2 Details of TAB procedures employed.

.3 Calculations procedures.

.4 Summaries.

1.14 TAB REPORT

.1 Format to be in accordance with referenced standard.

.2 TAB report to show results in SI units and to include:

.1 Project record drawings.

.2 System schematics.

.3 Submit three (3) copies of TAB Report to Departmental Representative for verification and approval, in English in D-ring binders, complete with index tabs.

1.15 VERIFICATION

.1 Reported results subject to verification by Departmental Representative.

.2 Provide manpower and instrumentation to verify up to 30 % of reported results.

.3 Number and location of verified results to be at discretion of Departmental Representative.

.4 Bear costs to repeat TAB as required to satisfaction of Departmental Representative.

1.16 SETTINGS

.1 After TAB is completed to satisfaction of Departmental Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.

.2 Permanently mark settings to allow restoration at any time during life of facility. Markings not to be eradicated or covered in any way.

1.17 COMPLETION OF TAB

.1 TAB to be considered complete when final TAB Report received and approved by Departmental Representative.

1.18 AIR SYSTEMS

.1 Definitions: This section applies to exhaust fans EF-1 and EF-2.

.2 Standard: TAB to be to most stringent of this section or TAB standards of AABC, NEBB, SMACNA, ASHRAE.

.3 Qualifications: personnel performing TAB to be current member in good standing of AABC or NEBB qualified to standards of AABC or NEBB.

.4 Quality assurance: Perform TAB under direction of supervisor qualified by to standards of AABC or NEBB.

.5 Measurements to include, but not limited to, following as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.

.6 Locations of equipment measurements: To include, but not be limited to, following as appropriate:

.1 Inlet and outlet of dampers, fan, other equipment causing changes in conditions.

.2 At controllers, controlled device.

.7 Locations of systems measurements to include, but not be limited to, following as appropriate: Main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

1.19 POST- OCCUPANCY TAB

.1 Measure DBT, WBT (or %RH), air velocity, air flow patterns, NC levels, in occupied zone of specified/affected areas:

.2 Participate in systems checks twice during Warranty Period - #1 approximately 3 months after acceptance and #2 within 1 month of termination of Warranty Period.

2.0 PRODUCTS

Not used.

3.0 EXECUTION

Not used.

END OF SECTION

1.0 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for duct accessories including flexible connections, access doors, vanes and collars.

.2 Sustainable requirements for construction and verification.

.2 Related Sections:

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 29.06 – Health and Safety Requirements

.3 Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

.4 Section 01 78 00 - Closeout Submittals.

.5 Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

1.2 REFERENCES

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

.1 Material Safety Data Sheets (MSDS).

.2 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

.1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible, latest edition.

.2 SMACNA HVAC Air Duct Leakage Test Manual, latest edition.

.3 IAQ Guideline for Occupied Buildings Under Construction, latest edition.

.3 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

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

.1 ASTM A480/A480M-03c, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

.2 ASTM A635/A635M-02, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.

.3 ASTM A653/A653M-03, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.5 Department of Justice Canada (Jus).

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33 .

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

.1 Material Safety Data Sheets (MSDS).

.7 National Fire Protection Association (NFPA).

.1 NFPA 90A-02, Standard for the Installation of Air-Conditioning and Ventilating Systems.

1.3 SUBMITTALS

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

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 30 - Closeout Submittals.

1.4 QUALITY ASSURANCE

.1 Certification of Ratings:

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Indoor Air Quality (IAQ) Management Plan.

.1 During construction meet or exceed the requirements of SMACNA IAQ Guideline for Occupied Buildings under Construction.

1.5 WASTE MANAGEMENT AND DISPOSAL

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

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

.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins recycling in accordance with Waste Management Plan (WMP).

.4 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan (WMP).

.5 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.

2.0 PRODUCTS

2.1 GENERAL

.1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 SEAL CLASSIFICATION

.1 Classification as follows:

Maximum Pressure Pa	SMACNA Seal Class
500	C
250	C
125	C
125	Unsealed

.2 Seal classification:

.1 Class C: transverse joints and connections made air tight with sealant, tape or combination thereof. Longitudinal seams unsealed.

.2 Unsealed seams and joints.

2.3 SEALANT

.1 Sealant: oil resistant, polymer type flame resistant duct sealant. Temperature range of minus 30 degrees C to plus 93 degrees C.

2.4 TAPE

.1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm wide.

2.5 DUCT LEAKAGE

.1 In accordance with SMACNA HVAC Air Duct Leakage Test Manual.

2.6 FITTINGS

.1 Fabrication: to SMACNA

.2 Radiused elbows.

.1 Rectangular: standard radius: 1.5 times width of duct

.2 Round: smooth radius.

.3 Mitred elbows, rectangular:

.1 To 400 mm: with single thickness turning vanes.

.2 Over 400 mm: with double thickness turning vanes.

.4 Branches:

.1 Rectangular main and branch: with radius on branch 1.5 times width of duct.

.2 Round main and branch: enter main duct at 45 degrees.

.3 Provide volume control damper in branch duct near connection to main duct.

.4 Main duct branches: with splitter damper.

.5 Transitions:

.1 Diverging: 20 degrees maximum included angle.

.2 Converging: 30 degrees maximum included angle.

.6 Offsets:

.1 Full radiused elbows

.7 Obstruction deflectors: maintain full cross-sectional area.

2.7 FIRE STOPPING

.1 Retaining angles around duct, on both sides of fire separation.

.2 Fire stopping material and installation must not distort duct.

2.8 GALVANIZED STEEL

.1 Lock forming quality: to ASTM A653/A653M, Z90 zinc coating.

.2 Thickness, fabrication and reinforcement: to SMACNA

.3 Joints: to SMACNA

2.9 HANGERS AND SUPPORTS

.1 Hangers and Supports: in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

.2 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct.

.3 Maximum size duct supported by strap hanger: 500

.4 Hanger configuration: to SMACNA.

.5 Hangers: galvanized steel angle with galvanized steel rods to SMACNA following table:

Duct Size (mm)	Angle Size (mm)	Rod Size (mm)
up to 750	25 x 25 x 3	6
751 to 1050	40 x 40 x 3	6
1051 to 1500	40 x 40 x 3	10
1501 to 2100	50 x 50 x 3	10
2101 to 2400	50 x 50 x 5	10
2401 and over	50 x 50 x 6	10

.6 Upper hanger attachments:

.1 For concrete: manufactured concrete inserts.

.2 For steel joist: manufactured joist clamp

.3 For steel beams: manufactured beam clamps

3.0 EXECUTION

3.1 GENERAL

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

.2 Do work in accordance with NFPA 90A AND SMACNA.

.3 Do not break continuity of insulation vapour barrier with hangers or rods.

.4 Support risers in accordance with SMACNA

.5 Install breakaway joints in ductwork on sides of fire separation.

.6 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.

3.2 HANGERS

.1 Strap hangers: install in accordance with SMACNA.

.2 Angle hangers: complete with locking nuts and washers.

.3 Hanger spacing: in accordance with SMACNA.

3.3 SEALING AND TAPING

.1 Apply sealant to outside of joint to manufacturer's recommendations.

.2 Bed tape in sealant and recoat with minimum of one coat of sealant to manufacturers recommendations.

3.4 FIELD QUALITY CONTROL

.1 Contractor's Verification, include:

.1 Materials and resources.

.2 Storage and collection of recyclables.

.3 Construction waste management.

.4 Resource reuse.

.5 Recycled content.

.6 Local/regional materials.

.7 Low-emitting materials.

3.5 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

1.0 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 29.06 – Health and Safety Requirements

.3 Section 01 74 19 - Waste Management And Disposal.

.4 Section 01 78 00 - Closeout Submittals.

.5 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC

1.2 REFERENCES

.1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible, 2005.

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 air duct accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Indicate:

.1 Flexible connections.

.2 Duct access doors.

.3 Turning vanes.

.4 Instrument test ports.

.3 Waste Management and Disposal

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

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

.3 Separate for reuse and recycling and place in designated containers Steel Metal Plastic_ waste in accordance with Waste Management Plan.

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

.5 Handle and dispose of hazardous materials in accordance with CEPA , TDGA , Regional and Municipal regulations.

.6 Fold up metal banding, flatten and place in designated area for recycling.

1.4 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 in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect air duct accessories from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

2.0 PRODUCTS

2.1 GENERAL

.1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 FLEXIBLE CONNECTIONS

.1 Frame: galvanized sheet metal frame 0.62 mm [24 ga] thick with fabric clenched by means of double locked seams.

.2 Material:

.1 Fire resistant, self-extinguishing, neoprene coated glass fabric, temperature rated at minus 40 degrees C to plus 90 degrees C, density of 1.3 kg/m^2.

2.3 ACCESS DOORS IN DUCTS

.1 Non-Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.

.2 Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.

.3 Gaskets: neoprene.

.4 Hardware:

.1 Up to 300 x 300 mm: two sash locks.

.2 301 to 450 mm: four sash locks.

.3 451 to 1000 mm: piano hinge and minimum two sash locks.

.4 Doors over 1000 mm: piano hinge and two handles operable from both sides.

.5 Hold open devices.

.6 300 x 300 mm glass viewing panels.

2.4 TURNING VANES

.1 Factory or shop fabricated single thickness with trailing edge, to recommendations of SMACNA and as indicated.

2.5 INSTRUMENT TEST

.1 1.6 mm thick steel zinc plated after manufacture.

.2 Cam lock handles with neoprene expansion plug and handle chain.

.3 28 mm minimum inside diameter. Length to suit insulation thickness.

.4 Neoprene mounting gasket.

2.6 SPIN-IN COLLARS

.1 Conical galvanized sheet metal spin-in collars with lockable butterfly damper.

.2 Sheet metal thickness to co-responding round duct standards.

3.0 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for air duct accessories 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 Flexible Connections:

.1 Install in following locations:

.1 Inlets and outlets to supply air units and fans.

.2 Inlets and outlets of exhaust and return air fans.

.3 As indicated.

.2 Length of connection: 100 mm.

.3 Minimum distance between metal parts when system in operation: 75 mm.

.4 Install in accordance with recommendations of SMACNA.

.5 When fan is running:

.1 Ducting on sides of flexible connection to be in alignment.

.2 Ensure slack material in flexible connection.

.2 Access Doors and Viewing Panels:

.1 Size:

.1 300 x 300 mm for servicing entry.

.2 As indicated.

.2 Locations:

.1 Fire and smoke dampers.

.2 Control dampers.

.3 Devices requiring maintenance.

.4 Required by code.

.5 Reheat coils.

.6 Elsewhere as indicated.

.3 Instrument Test Ports:

.1 General:

.1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.2 Locate to permit easy manipulation of instruments.

.3 Install insulation port extensions as required.

.4 Locations:

.1 For traverse readings:

.1 Ducted inlets to roof and wall exhausters.

.2 Inlets and outlets of other fan systems.

.3 Main and sub-main ducts.

.4 And as indicated.

.2 For temperature readings:

.1 At outside air intakes.

.2 Downstream of junctions of two converging air streams of different temperatures.

.3 And as indicated.

.4 Turning Vanes:

.1 Install in accordance with recommendations of SMACNA and as indicated.

3.3 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 in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

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

END OF SECTION

1.0 GENERAL

1.1 REFERENCES

.1 Sheet Metal and Air Conditioning National Association (SMACNA)

.1 SMACNA HVAC Duct Construction Standards, Metal and Flexible – 2006.

1.2 PRODUCT DATA

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

1.3 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal

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

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

.3 Separate for reuse and recycling and place in designated containers Steel Metal Plastic_ waste in accordance with Waste Management Plan.

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

.5 Handle and dispose of hazardous materials in accordance with CEPA , TDGA , Regional and Municipal regulations.

.6 Fold up metal banding, flatten and place in designated area for recycling.

2.0 PRODUCTS

2.1 GENERAL

.1 Manufacture to SMACNA standards.

2.2 SINGLE BLADE DAMPERS

.1 Of same material as duct, but one sheet metal thickness heavier. V-groove stiffened.

.2 Size and configuration to recommendations of SMACNA, except maximum height 100 mm.

.3 Locking quadrant with shaft extension to accommodate insulation thickness.

.4 Inside and outside bronze end bearings.

.5 Channel frame of same material as adjacent duct, complete with angle stop.

3.0 EXECUTION

3.1 INSTALLATION

.1 Install where indicated.

.2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.3 For supply, return and exhaust systems, locate balancing dampers in each branch duct.

.4 Runouts to registers and diffusers: install single blade damper located as close as possible to main ducts.

.5 All dampers to be vibration free.

.6 Ensure damper operators are observable and accessible.

3.2 FIELD QUALITY CONTROL

.1 Contractor's Verification, include:

.1 Materials and resources.

.2 Storage and collection of recyclables.

.3 Construction waste management.

.4 Resource reuse.

.5 Recycled content.

.6 Local/regional materials.

.7 Low-emitting materials.

END OF SECTION

1.0 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.

.3 Section 23 33 00 - Air Duct Accessories.

1.2 REFERENCES

.1 Air Movement and Control Association (AAMC)

.1 MCA 99, Standards Handbook.

.2 AMCA 300, Reverberant Room Method for Sound Testing of Fans.

.3 AMCA 301, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

.2 American National Standards Institute (ANSI)

.1 ANSI/ASHRAE 51/AMCA 210, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

.3 Canadian General Standards Board (CGSB)

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

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

.1 Material Safety Data Sheets (MSDS).

1.3 SYSTEM DESCRIPTION

.1 Performance Requirements:

.1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards in force.

.2 Capacity: flow rate, total static pressure, bhp and W, efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.

.3 Fans: statically and dynamically balanced, constructed in conformity with AMCA 99.

.4 Sound ratings: comply with AMCA 301, tested to AMCA 300.

.5 Performance ratings: based on tests performed in accordance with ANSI/AMCA 210.

1.4 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.5 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Include :

.1 Fan performance curves showing specified point of operation.

.2 Sound rating data.

.3 Motors, sheaves, bearings, shaft details.

.4 Minimum performance achievable with variable speed controllers.

.3 Provide:

.1 Fan performance curves showing point of operation, BHP and kW, and efficiency.

.2 Sound rating data at point of operation.

.3 Section 01 33 00 - Submittal Procedures.

1.6 CERTIFICATIONS

.1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered from independent testing agency signifying adherence to codes and standards in force.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal

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

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

.3 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan.

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

.5 Handle and dispose of hazardous materials in accordance with CEPA , TDGA , Regional and Municipal regulations.

.6 Fold up metal banding, flatten and place in designated area for recycling.

1.8 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.9 EXTRA MATERIALS

.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Furnish list of individual manufacturer's recommended spare parts for equipment such as bearings and seals, and addresses of suppliers, together with list of specialized tools necessary for adjusting, repairing or replacing, for placement into operating manual.

1.10 MANUFACTURED ITEMS

.1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards in force.

2.0 PRODUCTS

2.1 FANS GENERAL

.1 Capacity: flow rate, total static pressure, bhp, W, efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.

.2 Fans: statically and dynamically balanced, constructed in conformity with AMCA 99.

.3 Sound ratings: comply with AMCA 301, tested to AMCA 300. Unit shall bear AMCA certified sound rating seal.

.4 Performance ratings: based on tests performed in accordance with ANSI/AMCA 210, and ANSI/ASHRAE 51. Unit shall bear AMCA certified rating seal, except for propeller fans smaller than 300 mm diameter.

.5 Bearings: sealed lifetime heavy duty grease lubricated ball or roller bearings of self aligning type with oil retaining, dust excluding seals and a certified minimum rated life of 100,000 h.

.6 Motors:

.1 In accordance with Section 23 05 13 - Common Motors Requirements for HVAC Equipment supplemented as specified herein.

.2 For use with variable speed controllers.

.3 Sizes as specified.

.7 Accessories and hardware: matched sets of V-belt drives, adjustable motor bases, belt guards, coupling guards fan inlet and outlet safety screens as indicated and as specified in Section 23 05 13 - Common Motor Requirements for HVAC Equipment. Inlet and outlet dampers and vanes and as indicated.

.8 Factory primed before assembly in colour standard to manufacturer.

.9 Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.

.10 Vibration isolation: to Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.

.11 Flexible connections: to Section 23 33 00 - Air Duct Accessories.

2.2 FANS – CEILING EXHAUST

.1 Minimum requirements:

.1 Centrifugal blower, motor vibration isolated.

.2 Built-in backdraft damper.

.3 White plastic exhaust grille.

.4 Adjustable hanger bracket.

.5 Pre-wired outlet box, plug-in receptacle.

.2 Accessories

.1 Solid state speed control – where scheduled.

.3 Fan shall be installed in ceiling space.

.4 Standard of Acceptance:

.1 Greenheck, Cook, Carnes

3.0 EXECUTION

3.1 FAN INSTALLATION

.1 Install fans as indicated, complete with resilient mountings specified in Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment, flexible electrical leads and flexible connections in accordance with Section 23 33 00 - Air Duct Accessories.

.2 Bearings and extension tubes to be easily accessible.

.3 Access doors and access panels to be easily accessible.

3.2 ANCHOR BOLTS AND TEMPLATES

.1 Size anchor bolts to withstand seismic acceleration and velocity forces as specified.

3.3 FIELD QUALITY CONTROL

.1 Contractor's Verification, include:

.1 Materials and resources.

.2 Storage and collection of recyclables.

.3 Construction waste management.

.4 Resource reuse.

.5 Recycled content.

.6 Local/regional materials.

.7 Low-emitting materials.

3.4 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

1.0 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 29.06 – Health and Safety Requirements

.3 Section 01 74 19 - Waste Management And Disposal.

.4 Section 01 78 00 - Closeout Submittals.

.5 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC

1.2 REFERENCES

.1 ASTM International

.1 ASTM E90-[09], Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

.2 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

1.3 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Indicate the following:

.1 Capacity.

.2 Throw and terminal velocity.

.3 Noise criteria.

.4 Pressure drop.

.5 Neck velocity.

1.4 SAMPLES

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

.2 Samples are required for following:

.1 As indicated.

1.5 CERTIFICATIONS

.1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal

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

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

.3 Separate for reuse and recycling and place in designated containers Steel Metal Plastic_ waste in accordance with Waste Management Plan.

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

.5 Handle and dispose of hazardous materials in accordance with CEPA , TDGA , Regional and Municipal regulations.

.6 Fold up metal banding, flatten and place in designated area for recycling.

1.7 EXTRA MATERIALS

.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Include:

.1 Keys for volume control adjustment.

.2 Keys for air flow pattern adjustment.

2.0 PRODUCTS

2.1 GENERAL

.1 To meet capacity, pressure drop, terminal velocity, throw, noise level, neck velocity as indicated.

.2 Frames:

.1 Full perimeter gaskets.

.2 Plaster frames where set into plaster or gypsum board at all locations and as specified.

.3 Concealed fasteners.

.3 Concealed manual volume control damper operators.

.4 Seismic clips.

.5 Colour: Baked enamel colour B12.

2.2 LOUVERS- SATIONARY

.1 General:

.1 Extruded aluminum frames and blades.

.2 All welded construction with exposed joints ground flush and smooth or mechanically fastened with stainless steel fasteners.

.3 Lower assembly sealed and watertight.

.4 Removable 1.3 mm [16 ga] dia. aluminum wire birdscreen with 12 mm [1/2"] mesh. Birdscreen mounted in 0.66 mm [20 ga] thick aluminum folded frame. Frame to be installed inside louvre.

.5 Factory applied baked enamel finish to Consultants colour choice.

.2 Specific:

.1 Drawing designation - type "..L-1.".

.2 Frame 100 mm [4"] deep.

.3 100 mm [4"] deep blades inclined at 45 deg. to the horizontal.

.4 Blades at 90 mm [3-1/2"] on centres.

.5 Blades arranged with up-turned rain stops on trailing edges and drip channels on leading edges.

.6 Jamb drainage channels.

.7 Blades and frame 2 mm [12 gauge] thick extruded aluminum.

.8 Standard of Acceptance: Airolite ; Nailor, E.H. Price.

3.0 EXECUTION

3.1 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Install with flat head oval head stainless steel cadmium plated screws in countersunk holes where fastenings are visible.

.3 Verify on site whether the ceiling grid is imperial or metric and install corresponding grilles and diffusers.

END OF SECTION

1.0 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, 27, 28, 33, 34 & 48 in the Master Format or the Canadian Master Specifications.

.3 The word "Provide" shall mean "Supply and Install" the products and services specified. "As Indicated" means that the item(s) specified are shown on the drawings.

.4 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 equipment and wiring systems.

.8 Connect to equipment specified in other Sections and to equipment supplied and installed by other Contractors or by the Owner. Uncrate equipment, move in place and install complete; start-up and test. Include all field assembly of loosely/separately packaged accessories

.9 "Departmental Representative" shall mean Stantec Consulting Ltd.

1.2 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 CSA C22.1 Pages xxix - xxxii for related 'Reference Publications'

.4 Refer to NBCC Table 1.3.1.2 for applicable codes and the related revisions.

.5 Comply with local electrical bulletins and by-laws relating to the Authority Having Jurisdiction (AHJ).

.6 Install overhead and underground systems in accordance with CSA C22.3 No.1 (current adopted edition) - except where specified otherwise.

.7 Preferred Voltage Levels for AC Systems, 0-50,000V in accordance with CAN3-C235 (current adopted edition)

1.3 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.4 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.

1.5 SUBMITTALS

.1 Submittals to be in accordance with Division 01.

.2 Product Data: submit WHMIS MSDS in accordance with Division 01 - Sustainable Requirements and Division 02- Hazardous Materials

.3 Shop Drawings:

- .1 Submit shop drawings, product data and samples in accordance with Division 01. The submission shall be reviewed, signed and processed as described in Division 01.
- .2 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.
- .3 Where applicable, include wiring, line and schematic diagrams. Include wiring drawings or diagrams showing interconnection with work of other Sections.
- .4 Content
  - .1 Shop drawings submitted title sheet.
  - .2 Data shall be specific and technical.
  - .3 Identify each piece of equipment.
  - .4 Information shall include all scheduled data.
  - .5 Advertising literature will be rejected.
  - .6 The project and equipment designations shall be identified on each document.
  - .7 Information shall be given in S.I. [Imperial] units.
  - .8 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 Detailed drawings of bases, supports and anchor bolts.
    - .4 Control explanation and internal wiring diagrams for packaged equipment.
    - .5 A written description of control sequences relating to the schematic diagrams.

.4 Format

- .1 Black line prints 216 mm x 280 mm [8-1/2" x 11"] or 280 mm x 430 mm [11" x 17"].
- .2 Larger drawings may be submitted on reproducible single sheet media (ie not bound) with space for stamps and signatures - master set plus one working copy.
- .3 Bill of Quantities for related components, identified by model number, listed on the front cover with item identification numbers.

.5 Number of copies:

.1 Provide number of copies indicated in Section Division 01 with a minimum of 2 copies to be retained by the Departmental Representative.

.6 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 Representatives.

.7 Keep one copy of shop drawings and product data, on site, available for reference.

.8 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.

.9 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 AHJ. On completion of the Work, furnish final unconditional certificates of approval by the inspecting authorities.

1.6 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 respecting manpower vocational training and qualification.

.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.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Material Delivery Schedule: provide Consultant with schedule within 4 weeks after award of Contract.

.2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and/or recycling in accordance with Division 01 Construction/Demolition Waste Management and Disposal.

1.8 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.

1.9 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.

1.10 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.

1.11 ASBESTOS REMOVAL

.1 Refer to specification Division 01 for procedures, removal and disposal of asbestos.

.2 If during renovations / demolition, asbestos is discovered (or material suspected to be asbestos), all work in that area shall immediately cease and the General Contractor advised. The General Contractor shall take immediate appropriate action to verify presence of friable asbestos and be responsible for the removal of all friable asbestos.

.3 This division will not be entitled to a claim for any delays resulting from the investigation of or removal of asbestos.

1.12 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.

1.13 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 Owner, 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 Architect and 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.

1.14 SPRINKLER PROOF REQUIREMENTS

.1 All equipment and wiring systems shall be sprinklerproof standard where sprinkler fire protection systems are installed.

.2 In rooms where electrical equipment is installed surface mounted, electrical equipment contained in these rooms to be protected by non-combustible driphoods, shields, and gasketed doors as applicable to inhibit water ingress into electrical equipment. Exposed conduits connected to equipment to utilize watertight connectors. Top entry to be avoided where possible

.3 In particular all unit substations, transformers, switchgear, motor control and panelboard shop drawings shall be certified 'sprinkler proof' design.

1.15 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.

1.16 REUSED EQUIPMENT

.1 Where existing equipment is being relocated and re-used, check and report on the condition to the Departmental Representative before reinstallation. Protect and carefully store equipment designated for reuse.

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 existing services and the existing building(s) must be maintained in operation. Provide and install temporary services as required.

.3 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 SEQUENCE OF WORK

.1 Before interrupting major services notify the Owner well in advance and arrange an acceptable schedule for the interruptions.

.2 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.

.3 Include for the cost of all work that may be required out of regular hours to minimize the period of service interruption when modifying the existing systems.

.4 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.

1.19 BUILDING OPERATION DURING CONSTRUCTION

.1 In order to minimize operational difficulties for the existing building staff, the various trades must cooperate with the owner throughout the entire construction period and particularly ensure that noise is minimized.

.2 Convenient access for the staff and public to the building must be maintained at all times. Minor inconvenience and interruption of services will be tolerated, provided advance notice is given, but the Contractor will be expected to coordinate his work, in consultation with the owner, so the operation of the facility can be maintained as nearly normal as possible.

1.20 EXISTING SERVICES

.1 Protect all existing services encountered. Every effort has been made to show the known existing services. However, the removal of concealing surfaces may reveal other existing services. Work with the Owner's staff to trace the originating source and points served. Obtain instructions from the Departmental Representative when existing services require relocation or modifications, other than those already indicated in the Contract Documents.

.2 Arrange work to avoid shutdowns of existing services. Where shutdowns are unavoidable, obtain the Owner's approval of the timing, and work to minimize any interruptions.

.3 Shutdowns, to permit connections, to be coordinated with the maintenance staff.

.4 In order to maintain existing services in operation, temporary relocations and wiring may be required.

.5 Be responsible for any damages to existing systems by this work.

.6 The interruption of utility services to permit tie-ins shall be arranged through the Owner's representative. Application must be received in writing at least seven (7) calendar days prior to the date required for the shutdown. Service shutdowns shall only be carried out by facilities personnel and will normally be scheduled to occur during evenings or weekends. The Owner reserves the right to withhold permission for a reasonable period with respect to any shutdown, if the shutting-off of a service interferes with essential building operations.

1.21 SALVAGE

.1 All conduit, wiring and equipment which becomes redundant and is no longer required due to the work in this Contract shall be completely removed.

.2 All existing items which need to be removed, and which have a reasonable salvage value, shall be carefully removed and handed over to the Owner. Handing over to the Owner includes moving to Owner's designated storage place on site. These items shall not become the property of the Contractor. Obtain a written receipt from the Owner detailing each of the items handed over.

.3 Remove all redundant material not required by the Owner from the site.

1.22 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.

.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.

.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.

1.23 TENDER INQUIRIES

.1 All contractor queries during the tender period shall be made in writing to the Departmental Representative. Contractor queries will be collected and suitable addenda will be issued for clarification. No verbal information will be considered valid or issued by the Departmental Representative's office during tender. All tender queries may be faxed,

mailed or couriered to the Departmental Representative's office. No telephone questions will be answered.

1.24 EXAMINATION

.1 Visit the site before preparing the tender and examine all existing conditions. No extra cost will be considered for any misunderstanding of work to be done resulting from failure to visit the site.

.2 Examine the documents for details of work included. Obtain a written clarification in the event of conflict within the specification, between the specification and the drawing, or in the drawing. Obtain written clarification from the Departmental Representative if work affecting the installation is not clear. Where this is not done in advance, allow in the tender sum for providing the more costly alternative.

1.25 RESPONSIBILITIES

.1 Ensure that equipment does not transmit noise and/or vibration to other parts of the building, as a result of poor installation practice.

.2 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.

.3 Protect equipment and material from the weather, moisture, dust and physical damage.

.4 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 Owner.

.5 Protect all existing services encountered. Obtain instructions from the Departmental Representative when existing services require relocation or modification.

.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.

1.26 STANDARD OF ACCEPTANCE

.1 Standard of Acceptance means that the item named and specified by manufacturer and/or catalogue number forms part of specification and sets standard regarding performance, quality of material and workmanship and when used in conjunction with a referenced standard, shall be deemed to supplement the standard.

.2 Where two or more manufacturers are listed, the manufacturer's name shown first or underlined or shown with a model name and/or number was used in preparing the base design. Tenders may be based on any one of those named, provided that they meet every aspect of the base design and every aspect of the drawings and specifications.

.3 Where other than the first named or the underlined manufacturer or scheduled/specified manufacturer is selected or approved, include for the cost of any resulting work (both under this Division and other Divisions) and any necessary redesign of installation or structure. Submit redesign drawings for review with Shop Drawings. Maintain installation, access and servicing clearances. Equipment/materials shall not exceed the

available space limitations. Redesign drawings shall be to scale and of a standard equal to the Project Drawings.

.4 A visible manufacturer's nameplate shall indicate manufacturer's name, model number, serial number, capacity data, electrical characteristics and approval stamps.

1.27 ADDITION OF ACCEPTABLE MANUFACTURERS

.1 Material/products considered to satisfy the specification, but of a manufacturer other than those named may be submitted to the Departmental Representative for consideration not later than five (5) working days prior to closing of tender or of bid depository subtrade tender whichever is earlier.

.2 Alternate approvals will be given by written addendum only. No other substitution will be permitted after closing of tenders.

.3 Alternate approvals granted before the closing of tenders will be limited to a manufacturer's system and/or series only. This limited approval will not preclude substitute equipment/material from complying with specific features included with equipment/material specified. Determine that the alternate product meets the specification intent before basing a tender on the product

.4 Where alternate equipment/materials are selected, allow for effects on other parts of the work of this Trade and other Trades. Where substantial changes in arrangement are required, submit shop drawings of the proposed changes with Plan and Section views and show effects on work of other Trades. Alternate equipment/materials shall not exceed the available space limitations. Maintain installation, access and servicing clearances. No extra will be allowed due to the use of alternate equipment/materials.

.5 Where two or more items of equipment and/or material, of the same type, are required, provide products of a single manufacturer.

.6 Install and test all equipment and material, in accordance with the detailed recommendations of the manufacturer.

1.28 EQUIPMENT LIST

.1 Submit a completed Equipment List, showing the make of equipment and material included in the Tender, including the names of the subtrades, 10 days after the award of the Contract. **Form EF110** in Appendix A shall be used for this purpose.

.2 The equipment list shall be a full list of materials or systems intended for installation.

1.29 PROGRESS CLAIM AND CHANGEORDER BREAKDOWNS

.1 Ten (10) days after the award of contract, submit price breakdowns on photocopies of the Price Breakdown **Form EF112** included in Appendix A.

.2 In particular cases more detail may be necessary to properly assess a change order or progress claims. This additional information could include all suppliers and all sub-contractors when requested by the Departmental Representative. Provide details for each section of the electrical work listed for each separate electrical change order item exceeding $10,000.00.

.3 Mark-up information is required for change orders but is optional on the original tender price.

.4 Progress claims will not be certified nor payment made beyond 90% of the overall Electrical contract until commissioning and verification of the systems are complete. This procedure is to allow for any necessary deficiency holdbacks on items which do not become apparent until the systems are commissioned.

1.30 PROJECT CLOSE-OUT REQUIREMENTS

.1 Refer to detailed specifications in each section for detailed requirements. Also refer to Specification **Form EF-142** included in Appendix A for list of required substantial completion submissions. Record drawings to be submitted to Departmental Representative and all life safety systems must be operational, verified and tested and demonstrated to Departmental Representative prior to issuance of Schedule C-B.

1.31 SUBSTANTIAL PERFORMANCE REQUIREMENTS

.1 Before the Departmental Representative is requested to make an inspection for substantial performance of the work:

- .1 Commission all systems and prove out all components, interlocks and safety devices.
- .2 Submit a letter certifying that all work is complete for the intended use, operational, clean and all required submissions have been completed. **Form EF143** in Appendix A should be used for this purpose.
- .3 A complete list of incomplete or deficient items shall be provided. If, in the opinion of the Departmental Representative, this list indicates the project is excessively incomplete, a substantial completion inspection will not be performed.

.2 The work will not be considered to be ready for use or substantially complete until the following requirements have been met:

- .1 All reported deficiencies have been corrected.
- .2 Operating and Maintenance Manuals completed.
- .3 "As Built" Record Drawing ready for review.
- .4 Systems Commissioning has been completed and has been verified by Departmental Representative.
- .5 All demonstrations to the owner have been completed.
- .6 All documents required on **Form EF142** in Appendix A have been submitted.

.3 Departmental Representatives Letters of Assurance will not be issued until the following requirements have been met:

- .1 All items listed in .1 above have been completed or addressed.
- .2 Certificate of Penetrations through separations (**Form EF130**).
- .3 Provincial or City Electrical Inspection - Certificate of inspection.
- .4 Seismic Departmental Representatives letter of Assurance and final inspection report.
- .5 Certificate of Substantial Performance (**Form EF143**).
- .6 Signed off copy of Departmental Representatives final inspection report.
- .7 Fire alarm verification.

1.32 DEFICIENCY HOLDBACKS AND DEFICIENCY INSPECTIONS

.1 Work under this Division which is still outstanding when substantial performance is certified will be considered deficient and a sum equal to at least twice the estimated cost of completing that work will be held back.

.2 It is expected that outstanding work will be completed in an expeditious manner and the entire holdback sum will be retained until the requirements for Total Performance of Division 26, 27, 28, 33 (electrical) work have been met and verified.

2.0 PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

.1 Materials and products in accordance with Division 01 - Sustainable Requirements: Construction

.2 Do verification requirements in accordance with Division 01 Sustainable Requirements: Contractor's Verification.

2.2 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 commercial quality available for the intended purpose.

.4 Factory assemble control panels and component assemblies.

2.3 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 Ground all motors to conduit system with separate grounding conductor in flexible conduit or bonding conductor in the flexible conduit.

.3 Connections shall be made with watertight flexible conduit with watertight connectors.

.4 Control wiring and conduit standards are specified in the Electrical Divisions. Refer to Mechanical Divisions for scope of work and particular details.

2.4 WARNING SIGNS

.1 Provide warning signs, as specified or to meet the requirements of Inspection Department, Authority having Jurisdiction, Departmental Representative and Architect.

.2 Use decal signs, minimum 175 x 250 mm [7" x 10"] size

2.5 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

2.6 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 Lamicoid 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 – eg Conditional/Vital – Size 4 lettering

.2 Line 2 – Panel/CDP designation – Size 4 lettering

.3 Line 3 – eg 225A, 120/208V, 3 phase 4W – Size 2 lettering

.4 Line 4 – Feeder: eg 4#3 – 35mm C – Size 2 lettering

.5 Line 5 – Origin eg: Main Elect. Room – Size 2 lettering

.2 Distribution Circuit Breakers – 4 lines

.1 Line 1 – Conditional/Vital – Size 4 lettering

.2 Line 2 – Main Circuit Breaker – Size 4 lettering

.3 Line 3 – Feeder: eg 4#3 – Size 2 lettering

.4 Line 4 – Origin: eg K1 Sub-station – Size 2 lettering

.3 Label colours unless otherwise indicated:

.1 120/208V labels: white letters on black base.

.2 347/600V labels: Black letters on white base.

.3 Standby/Emergency Power: white letters on red 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.

.7 Terminal cabinets and pull boxes: indicate system and voltage.

.8 Transformers: indicate capacity, primary and secondary voltages.

.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.

2.7 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.

2.8 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.

.3 Colour coding to be as follows unless otherwise specified:

SYSTEM	MAJOR BAND	MINOR BAND	CHARACTERS
High Voltage	Yellow	Purple	Nominal V
347/600V Normal	Dark Blue		
347/600V Emergency	Dark Blue	Red	
120/208V Normal	Light Blue		
120/208V Emergency	Light Blue	Red	
Ground	Dark Green		GR
Fire Alarm	Red		FA
Security Systems	Purple		SEC
Building Alarm	Purple	White	BA
Door Lock Release	Purple	Black	ED

.4 Refer to Specification Appendix A Electrical **Form EF120**. Obtain the Building Owner's representative sign off for the colour coding prior to the identification process. Use **Form EF 120** for this purpose.

2.9 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.

2.10 ACCESS PANELS (DOORS)

.1 Unless otherwise noted, access doors shall be minimum: 450mmx450mm [18"x18"] for body entry; 300mmx300mm [12"x 12"] for hand entry.

.2 Access doors in fire separations of 3/4 hour rating, and higher, and firewalls shall have a compatible fire rating and a ULC label with tamper-proof latch, self closing.

.3 Minimum Requirements:

.1 180 degree door swing, mitred rounded safety corners flush welded, concealed hinges, screwdriver latches, and anchor straps or lugs to suit construction, all steel prime coated.

.2 Plaster or wet wall construction: 14 gauge bonderized steel flush with wall or ceiling type with concealed flange.

.1 Acceptable Product: Acudor PS-5030.

.3 Masonry or drywall construction: 16 gauge for 400 mm [16"] x 400 mm [16"] and smaller, 14 gauge for 450 mm [18"] x 450 mm [18"] and larger bonderized steel face of wall type with exposed flange.

.1 Acceptable Product: Acudor UF-5000.

.4 Tile, ceramic tile, marble, terrazzo, plaster or wet wall construction in washrooms and other special areas: 14 gauge stainless steel flush with wall or ceiling type with concealed flange.

.1 Acceptable Product: Acudor PS-5030 stainless.

.5 Acoustical tile ceiling and similar block materials: 14 gauge bonderized steel recessed ceiling type.

.1 Acceptable Product: Acudor AP-5010 or AT-5020.

.6 Feature wall construction: Recessed wall type that is selected to complement and conform to the architectural module, treatment, or panelling. The size shall conform to adjacent finishes.

.7 Access panels in fire separations and fire walls shall have a compatible fire rating and ULC label. (ie. Acudor Fire Rated FW-5050 or FB-5060).

.4 Standard of Acceptance: Zurn, Wade, Acudor, Can-Aqua, Milcor, Maxam, Van-Met.

2.11 ANCHOR BOLTS AND TEMPLATES

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

2.12 FASTENING TO BUILDING STRUCTURE

.1 General:

.1 Do not use inserts in base material with a compressive strength less than 13.79 MPa [2000 psi] [refer to structural drawings].

.2 All inserts supporting conduit racks shall have a factor of safety of 5. All other inserts shall have a factor of safety of 4.

.2 Types:

.1 Cast-in-place type:

.1 Channel type - Burndy, Canadian Strut, Unistrut, Cantruss or Hilti Channel.

.2 Wedge type galvanized steel concrete insert, Grinnell Fig. 281 for up to 200 mm [8"] pipe size.

.3 Universal type malleable iron body insert, Grinnell Fig. 282 for up to 200 mm [8"] pipe size.

.2 Drilled, mechanical expansion type:

.1 Hilti HSL or UCAN LHL heavy duty anchor for use in concrete with compressive strength not less than 19.6 MPa [2840 psi].

.2 Hilti Kwik-Bolt or UCAN WED stud anchor for concrete. (Do not use in seismic restraint applications).

.3 Hilti HDI or UCAN IPA drop-in anchor for concrete.

.4 Hilti or UCAN Sleeve Anchor (medium and light duty) for concrete and masonry.

.5 Hilti ZBP or UCAN Zamac pin bolt (light duty) for concrete and masonry.

.3 Drilled, adhesive type:

.1 Hilti HVA or UCAN Adhesive Anchor consisting of anchor rod assembly with a capsule containing a two-component adhesive, resin and hardener.

.2 Hilti HY150 consisting of anchor rod with a 2 part adhesive system.

.3 For use in concrete housekeeping bases (in vertical downward position) where the distance to the edge of the concrete base could cause weakness if a mechanical expansion type anchor were used.

.4 Rod assemblies shall extend a minimum of 50 mm [2"] into the concrete slab below the housekeeping bases.

.3 Note:

.1 All drilling for inserts shall be performed using the appropriate tool specifically designed for the particular insert. The diameter and depth of each drilled hole shall be to the exact dimensions as specified by the insert manufacturer.

.2 Refer to manufacturer's recommendations for tightening torques to be applied to inserts.

.3 Where specifically called for, drills shall include a dust vacuum system, Hilti SAV Dust Vacuum System.

2.13 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 - Embeco 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.

2.14 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.

2.15 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.

.4 The manual information shall be bound in a three "D-ring" hard back reinforced vinyl covered ("bar lock" post type where more than 50mm [2"] rings required) binder c/w index tab separators to divide the different sections. The binder cover shall be black with white lettering. Printing of the binder cover shall be completed before the binder is manufactured and the wording shall be approved by the Departmental Representative before printing.

.5 Submit a draft copy to the Departmental Representative for review thirty (30) days prior to start up of the systems and equipment.

.6 Submit three (3) copies in the final approved form.

2.16 PROJECT RECORD DRAWINGS

.1 Provide project record documents as specified in Division 01 as further called for in this Division.

.2 During the construction period, keep on site a clean set of drawings marked up to reflect the "As-Built" state, for examination by the Departmental Representative on a regular basis. Include elevations and detailed locations of buried services, empty conduit systems and junction and pull boxes.

.3 At the time of "substantial performance", request a set of CAD files from the Departmental Representative. The Electrical Division shall include all associated costs to obtain and complete the CAD Record Drawings including retaining the services of an approved CAD draftsperson to transfer all changes to amend the CAD files in the latest version of AutoCAD. Include all revisions and change orders.

.4 Submit the "Record Drawing" CAD files and one set of plots to the Departmental Representative prior to Total Performance of the contract.

.5 Note: The Contractor will be required to sign a standard Stantec / Contractor agreement entitled "Authorization to Use CAD drawing files". The agreement restricts the use of the CAD files to the purpose of "as-built" only and determines the editing procedures.

3.0 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.

.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 strike side of doors unless otherwise indicated.

.4 Locate light switches on latch side of doors.

.5 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

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 Refer to detail on drawings.

.4 In the absence of a drawing detail or drawing note, use the following:

Device	Height		Comment
Local switches	1200	[48"]	
Wall receptacles/data	450	[18"]	General
Wall receptacles/data	200	[8"]	Above top of continuous baseboard heater
Wall receptacles/data	175	[7"]	Above top of counters or counter splash backs – coordinate with Architectural detail
Wall receptacles/data	900	[36"]	In mechanical rooms
Wall mtd telephone	1500	[60"]	
Fire alarm stations	1350	[54"]	ULC S524 requires not less than 1200mm or more than1400mm.
Fire alarm bells/audio	2200	[88"]	ULC S524 requires not less than 1800mm to centre. In any event not closer than 50mm to the ceiling

Fire alarm visual devices	2000	[80"]	ULC S524 requires not more than 2000mm to centre. In any event not closer than 150mm to the ceiling
End of line resistors	1800	[72"]	
Emergency Lighting (wall mounted)			150mm below ceiling or 4800mm max.

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 Lighting and its control.

.4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

.5 Systems: fire alarm system and communications.

.6 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350V with a 500V instrument.

.2 Megger 350-600V circuits, feeders and equipment with a 1000V instrument.

.3 Check resistance to ground 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 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports.

.2 Furnish manufacturer's certificate or letter conforming that entire installation as it pertains to each system has been installed to manufacturer's instructions.

.3 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.4 Schedule site visits to review Work.

.6 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.

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.

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 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.

.2 The scope includes new services which pass through existing rated separations and also all existing services which pass through a new rated separation or existing separations whose rating has been upgraded.

.3 Fire resistance rating of installed firestopping assembly shall not be less than fire resistance rating of surrounding assembly indicated on Architectural drawings. Where this is not indicated assume a minimum of one hour for walls and two hours for floors.

.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 as detailed above.

.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.

.6 Provide fire stopping material and system information in the maintenance manuals and via labels at major penetrations that are likely to be repenetrated.

.7 Allow openings for 100% capacity of raceway or 200% capacity of J-hooks.

.8 Provide split systems where existing cables are involved.

.9 Provide Firestopping approval certificate in including a Building Code / By-Law Schedule B and C-B signed by a BC registered Professional Consultant. Submit a letter certifying that all work is complete and in accordance with this specification. Electrical Form EF130 in Section 26 06 02 should be used for this purpose.

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.

3.15 ACCESSIBILITY AND ACCESS PANELS

.1 Install all equipment, controls and junction boxes so as to be readily accessible for future modification, adjustment, operation and maintenance as appropriate.

.2 Provide access panels where required in building surfaces. Do not locate access panels in panelled or special finish walls, without prior approval of the Departmental Representative.

.3 Access panels in U.L.C. fire separations and fire walls shall have a compatible fire rating and U.L.C. label. Acquire approval in writing from the local fire authority if required.

.4 Access panels shall be painted with a primer coat if applicable and then with a finish coat, colour and type to the Departmental Repsentative's approval.

.5 Locate equipment and junction boxes in service areas wherever possible.

3.16 EQUIPMENT INSTALLATION

.1 Provide means of access for servicing equipment.

.2 CSA identification and equipment labels to be clearly visible after installation.

3.17 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 Be responsible for all cutting, patching, digging, canning and coring required to accommodate the electrical services.

.3 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. Repairs to existing services and structural components damaged as a result of core drilling and cutting is included in this section of the work.

.5 Openings through structural members of the building shall not be made without the approval of the Structural 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.

3.18 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.

.4 Coordinate with Division 09.

END OF SECTION 26 05 00

1.0 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 (BCBC) and amendments.

.2 The Seismic Departmental Representative should be able to provide a proof of professional insurance and the related practice credentials if requested by the Electrical Departmental Representative. The Seismic Departmental Representative should be familiar with SMACNA, ECABC & NFPA guidelines as well as BCBC requirements.

.3 The Contractors Seismic Departmental Representative , herein referred to as the Seismic Departmental Representative, shall submit original signed BCBC "Letters of Assurance" "Schedules B and C-B" to the Prime Consultant or Electrical Departmental Representative.

.4 The above requirements shall not restrict or supplant the requirements of any local bylaws, codes, or other certified agencies which may have jurisdiction over all or part of the installation.

1.3 SCOPE

.1 It is the responsibility of equipment manufacturers to design their equipment so that the strength and anchorage of internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.

.2 Manufacturer's shop drawings to be submitted with seismic information on equipment structure, bracing and internal components and as required by Division 01.

.3 Provide restraint on all equipment and machinery, which is part of the building electrical services and systems, to prevent injury or hazard to persons and equipment in and around the structure. Restrain all such equipment in its normal position in the event of an earthquake.

.4 The total electrical seismic restraint design and field review and inspection will be by a B.C. registered professional structural Departmental Representative 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 Departmental Representative. This Departmental Representative 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 Departmental Representative 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 Departmental Representative shall provide inspections during and after installation. The Contractor shall correct any deficiencies noted without additional cost to the contract.

.9 Include all costs associated with the Seismic installation and certification in the base tender.

1.4 SHOP DRAWINGS & SUBMITTALS

.1 Submit shop drawings of all seismic restraint systems including details of attachment to the structure, either tested in an independent testing laboratory or approved by the Seismic Departmental Representative.

.2 Submit all the proposed types and locations of inserts or connection points to the building structure or support slabs. Follow the directions and recommendations of the Seismic Representative.

2.0 PRODUCTS

2.1 SLACK CABLE SYSTEMS

.1 Slack cable restraint systems shall be as 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° to each other (in plan), and tied back to the ceiling slab or its structure at approximately 45° 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° 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.

3.0 EXECUTION

3.1 GENERAL

.1 All seismic restraints systems shall conform to local Authority Having Jurisdiction (AHJ) 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 [30 ft] o.c.

.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 it in alignment and prevent sagging.

.2 EMT tubing - tubing shall be supported at approximately 1.2 m [4 ft] intervals for tubing.

.5 Provide transverse bracing at 12.2 m [40 ft] o.c. maximum unless otherwise noted. Provide bracing at all 90o bend assemblies, and pull box locations.

.6 Provide longitudinal bracing at 24.4 m [80 ft] o.c. maximum unless otherwise noted.

.7 Do not brace conduit runs against each other. Use separate support and restraint system.

.8 Support all conduits in accordance with the capability of the pipe to resist seismic load requirements indicated.

.9 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.

.10 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.

.11 Provide large enough conduit sleeves through walls or floors to allow for anticipated differential movements with firestopping where required.

.12 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 Departmental Representative and submit shop drawings to consultants for their reference.

3.3 LUMINAIRES

.1 Luminaires in suspended ceilings shall be hung independently of the ceiling system. Luminaires shall be secured to concrete or structural deck above by at least two taught cables which are connected to the luminaire at diagonal points.

.2 Surface and recessed style luminaires shall be hung independently of the ceiling system. Luminaires shall be secured to concrete or structural deck above by taut cables.

.3 Luminaires 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 luminaire. 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 Luminaires which are rod hung shall have seismic ball alignment fittings at the ceiling and fixture.

END OF SECTION 26 05 05

1.0 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 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 Teck 90 1000 volt having a PVC jacket with FT-4 flame spread rating.

.3 Flexible armoured cabling (BX) shall not be used for the general wiring system other than final drops to recessed luminaires in concealed locations.

.4 Provide all control wiring except HVAC controls as specified in Mechanical Divisions.

.5 Refer to Equipment Schedule(s) for detailed responsibilities.

.6 Non-metallic sheathed wiring is not to be used on this project.

1.3 PRODUCT DATA

.1 Provide product data in accordance with Division 01

1.4 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 Workplan.

.2 Avoid using landfill waste disposal procedures when recycling facilities are available.

.3 Place materials defined as hazardous or toxic waste in designated containers.

2.0 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 RWU90XLPE for underground installations.

.4 Site services sub-circuits, including site lighting, to be minimum #10 AWG for power and #12 for controls. Increase wiring size for lengthy and/or loaded circuits so that system will not exceed the maximum voltage drop as recommended by the Canadian Electrical Code CSA 22.1.

.5 Armoured (BX) 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.

.6 Conductors to be colour-coded. Conductors No.10 gauge and smaller shall have colour impregnated into insulation at time of manufacture. Conductors size No.8 gauge 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 condulet fittings. Conductors not to be painted.

2.2 TECK 90 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. 2-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 (*BX*)

.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.

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.

3.0 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 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.

.8 Provide sleeves where cables enter or exit cast concrete or masonry.

.9 Power wiring up to and including No.6 gauge 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 26 05 21

1.0 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 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 Workplan.

.2 Avoid using landfill waste disposal procedures when recycling facilities are available.

.3 Place materials defined as hazardous or toxic waste in designated containers.

2.0 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.

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 102 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 Luminaire outlets: 102 mm [4"] square outlet boxes (No 52151, 52171 or 72171) or octagonal outlet boxes (No 54151 or 54171).

.5 102 mm [4"] square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster and/or tile walls.

2.3 CONCRETE BOXES

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

2.4 SURFACE CONDUIT BOXES

.1 Cast FS or FD aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacles.

2.5 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.

3.0 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 luminaire or row of luminaires installed in other than T bar ceilings with removable tiles.

.4 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of construction material. Remove upon completion of work.

.5 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.

.6 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers not to be used.

.7 All outlet boxes to be flush mounted in all areas, excluding mechanical rooms, electrical rooms, and above removable ceilings.

.8 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.

.9 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.

.10 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.

.11 Outlets installed back to back in party stud walls to be off-set by one stud space.

.12 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.

.13 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.

.14 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.

END OF SECTION 26 05 32

1.0 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 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 Workplan.

.2 Avoid using landfill waste disposal procedures when recycling facilities are available.

.3 Place materials defined as hazardous or toxic waste in designated containers.

1.3 REFERENCES

.1 All conduits and accessories to be manufactured and certified by the related CSA standard.

1.4 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 (existing) or concealment is not practical, obtain ruling from Departmental Representative where exposed raceway similar to "wiremold" may be substituted.

.4 Note particular requirements for routing of conduits where detailed.

.5 Provide polypropylene pull cord in all "empty" conduits.

2.0 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.

2.2 CONDUIT FASTENINGS

.1 One-hole steel straps to secure surface conduits 41mm [1.5"] and smaller. Use 2-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 [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° 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 with 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 unless there is no chance of burrs. 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 similar to 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.

3.0 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 grounding 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/data conduits to be minimum 21 mm [3/4"] 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: e.g. 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 of moisture during construction.

.16 Locate conduits more than 75mm [3"] parallel to steam or hot water lines with a minimum of 25mm [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 or to comply with Code.

.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 markers similar to 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 incandescent fixtures without a prewired outlet box and connection to recessed fluorescent fixtures.

.32 Use liquid tight flexible metal conduit for connection to motors, 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 EXPANSION JOINT CONDUIT FITTINGS

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

3.4 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 SECITON 26 05 34

1.0GENERAL

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, latest edition.

.2 CAN/CSA C22.2 No.9.0, General Requirements for Luminaires.

1.3 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 Workplan.

.2 Avoid using landfill waste disposal procedures when recycling facilities are available.

.3 Place materials defined as hazardous or toxic waste in designated containers.

1.4 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 26 05 00.

.2 Submit complete photometric and heat dissipation data prepared by independent testing laboratory for proposed luminaires.

.3 Photometric data to include VCP Table and spacing criterion.

1.5 SAMPLE LUMINAIRES

.1 Submit sample luminaires for review prior to manufacturing when requested by the Departmental Representative.

.2 Sample luminaires to be operable and complete with lamps, accessories and a plug-in power cord if requested by the Departmental Representative.

.3 Deliver samples to the Departmental Representative's office or to another location as directed. Collect the sample(s) at the conclusion of the review.

1.6 INTENT

.1 Provide luminaires and accessories for all outlets as shown on drawings.

.2 Luminaires shall be structurally well designed and constructed, using new parts and materials of the highest commercial grade available.

.3 Ground all lighting equipment to grounding system.

.4 Verify all ceiling types and finishes before ordering luminaires and provide luminaires suitable for mounting in or on ceilings being installed in each area, as specified. Where luminaire types specified are not suitable for ceiling being installed, obtain written instructions from the Departmental Representative before ordering luminaires.

.5 Luminaires of the same or similar type shall be supplied by the same manufacturer.

2.0PRODUCTS

2.1 BALLASTS

.1 All ballasts shall be supplied with a rated voltage matching the supply voltage indicated on the drawings. Ballast output current and voltage shall match the current and voltage ratings of the lamp or lamps they are designed to operate. All ballasts to be built to CSA Standard C22.2 No.74.

.2 Ballasts shall comply with FCC and NEMA limits covering EMI and RFI and shall not interfere with operation of other normal electrical equipment.

.3 Minimum requirements for electronic ballasts:

- .1 Sound rating of 'A'.
- .2 High frequency operation (25 KHz or higher).
- .3 Total harmonic distortion to be less than 10%.
- .4 Current crest factor to be less than 1.7.
- .5 Rated lamp life shall be maintained.
- .6 High power factor of 90% or higher.
- .7 High efficiency ballasts for linear fluorescent lamps.
- .8 120V input, or otherwise indicated on the drawings.
- .9 Ballast to operate no more than two linear fluorescent lamps.
- .10 Ballasts used in exterior luminaires to have minimum starting temperature of -18°C.

.4 Minimum requirements for electromagnetic ballasts:

- .1 Pulse start type for metal halide.
- .2 Current crest factor to be less than 1.7.
- .3 Epoxy encased "super quiet" ballast assemblies for all interior luminaires ballast.
- .4 Ballasts used in exterior luminaires to have minimum starting temperature of -30°C.

2.2 LAMPS

.1 Provide and install lamps in all luminaires in the project.

.2 Install fluorescent lamps with the same watt rating as indicated. Refer to schedule or drawings for lamp colour and colour rendering index.

.3 Incandescent luminaires shall be complete with 2500 hour 130 V extended service inside frosted lamps.

.4 Compact fluorescent lamps shall be 3500K colour temperature or as indicated.

2.3 SOCKETS

.1 Sockets for incandescent luminaires shall be standard medium base.

.2 Sockets for fluorescent luminaires shall be standard medium bi-pin unless otherwise noted.

2.4 LUMINAIRES

.1 Accessories and components shall comply with relevant CSA Standards.

.2 Recessed downlighter luminaires shall be of the approved prewired type with junction box forming an integral part of the luminaire assembly and so located in relation to the luminaire that the junction box is CSA approved for 60°C wire. The electrical trade shall supply and install all necessary plaster rings, supports, etc., required for complete and proper installation.

.3 Except where otherwise noted, depth of recessed fluorescent luminaires 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.

.4 Fluorescent luminaires 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%.

.5 All luminaire diffusers, lens panels, lens frames, etc., shall be securely and adequately supported and shall be removable without the use of tools for cleaning.

.6 Luminaires shall incorporate adequate gasketting, stops and barriers to form light traps and prevent light leaks.

.7 Luminaires shall be designed for adequate dissipation of ballast and lamp heat to avoid short ballast life, nuisance thermal tripping and decreased lamp output. Heat test reports by independent laboratories shall be provided where required by the Consultant.

.8 Construction of all luminaires shall be such as to provide a rigid well aligned luminaire. Formed or ribbed backplates, end plates, reinforcing channel, heavy gauge sockets, straps, etc., shall be used where required to accomplish this.

.9 The construction and performance of all fluorescent luminaires shall be subject to the acceptance of the Departmental Representative. Full photometric data from independent testing laboratory shall be provided when requested by the Departmental Representative.

3.0 EXECUTION

3.1 INSTALLATION AND SUPPORTS

.1 Provide complete and proper support for all luminaires, luminaire hangers, etc., including headers in ceiling space, where required, for proper support of outlet boxes and luminaire hanger assemblies.

.2 Support luminaires 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 luminaire 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 luminaires. 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 luminaires by hangers and mounting arrangements which will not cause the luminaire frame, housing, sides or lens frame to be distorted; or prevent complete alignment of several luminaires in a row.

.5 The suspension length of all ceiling mounted suspended types of lighting luminaires shall be the overall length from the ceiling to the lowest point of the luminaire 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 luminaires are surface mounted on the underside of an inverted tee bar ceiling, the luminaire 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. Luminaires shall be supported from the quarter points.

.8 Wiring from outlet boxes to fluorescent luminaires and wiring through fluorescent luminaire channels shall be rated for 90°C.

.9 Connection to incandescent luminaires shall be by means of approved luminaire type wiring.

.10 All recessed luminaires shall be installed so that they are removable from below to gain access to outlet box or prewired luminaire box. Connect all recessed luminaires to boxes with flexible conduit and approved luminaire wire. Provide approved drywall enclosures in insulated ceilings. Volume of enclosure to comply with the Canadian Electrical Code.

.11 Install luminaire lenses as late as possible to protect from dirt and dust. Remove and clean or replace lenses to the satisfaction of the Departmental Representative.

.12 Where ballasts are to be remotely located, they shall be racked together and labelled with size 3 lamicoid. Label shall bear the ballast 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 26 05 50

CANADA BORDER SERVICES AGENCY
PACIFIC HIGHWAY PORT OF ENTRY
TRAFFIC OFFICE BUILDING
INTERIOR RENOVATIONS
SURREY, BRITISH COLUMBIA

APPENDIX A

ELECTRICAL FORMS

TABLE OF CONTENTS

EF 100 Check List – Submission to Consultant
EF 110 Equipment/Sub-Trade List
EF 111 Check List – Shop drawings and Product and Samples
EF 112 Progress Claim Summary – Div 26
EF 120 Check List – Colour Coding
EF 130 Certificate of Penetrations Through Separations
EF 131 Certificate of Seismic Restraint Installation
EF 140 Check List & Record – Items to be Handed to Owner
EF 141 Check List – Owners Demonstration
EF 142 Check List – Substantial Performance Submissions - Electrical
EF 143 Certificate of Substantial Performance - Electrical
EF 144 Check List – Work Remaining after Substantial Performance
EF 145 Certificate of Total Performance - Electrical

EF 100 Check List – Submissions to Consultant

ITEM	CHECKED BY	DATE
5 WORKING DAYS BEFORE CLOSE OF SUBTRADE TENDER – Request for addition of acceptable manufacturers		
10 DAYS AFTER AWARD OF THE CONTRACT – List of equipment suppliers and subtrades (EF 110) – Detailed price breakdown (EF 112)		
AS SOON AS POSSIBLE – Shop drawings and Product Samples (EF 111)		
WITH EACH APPLICATION FOR PROGRESS PAYMENT – Price breakdown (EF 112)		
PRIOR TO DEMONSTRATION OF SYSTEMS – Demonstration agenda		
DEMONSTRATION OF SYSTEMS – Checklists for sign off of demonstrations (EF 141)		
10 DAYS PRIOR TO SUBSTANTIAL PERFORMANCE – Submission of items listed on Form EF-142		
WHEN REQUESTING REVIEW OF OUTSTANDING WORK – Checklist of work remaining (EF 144) – Certificate of total completion (EF 145)		

1.1 EF 110 Equipment/Sub-Trade List

ITEM	COMPANY/SUPPLIER
Motor Control	
Wiring Devices	
Luminaires	
Fire Alarm System	
Fire Alarm Verification Agency	
Seismic Engineer	
Testing and Commission Agency	

EF 111 Check List –Shop drawings and Product and Samples

		REVIEW	
ITEM	**DATE SUBMITTED**	**ACTION**	**DATE**
Motor Control			
Wiring Devices			
Luminaires (list groups)			

NOTES:

.1 Modify list to suit project.

.2 Submit samples where indicated to the consultant for review prior to installation.

1.2 EF 112 Progress Claim Summary – Division 26

PROJECT: **CLAIM NO:** _____

FOR MONTH OF: _____

ITEM		PRICE	WORK TO DATE		PREVIOUS WORK		THIS MONTH	
		$	%	$	%	$	%	$
Base Contract:								
General Conditions								
Mobilization (not to exceed 2%)								
Demolition								
Conduit, Boxes & Wire	Mat Lab.							
Motor Control	Mat Lab.							
Wiring Devices & Plates	Mat Lab.							
Lighting	Mat Lab.							
Fire Alarm System	Mat Lab.							
O & M								
Testing and Commissioning								
Other								
Cash Allowances								
Total Base Contract								
Change Order								
Total Change Orders								
Total Contract:								
Amount due less 10% lien holdback								

Submit this form as called for on **EF 100** for tender price breakdown and for each progress claim

1.3 EF 120 Check List –Colour Coding

Obtain sign off from Building Owner's representative prior to colour coding systems.

Project Identification: _____

	SYSTEM	MAJOR BAND	MINOR BAND	CHARACTERS
1	120/208 volt Normal	*Light Blue*		
2	347/600 volt Normal	*Dark Blue*		
3	120/208 volt Emergency	*Light Blue*	*Black*	
4	347/600 volt Emergency	*Dark Blue*	*White*	
8	Fire Alarm	*Red*		*FA*
16	Other			

Prepared By _____

Owner's Sign Off _____ DATE _____

1.4 EF 130 Certificate of Penetrations Through Separations

Project Identification: _____

I hereby certify that I _____

am an employee / a principal / an agent of _____

have personally witnessed that all electrical service penetrations through fire separations (rated & non-rated) and sound separations in the following areas have been properly sealed in accordance with the specified requirements.

SIGNED _____ DATE _____

AREA	SIGNED	DATE
Level:		
Level:		
Level:		
Level:		
Level:		
Level:		
Level:		
Level:		
Level:		

NOTES:

.1 This certificate shall be submitted to the Consultant prior to Substantial Performance.

1.5 EF 131 Certificate of Seismic Restraint Installation

Project Identification: _____

I hereby certify that I _____

am an employee / a principal / an agent of _____

Certify that the seismic restraint of all electrical equipment and wiring system installation meets the requirements of the B.C. Building Code as it relates to seismic restraint and the Schedules B and CB have been signed, stamped and submitted to the Consultant.

SIGNED _____ DATE _____

NOTES:

.1 This certificate shall be submitted to the Consultant prior to Substantial Performance.

1.6 EF 140 Check List & Record – Items to be Handed to Owner

ITEM	QUANTITY	RECEIVED	DATE
Fluorescent Lighting Ballasts –	1 of ea type		
Fluorescent lamps - no less than 10% of each size & type	1 minimum		
Rated Access Door Keys	1		
Salvaged Materials (Attach List)			

NOTES:

.1 Copies of this form shall be submitted to the consultant and the owner with all items signed off prior to substantial performance.

Prepared By _____

Owner's Sign Off _____ DATE _____

1.7 EF 141 Check List – Owners Demonstration

	CONTRACTOR		OWNER	
SYSTEM/ITEM	**SIGNED**	**DATE**	**SIGNED**	**DATE**
Lighting System Controls				
Fire Alarm Systems				
Location of Control Devices				
Access to Equipment				
Review of Maintenance Manual				
Points of required Maintenance				

NOTES:

.1 Contractor shall submit copies of this form with each appropriate item signed and dated by the person having overall charge of commissioning prior to substantial performance. (See **EF 143**.)

.2 Owner's representative shall sign off each item during or after the demonstration.

.3 Contractor to strike out items where they do not apply to the systems being demonstrated.

.4 Interlocks and controls to be demonstrated by following the descriptions and diagrams in the contract documents and proving that all controls function as required.

.5 Where multiple identical controls are installed the Owners representative may elect to only witness sample items, but the person having charge of commissioning is expected to have checked them all.

1.8 EF 142 Check List – Substantial Performance Submissions - Electrical

SECTION	ITEM	DATE	STATUS
260500	Final Electrical Inspector Certificate		
260500	Fire Stop Penetration Certificate. (**EF-130**)		
260500	Items handed to Owner Checklist (**EF 140**)		
260500	Identification		
260500	Record Drawings		
260500	Operating & Maintenance Manuals		
260505	Seismic Engineer Report and Schedules (**EF131**)		
260924	Lighting Controls Commissioning		
280000	Access Control Commissioning		
283100	Fire Alarm Verification Report and Appendix C (FA)		
	Contractors Letter of Guarantee		
	Demonstration to Operating Staff agenda		
	Demonstrations Checklists (**EF 141**)		
	Substantial Performance Certificate (**EF143**)		
	Checklist of work remaining after Substantial (**EF 144**).		

NOTES:

.1 This list is provided as a checklist and may not include all Substantial Performance requirements.

1.9 EF 143 Certificate of Substantial Performance - Electrical

I hereby certify that I _____

am an employee / a principal / an agent of _____

and have personally witnessed the following with regard to the electrical systems work specified for the above project and that to the best of my knowledge except as noted on **EF 144** (attached);

- The installation is complete and as specified.
- The systems have been commissioned and operate satisfactorily.
- Every control sequence and every control performs as specified.
- The systems are clean.
- All of the required submissions have been made to the consultant.

SIGNED _____ DATE _____

NOTES:

.1 This certificate must be completed and submitted to the consultant prior to substantial performance.

.2 If it is apparent that the systems or their operation are seriously deficient then all reasonable costs and consultant time charges relating to any subsequent site reviews shall be deducted from the contract sum.

1.10 EF 144 Check List – Work Remaining After Substantial Performance

		COMPLETION		
ITEM NO.	**DESCRIPTION**	**CLAIMED BY**	**DATE**	**VERIFIED DATE**

NOTES:

.1 This form must be filled in and submitted to the Consultant prior to substantial performance.

.2 Any discovered outstanding items will be added to the list by the Consultant. Copies of the complete list will be circulated to the Owner, the Architect and the Contractor.

.3 The Contractor may include estimated values against the outstanding work but determination of the actual amounts to be held will be made by the Consultant.

.4 The Contractor shall sign off each item as it is completed and submit the list monthly to the Consultant. When all items are signed off the completed list shall be submitted with the certificate of total performance **EF 145**.

1.11 EF 145 Certificate of Total Performance – Electrical

I hereby certify that I _____

am an employee / a principal / an agent of _____

and have personally witnessed that each item of outstanding work on the checklist and record of work remaining after substantial completion EF 144 (attached) has been satisfactorily completed and I hereby certify that the Electrical systems work specified on the above project is complete.

SIGNED _____ DATE _____

NOTES:

.1 This certificate must be completed and submitted to the Consultant when requesting total performance.

.2 If it is apparent during the final review that the systems or their operation are seriously deficient then all reasonable costs and consultant time charges relating to any subsequent site reviews shall be deducted from the contract sum.

CANADA BORDER SERVICES AGENCY
PACIFIC HIGHWAY PORT OF ENTRY
TRAFFIC OFFICE BUILDING
INTERIOR RENOVATIONS
SURREY, BRITISH COLUMBIA

APPENDIX B

INTERIOR FINISH AND COLOR SCHEDULE

REFERENCE SPECIFICATION SECTION	ACCEPTABLE PRODUCTS			REMARKS
	LEGEND	MATERIALS	MANUFACTURER / STYLE / COLOUR	
09 30 13 Ceramic Tiling	**TL**	Floor Tile – Porcelain	"Regal – Sand Beige Matte by Olympia	
09 51 99 Acoustical Ceilings for Minor Works	**ACT**	Acoustic Ceiling Tiles	"Fine Fissured" #1729 by Armstrong or "Radar" #2310 by CGC	
	-	Suspended T-Bar	"Prelude XL", colour White by Armstrong	
09 65 99 Resilient Flooring for Minor Works	**LIN**	Sheet Linoleum	"Cloudy Sand", style 3711 Concrete by Forbo	
09 91 23 Interior Painting	**PT**	Paint	Benjamin Moore, Decorators White CC-20	

NOTE:

.1 This schedule is a separate document from the specification and may list specific manufacturers related to patterns and colours upon which the colour scheme for the project is based.

.2 "Acceptable products" are listed in order to establish a quality of product upon which a price can be tendered. Other products having the same characteristics will not be excluded. Refer to the specification sections as listed for quality specifics.

.3 The Departmental Representative will consider substitute Products which meet or exceed the properties of the specified Product and are similar in material, construction, thickness, colour, texture, and overall quality, provided that proposals are submitted to the Departmental Representative complete with samples and whatever other data the Departmental Representative may require in order to evaluate the proposed substitute Product. If the Departmental Representative approves the proposed substitute Product, the Contractor will have the option of providing Product listed in the Finish schedule or an approved alternative.

END OF SCHEDULE