



Public Works and Government Services Canada

Requisition No. EZ899-160207/A

DRAWINGS & SPECIFICATIONS
for

CAN NOR Relocation Consolidated
Interior Renovation

Project #R.072738.001

for
APPROVED BY:

PREETIPAL PAUL
Regional Manager, AES

2015/05/20
Date

[Signature]
Construction Safety Coordinator

2015/05/05
Date

TENDER:

[Signature]
Project Manager

May 20/15
Date

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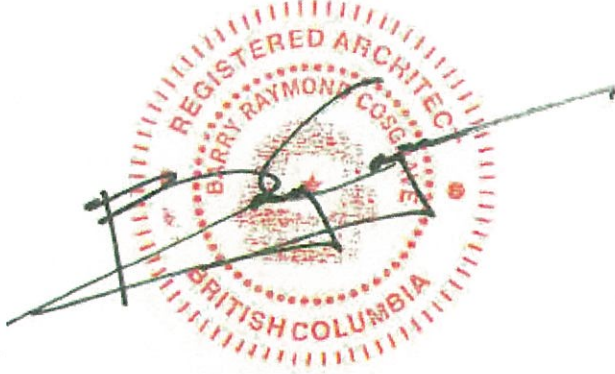

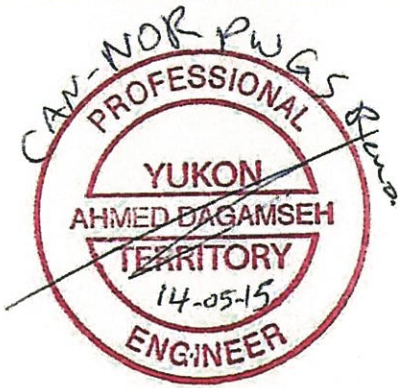
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DISCIPLINE	SEAL
PRIME CONSULTANT ARCHITECT	
MECHANICAL ENGINEER	
ELECTRICAL ENGINEER	

END OF SECTION

DRAWING

Architectural

A00	Cover, Code Review, Drawing List, Site Plan & Abbreviations
A01	Second Floor – Demolition Plan
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A12	Assemblies & Schedules
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Mechanical

M1	Fourth Floor – Plumbing & Fire Protection
M2	Fourth Floor – Heating And Ventilation
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Electrical

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E2	Second Floor – Power, Tele/Data, Auxiliary Systems, And Lighting And Life Safety New Layout
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E4	Fourth Floor - Existing Lighting And Life Safety
E5	Fourth Floor - Existing Power And Tele/Data Layout
E6	Fourth Floor - New Lighting And Life Safety Layout
E7	Fourth Floor - New Power And Tel/Data Layout

Part 1 General

1.1 DESCRIPTION OF THE WORK

- .1 Work of this Contract comprises the following work located at 300 Main Street, Whitehorse, YT:
 - .1 The partial renovation of the fourth floor, and further identified as CAN NOR.
 - .2 The partial renovation of the second floor, and further identified as CSPS, CH, CIC.
- .2 Work to be performed under this Contract includes, but is not limited to, the following items covered further in the Contract documents:
 - .1 Demolition of existing partition walls, demising walls, finishes, and millwork.
 - .2 Construction of new partition walls and millwork, new floor and wall finishes, and modify, patch and repair ceiling.
 - .3 Modification of existing HVAC system.
 - .4 Modification of existing power, data, and lighting systems.
- .3 Division of the Work among Subcontractors is solely the Contractor's responsibility. The Departmental Representative does not assume any responsibility to act as an arbiter to establish subcontract terms between sectors or disciplines of work.

1.2 CONTRACT DOCUMENTS

- .1 The Contract documents, drawings and specifications are intended to complement each other, and to provide for and include everything necessary for the completion of the work.
- .2 Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the work.

1.3 DIVISION OF SPECIFICATIONS

- .1 The specifications are subdivided in accordance with the current 6-digit National Master Specifications System.
- .2 A division may consist of the work of more than one (1) subcontractor. Responsibility for determining which subcontractor provides the labour, material, equipment and services required to complete the work rests solely with the Contractor.
- .3 In the event of discrepancies or conflicts when interpreting the drawings and specifications, the specifications govern.

1.4 PERFORMANCE OF THE WORK

- .1 Substantial Performance of the Work is required within ten (10) weeks of Award of Contract.
- .2 Final Completion of the Work is required within two (2) weeks of Substantial Performance.

1.5 COST BREAKDOWN

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

1.6 CODES, BYLAWS, AND STANDARDS

- .1 Perform work in accordance with the National Building Code of Canada (NBC) current edition, including amendments up to tender closing date, 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.

1.7 CONTRACT METHOD

- .1 Construct Work under stipulated price contract.
- .2 Relations and responsibilities are between the Contractor and the Departmental Representative.
- .3 Contract Documents were prepared by the Consultant for the Departmental Representative. Any use which a third party makes of the Contract Documents, or any reliance on or decisions to be made based on them, are the responsibility of such third parties. The Consultant and Departmental Representative accept no responsibility for damages, suffered by any third party as a result of decisions made or actions based on the Contract Documents.
- .4 For purposes of reference in these Contract Documents, the term "Contractor" shall mean the party in contract with Public Works Government Services Canada (PWGSC).

1.8 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract drawings.
 - .2 Contract specifications.
 - .3 Addenda to Contract documents.
 - .4 Copy of approved work schedule.
 - .5 Reviewed / approved shop drawings.
 - .6 Change orders.
 - .7 Other modifications to contract.
 - .8 Field Test Reports.
 - .9 Reviewed / approved samples.
 - .10 Manufacturers installation and application instructions.
 - .11 One set of record drawings and specifications for 'As-Built' purposes.
 - .12 National Building Code of Canada, current edition.

- .13 Health and Safety Plan and Other Safety Related Documents.
- .14 Current construction standards of workmanship listed in technical s.
- .15 Other documents as specified.

1.9 REGULATORY REQUIREMENTS

- .1 Obtain and pay for Building Permit, Certificates, Licenses and other permit required by regulatory municipal, 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 to the requirements of the authority having jurisdiction.
- .4 Complete and submit application, template to be provided, to the facility management company (BJCC) for the Permit To Work. Application will include schedule of planned construction activities and will be submitted on a weekly basis.

1.10 WORK SEQUENCE

- .1 Construct Work on second floor in phases to accommodate tenants continued use of premises during construction.
- .2 Coordinate Progress Schedule and coordinate with Tenant Occupancy during construction.
- .3 Required phases:
 - .1 Second Floor – Phase 1, see drawing A02:
 - .1 CIC Office 2-107 to remain partially occupied, contractor to provide continued and direct access to the Secure Lobby 2-106 and the Interview Room 2-103.
 - .2 Second Floor – Phase 2, see drawing A03:
 - .1 CIC tenant to be relocated; work to be completed for the new Lobby 2-107, and the Secure Lobby 2-106 and Interview Room 2-103.
- .4 All phases to be completed within the required time frame stated in 1.4 Performance of the Work.
- .5 Maintain fire access/control.

1.11 CONTRACTOR USE OF PREMISES

- .1 Second Floor:
 - .1 Scope of work is limited to the 'Area of Construction' as indicated on the drawings.
 - .2 Limit use of premises to allow for partial tenant occupancy within the 'Area of Construction', see 1.10 Work Sequence.
 - .3 'Area of Construction' to be used for Work, storage, and access.
 - .4 Tenants will occupy the remainder of the floor area and building for the duration of the project.

- .2 Fourth Floor:
 - .1 Scope of work is limited to the 'Area of Construction' as indicated on the drawings.
 - .2 'Area of Construction' to be used for Work, storage, and access.
 - .3 Tenants will occupy the remainder of the floor area and building for the duration of the project.
- .3 Perform noise generating work:
 - .1 From Monday to Friday from 17:00 to 08:30 hours.
 - .2 On Saturdays, Sundays, and statutory holidays to Departmental Representative's approval.
- .4 Submit schedule of special requirements or disruptions in accordance with Section 01 33 00.
- .5 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative such as moving contractors and furniture installers.
- .6 Co-ordinate use of premises under direction of the Departmental Representative.
- .7 Execute work with least possible interference or disturbance to building operations, occupants, and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.
- .8 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .9 Use only elevators existing in building for moving workers and material. Refer to Section 01 52 00 for specific requirements.
- .10 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .11 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by the Departmental Representative.
- .12 At completion of operations condition of existing work: equal to or better than that which existed before new work started.
- .13 The premises will be occupied during the entire construction period for execution of normal operations.
- .14 Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate occupancy of the premises.
- .15 Maintain fire and life safety systems and public access to exits during all stages of the Work.

1.12 EXAMINATION

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

1.13 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 two (2) weeks notice for necessary interruption of mechanical or electrical service throughout course of work.
 - .1 Keep duration of interruptions minimum.
 - .2 Perform work at times as directed by governing authorities and Departmental Representative with minimum disturbance to tenant operations.
- .3 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
- .4 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .5 Provide temporary services to maintain critical building and tenant systems.
- .6 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .7 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .8 Record locations of maintained, re-routed and abandoned service lines.
- .9 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers And Enclosures.

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 locations.
- .4 Submit field drawings or shop drawings to indicate the relative position of various services and equipment when required by the Departmental Representative.

1.15 SETTING OUT OF WORK

- .1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.
- .2 Provide devices needed to lay out and construct work.
- .3 Supply such devices as templates required to facilitate Departmental Representative's inspection of work.

1.16 ACCEPTANCE OF SUBSTRADES

- .1 Each subtrade shall examine surfaces prepared by others and job conditions which may affect his work, and shall report defects to the Departmental Representative.
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, current edition, and British Columbia Construction Standards.
- .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 subcontractors:
 - .1 Designate one person to be responsible for review of contract documents and shop drawings and managing coordination of Work.
- .2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.
 - .1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.
 - .2 Develop coordination drawings when required, illustrating potential interference between work of various trades and distribute to affected parties.
 - .1 Pay particular close attention to overhead work above ceilings and within or near to building structural elements.
 - .2 Identify on coordination drawings, building elements, service lines, rough-in points and indicate location services entrance to site.
 - .3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign off on drawings.
 - .4 Publish minutes of each meeting.
 - .5 Plan and coordinate work in such a way to minimize quantity of service line offsets.
 - .6 Submit copy of coordination drawings and meeting minutes to Departmental Representative for information purposes.
- .3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.
- .4 Work coordination:
 - .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.
- .5 Departmental Representative is not responsible for, or accountable for, extra costs incurred as a result of Contractor's failure to coordinate Work.

1.19 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- .1 In accordance with Section 01 33 00, 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 Sections of Division 02 to 27.

1.20 WORK BY OTHERS

- .1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative.
- .2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of Work.
- .3 Work of Project which will be executed after completion of Work of this Contract, and which is specifically excluded from this Contract:
 - .1 Supply and installation of systems furniture.
- .4 Items noted NIC (Not in Contract), will be supplied and installed by tenant following Substantial Completion.

1.21 SECURITY

- .1 Personnel will be checked at start of work shift and provided with pass which must be worn at all times.
- .2 Contractor shall be fully responsible for securing the area of construction and its contents throughout the construction period.
- .3 Departmental Representative to provide a commissionaire to be present during all work performed Monday to Friday from 18:00 to 8:30, weekends, and statutory holidays.
- .4 Indicate requirement for a commissionaire to be provided in Progress Schedule, Contractor to coordinate with Departmental Representative.

1.22 PROJECT MEETINGS

- .1 Departmental Representative will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.

1.23 TESTING AND INSPECTION

- .1 Particular requirements for inspection and testing to be carried out by testing service or laboratory approved by the Departmental Representative are specified in each section.
- .2 The Contractor will appoint and pay for the services of testing agency or testing laboratory as specified, and where required for the following:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems:
 - .1 Mill tests and certificates of compliance.
 - .2 Tests specified to be carried out by Contractor under the Departmental Representative's supervision.
- .3 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 correct work.
- .4 Contractor shall furnish labour and facilities to:
 - .1 Notify Departmental Representative in advance of planned testing.
- .5 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .6 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.
- .7 The Departmental Representative may require, and pay for, additional inspection and testing services not specified.
- .8 Provide Departmental Representative with electronic copy of testing laboratory reports as soon as they are available.

1.24 AS-BUILT DOCUMENTS

- .1 The Departmental Representative will provide two (2) sets of Contract documents for record "as-built" purposes.
- .2 As 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 Refer to Section 01 78 00 – Closeout Submittals.

1.25 DUST CONTROL

- .1 Provide temporary dust tight screens or partitions per requirements of Section 01 56 00 – Temporary Barriers And Enclosures.

1.26 ENVIRONMENTAL PROTECTION

- .1 Prevent extraneous materials from contaminating air beyond construction area, by providing temporary enclosures during work.
- .2 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers.
- .3 Ensure proper disposal procedures in accordance with all applicable provincial regulations.

1.27 MAINTENACE MATERIALS, SPECIAL TOOLS AND SPARE PARTS

- .1 Specific requirements for maintenance materials, tools, and spare parts are specified in individual sections of Divisions 02 to 28.

1.28 DOCUMENTS PROVIDED

- .1 Upon request, the Departmental Representative may supply the Contractor with up to a maximum of ten (10) sets of Contract Documents for construction purposes.
- .2 The Contractor may obtain additional sets of Contract Documents at the cost of printing, handling and shipping.

1.29 ADDITIONAL DRAWINGS

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

1.30 BUILDING SMOKING ENVIRONMENT

- .1 Smoking within the building is not permitted.

1.31 SYSTEM OF MEASUREMENT

- .1 The metric system of measurement (SI) will be employed on this Contract.

1.32 FAMILIARIZATION WITH SITE

- .1 Before submitting tender, visit site – as indicated in tender documents and become familiar with all conditions likely to affect the cost of the work.

1.33 SUBMISSION OF TENDER

- .1 Submission of a tender is deemed to be confirmation of the fact that the Tenderer has analyzed the Contract documents and inspected the site, and is fully conversant with all conditions.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Construction Schedule.

1.2 SCHEDULE FORMAT

- .1 Submit a horizontal bar chart (Gantt) with separate line for each section of Work, identifying first work day of each week.
- .2 Identification of listings: By specific tasks.

1.3 SCHEDULE SUBMISSION

- .1 Schedule Submission
 - .1 Submit initial format of schedules within seven (7) working days after award of Contract, unless otherwise directed by the Department Representative.
 - .2 Submit schedules in electronic format, forward through e-mail, as.pdf files.
 - .3 Department Representative will review schedule and return review copy within seven (7) days after receipt.
 - .4 Resubmit finalized schedule within three (3) days after return of review copy, unless otherwise directed by the Department Representative.
 - .5 Submit revised progress schedule with each Request for Progress Payment (PWGSC form found on website).
 - .6 Distribute copies of revised schedule to:
 - .1 Job site office.
 - .2 Subcontractors.
 - .3 Other concerned parties.
 - .7 Instruct recipients to report to Contractor within five (5) working days, any problems anticipated by timetable shown in schedule.
 - .8 Submit revised schedules with Application for Payment, identifying changes since previous version.

1.4 SCHEDULING

- .1 Show complete sequence of construction by activity, identifying Work of separate stages and final completion of the entire project within the time period required by the Contract Documents. Indicate the following:
 - .1 Submission of Shop Drawings, product data, MSDS sheets, and samples.
 - .2 Include dates for commencement and completion of each major element of construction.
 - .3 Indicate estimated percentage of completion for each item of work at each submission.
 - .4 Indicate projected percentage of completion of each item as of first day of month.
 - .5 Indicate progress of each activity to date of submission schedule.
 - .6 Indicate changes occurring since previous submission of schedule:

- .1 Major changes in scope.
- .2 Activities modified since previous submission.
- .3 Revised projections of progress and completion.
- .4 Other identifiable changes.
- .7 Final completion date within the time period required by the Contract Documents.

1.5 PROGRESS REPORTS

- .1 Maintain an accurate record of the Construction work. Submit progress report when requested by the Departmental Representative.
- .2 Include in reports, the dates of commencement and percentage of work completed for different aspects of the work.

1.6 CHANGES IN THE SCHEDULE

- .1 When proposing a change in the construction schedule, submit proposed revised schedule to the Departmental Representative, together with such analyses thereof as are required to clearly indicate the purpose and anticipated results of such changes.
- .2 If, in the opinion of the Departmental Representative, any proposed change in construction scheduled is inadequate to secure completion of the Work within the specified time, or is otherwise not in accordance with the specifications, or if the Work is not being adequately or properly prosecuted in any respect, the Departmental Representative reserves the right to require a revised schedule together with such analyses thereof as are required to indicate the anticipated results of such revision.
- .3 Claims for additional compensation or extension of Contract Time on account of such requirements will not be considered.

END OF SECTION

Part 1 General

1.1 APPROVALS

- .1 Approval of shop drawings and samples: refer to 01 11 55 – General Instructions, Clause 1.19.

1.2 GENERAL

- .1 This Section specifies general requirements and procedures for the Contractor's submissions of shop drawings, product data, samples and other requested submittals to Departmental Representative for review. Additional specific requirements for submissions are specified in individual technical sections.
- .2 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.
- .3 Do not proceed with Work affected by submittal until review is complete.
- .4 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .5 Where items or information is not produced in SI Metric units converted values are acceptable.
- .6 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.
- .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 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review unless Departmental Representative gives written acceptance of specific deviations.
- .11 Make any changes in submissions which Departmental Representative may require consistent with Contract documents and resubmit as directed by Departmental Representative.
- .12 Notify Departmental Representative in writing, when resubmitting, of any revisions other than those requested by Departmental Representative.
- .13 **Do not proceed with work until relevant submissions are reviewed and approved by the Departmental Representative.**

1.3 SUBMISSION REQUIREMENTS

- .1 Coordinate each submission with the requirements of the work and the Contract documents. Individual submissions will not be reviewed until all related information is available.
- .2 Allow five (5) days for Departmental Representative's review of each submission.
- .3 Accompany submissions with transmittal letter 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 Specification Section that applies to the submission.
 - .6 Other pertinent data.
- .4 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Specification Section.
 - .4 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .5 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .6 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.
- .5 After Departmental Representative's review, distribute copies..

1.4 SHOP DRAWINGS

- .1 Shop drawings: original drawings or modified standard drawings provided by Contractor to illustrate details of a portion of Work which are specific to project requirements.

- .2 Maximum sheet size: 850 x 1050 mm.
- .3 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .4 Cross-reference shop drawing information to applicable portions of the Contract documents.
- .5 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.
- .6 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.
- .7 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.
- .8 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.
- .9 The review of shop drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same.
 - .2 This 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.
 - .3 Without restricting generality of foregoing, Contractor is responsible for:
 - .1 Dimensions to be confirmed and correlated at job site.
 - .2 Information that pertains solely to fabrication processes or to techniques of construction and installation.
 - .3 Co-ordination of Work of all sub-trades.

1.5 PRODUCT DATA

- .1 Product data: manufacturers' catalogue sheets, MSDS sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products or any other specified information.
- .2 Delete information not applicable to project.
- .3 Supplement standard information to provide details applicable to project.
- .4 Cross-reference product data information to applicable portions of the Contract documents.

- .5 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.
- .6 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.
- .7 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .8 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

1.6 SAMPLES

- .1 Samples: examples of materials, equipment, quality, finishes and workmanship.
- .2 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .3 Deliver samples prepaid to Departmental Representative's business address.
- .4 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .5 Where colour, pattern or texture is criterion, submit full range of samples.
- .6 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.
- .7 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .8 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.7 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of digital photography in jpg format, standard resolution as directed by Departmental Representative.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 4 locations.
 - .1 Viewpoints and their location as determined by Departmental Representative.
- .4 Frequency of photographic documentation: weekly and as follows

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

1.8 PROGRESS SCHEDULE

- .1 Submit work schedule and cost breakdown as required in Section 01 32 18.

1.9 TEST RESULTS AND INSPECTION REPORTS

- .1 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 three (3) years of date of contract award for project.
- .2 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative
- .3 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 32 18 – Construction Progress Schedule.
- .2 Section 01 33 00 – Submittal Procedures.
- .3 Section 01 51 00 – Temporary Utilities.
- .4 Section 01 52 00 – Construction Facilities.
- .5 Section 01 56 00 – Temporary Barriers And Enclosures.
- .6 This section describes requirements applicable to all Sections within Divisions 02 to 28.

1.2 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):
 - .1 Part 8, Safety Measures at Construction and Demolition Sites.
- .3 Canadian Standards Association (CSA) as amended:
 - .1 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
 - .2 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
 - .3 CSA Z797-2009, Code of Practice for Access Scaffold.
- .4 Fire Protection Engineering Services:
 - .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/ASSE A10.3-2006, American National Standard - Construction and Demolition Operations- Safety Requirements for Powder-Actuated Fastening Systems.
- .6 Yukon Territory:
 - .1 Occupational Health and Safety Act, R.S.Y.

1.3 WORKERS' COMPENSATION BOARD COVERAGE

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

1.4 COMPLIANCE WITH REGULATIONS

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

1.5 SUBMITTALS

- .1 Submit to Departmental Representative submittals listed for review, in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Work affected by submittal will not proceed until review is complete.
- .3 Submit 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 Materials Information System (WHMIS) requirements.
 - .5 Emergency Procedures.
- .4 Departmental Representative will review Contractor's site-specific project Health and Safety Plan and emergency procedures and provide comments to Contractor within 5 working days after receipt of plan. Revise plan as appropriate and re-submit 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 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 Contractor of his legal obligations for provision of health and safety on project.

1.6 RESPONSIBILITY

- .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.

1.7 HEALTH AND SAFETY COORDINATOR

- .1 Health and Safety Coordinator must:
 - .1 Be responsible for completing all health and safety training and ensuring that personnel that do not successfully complete required training are not permitted to enter site to perform work.
 - .2 Be responsible for implementing, daily enforcing and monitoring 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 safe working environment for workers and protection for non-workers.
- .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, 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 above authorities, the most stringent provision will apply. Should dispute arise in determining the most stringent requirement, the Departmental Representative will advise on course of action to be followed.

1.10 WORK PERMITS

- .1 Obtain specialty permits related to the 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 Territorial authorities.
- .2 Provide copies of all notices to the Departmental Representative.

1.12 HEALTH AND SAFETY PLAN

- .1 Conduct site specific safety hazard assessment based on review of Contract documents, required work, and project site. Identify known and potential health risks and safety hazards.
- .2 Develop written site specific Health and Safety Plan based on hazard assessment prior to commencing any site Work and continue to implement, maintain, and enforce plan until final demobilization from site.

- .3 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, 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.
- .4 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.
- .5 Department Representative may respond in writing, where deficiencies or concerns are noted and may request resubmission with correction of deficiencies or concerns.
- .6 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.
- .7 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 per legislated regulations.
 - .3 Local emergency resources.
 - .4 Departmental Representative.
- .2 Include the following provisions in the emergency procedures:

- .1 Notify workers, and the first-aid attendant, of the nature and location of the emergency.
- .2 Evacuate all workers safely.
- .3 Check and confirm the safe evacuation of all workers.
- .4 Notify the fire department or other emergency responders.
- .5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
- .6 Notify Departmental Representative.
- .3 Provide written rescue/evacuation procedures as required for, but not limited to:
 - .1 Work in confined spaces or where there is a risk of entrapment.
 - .2 Work with hazardous substances.
 - .3 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:

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 per Section 01 33 00.
 - .2 In conjunction with Departmental Representative, schedule to carry out work during "off hours" when tenants have left the building.
 - .3 Provide adequate means of ventilation in accordance with Section 01 51 00.

1.15 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.

1.16 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.

1.17 OVERLOADING

- .1 Ensure no part of work is subjected to a load which will endanger it or its integrity or the permanent deformation:

1.18 FALSEWORK

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

1.19 SCAFFOLDING

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

1.20 CONFINED SPACES

- .1 Carry out work in confined spaces in compliance with provincial regulations.

1.21 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.

1.22 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.

1.23 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.

1.24 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.

1.25 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Yukon Territory, and in consultation with the Departmental Representative.
- .2 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 marshaling 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.
- .3 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.

1.26 MEETINGS

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

1.27 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Department Representative.
- .2 Provide Department Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Department 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

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

1.2 INSTALLATION AND REMOVAL

- .1 Provide temporary utilities controls in order to execute work expeditiously.
- .2 Remove from site all such work after use or when directed by the Departmental Representative.

1.3 TEMPORARY POWER AND LIGHT

- .1 Electrical power and lighting at existing building may be used for construction purposes at no extra cost, provided that warranties are not affected thereby and electrical components used for temporary power are replaced when damaged. Do not use emergency power or UPS panels for this purpose.
- .2 Electrical power and lighting systems installed under this Contract may be used for construction requirements provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than three (3) months.

1.4 WATER SUPPLY

- .1 Water supply is available at existing building and may be used for construction purposes at no cost.
- .2 Exercise conservation. Turn off water when not in use.

1.5 TEMPORARY HEATING AND VENTILATION

- .1 Do not begin work until arrangements have been made with the Departmental Representative for protection of on-floor heating, ventilating and air conditioning.
 - .1 If there is any dirt in the heating and ventilation system, it will be the Contractor's responsibility to return it to its original state in accordance with the Departmental Representative's specifications.
- .2 Prevent dust and odour migration to other occupied areas.
 - .1 Do not activate HVAC system to occupied floors. Purge air from construction floors only when directed by Departmental Representative, where dust and fumes will be generated.
 - .2 Change filters in existing HVAC system frequently.
- .3 On completion of Work for which permanent heating system is used replace filters, and clean ducting, vents and grilles.
- .4 Ensure date of Substantial Performance of the Work and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Consultant.

1.6 FIRE PROTECTION

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.
- .2 Burning rubbish and construction waste materials is not permitted on site.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-0121-M1978(R2003), Douglas Fir Plywood.
 - .2 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.
- .2 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 ACCESS AND DELIVERY

- .1 Only the designated entrance may be used for access to building.
 - .1 Maintain for duration of Contract.
 - .2 Make good damage resulting from Contractor's use.
- .2 Use of the Loading facility will be granted to the Contractor through the Departmental Representative.
 - .1 The designated loading space is to be used for loading and unloading purposes only.
 - .2 Limited Parking is will be permitted on site, to be coordinated with Departmental Representative.

1.4 INSTALLATION AND REMOVAL

- .1 Provide construction facilities in order to execute work expeditiously.
- .2 Remove from site all such work after use or when directed by the Departmental Representative.

1.5 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ladders, and platforms necessary for the performance of the work.
- .3 Construct and maintain scaffolding in rigid, secure and safe manner.
- .4 Erect scaffolding independent of walls. Remove promptly when no longer required.

1.6 ELEVATORS

- .1 Designated existing elevator to be used by construction personnel. Coordinate use with Departmental Representative.

- .2 Existing elevator not to be used for transporting of materials during business hours (08:30 to 18:00). Coordinate use with Departmental Representative.
- .3 Provide protective coverings for finish surfaces of cars and entrances.

1.7 SITE STORAGE/LOADING

- .1 Storage space will be limited to the area of construction.
- .2 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .3 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.8 CONSTRUCTION PARKING

- .1 Limited parking will be permitted on site. Coordinate use with Departmental Representative.
- .2 One loading space, to be used for deliveries only, is available on site. Coordinate use with Departmental Representative.
- .3 Provide and maintain adequate access to project site.

1.9 OFFICES

- .1 A site office is not required. Contractor may provide site office at their own discretion. Office location where directed by Departmental Representative.

1.10 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.

1.11 SANITARY FACILITIES

- .1 Existing permanent facilities may be used.
- .2 Keep sanitary facilities clean and fully stocked with the necessary supplies at all times and before final completion.

1.12 CONSTRUCTION SIGNAGE

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

1.13 CLEAN-UP

- .1 Remove construction debris, waste materials, and 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

Part 1 General

1.1 SECTION INCLUDES

- .1 Site enclosure.
- .2 Guardrails and barriers.
- .3 Weather enclosures.
- .4 Dust tight barriers.
- .5 Protection for off-site and public property.
- .6 Protection of applied finishes.
- .7 Protection of surrounding Work.

1.2 RELATED SECTIONS

- .1 Section 01 51 00 - Temporary Utilities.
- .2 This section describes requirements applicable to all Sections within Divisions 02 to 28.

1.3 INSTALLATION AND REMOVAL

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

1.4 DUST TIGHT BARRIERS

- .1 Provide dust tight barriers and screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Protect furnishings within work area with 0.102 mm thick polyethylene film during construction.
- .3 Maintain and relocate protection until such work is complete.

1.5 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Prevent extraneous materials from contaminating air beyond construction area, by providing temporary enclosures during work.
- .3 Be responsible for damage incurred.

1.6 PROTECTION OF APPLIED FINISHES

- .1 Provide protection for finished and partially finished surfaces and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.

- .3 Confirm with Departmental Representative locations and installation schedule five (5) days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

1.7 PROTECTION OF SURROUNDING WORK

- .1 Provide protection for finished and partially finished Work from damage.
- .2 Provide necessary cover and protection.
- .3 Be responsible for damage incurred due to lack of or improper or inappropriate protection.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Within text of each specifications section, reference may be made to reference standards.
- .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.

1.2 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.
- .6 Fastenings which cause spalling or cracking are not acceptable.
- .7 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .8 Use heavy hexagon heads, semi-finished unless otherwise specified.
- .9 Bolts may not project more than 1 diameter beyond nuts.
- .10 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.
- .11 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.
- .12 Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from site.
- .13 Store products in accordance with suppliers' instructions.
- .14 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.

1.3 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.

1.4 AVAILABILITY OF PRODUCTS

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for 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 Work.
- .3 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.5 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 re-installation at no increase in either the Contract price or the Contract time.

1.6 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" (used for complex Mechanical or Electrical Systems): 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 Performance specifications, upon request of Departmental Representative obtain from manufacturer and independent laboratory report showing that the product meets or exceeds the specified requirements.

1.7 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 the 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.

1.8 STORAGE, HANDLING AND PROTECTION

- .1 Deliver, handle, and store products in manner to prevent damage, adulteration, deterioration and soiling, and in accordance with manufacturer's instructions when applicable. Immediately remove rejected products from site.
- .2 Deliver, store, and maintain products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.9 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by the Departmental Representative will be paid for by the Contractor. Unload, handle and store such products.

1.10 QUALITY OF WORK

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed.
- .2 Do not employ anyone unskilled in their required duties.
- .3 The workmanship, erection methods and procedures to meet minimum standards set out in the National Building Code of Canada, current edition, and Canadian Construction Standards.
- .4 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative whose decision is final.

1.11 CONCEALMENT

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Requirements and limitations for cutting and patching of Work.

1.2 RELATED SECTIONS

- .1 Section 01 61 00 - Product Requirements.
- .2 Individual Product Specification Sections:
 - .1 Cutting and patching incidental to work of the section.
 - .2 Advance notification to other sections of openings required in Work of those sections.

1.3 SUBMITTALS

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

Part 2 Products

2.1 MATERIALS

- .1 Primary Products: Those required for original installation.

Part 3 Execution

3.1 EXAMINATION

- .1 Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering existing Work, assess conditions affecting performance of work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

- .1 Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.
- .2 Provide protection from elements for areas which may be exposed by uncovering work.
- .3 Maintain excavations free of water.

3.3 CUTTING

- .1 Execute cutting and fitting to complete the Work.
- .2 Uncover work to install improperly sequenced work.
- .3 Remove and replace defective or non-conforming work.
- .4 Remove samples of installed work for testing when requested.
- .5 Provide openings in the Work for penetration of mechanical and electrical work.
- .6 Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- .7 Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

3.4 PATCHING

- .1 Execute patching to complement adjacent Work.
- .2 Fit Products together to integrate with other Work.
- .3 Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- .4 Restore work with new Products in accordance with requirements of Contract Documents.
- .5 Fit work to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .6 Conceal pipes, ducts and wiring in raised floors, wall and ceiling construction of finished areas except where indicated otherwise.
- .7 At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with CAN-ULC-S115, to full thickness of the penetrated element.
- .8 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.
- .9 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 1500 mm in ambient light, and includes painting the whole surface to the next change in plane.
- .10 Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Progressive cleaning.
- .2 Cleaning prior to acceptance.

Part 2 Products

2.1 CLEANING MATERIALS

- .1 Cleaning Agents and Materials: Low VOC content.

Part 3 Execution

3.1 PROGRESSIVE CLEANING

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .2 Remove waste materials from site at regularly scheduled times and dispose of per Section 01 74 19 - Construction Waste Management and Disposal. 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 Containers:
 - .1 Provide on-site containers for collection of waste materials and debris.
 - .2 Provide and use clearly marked, separate bins for recycling.
- .5 Remove waste material and debris from site at end of each working day.
- .6 Dispose of waste materials and debris off site.
- .7 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
- .8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .9 Provide adequate ventilation during use of volatile or noxious substances. Use of enclosure ventilation systems is not permitted for this purpose.
- .10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

3.2 CLEANING PRIOR TO ACCEPTANCE

- .1 Prior to applying for Substantial Performance of the Work, 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 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 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.
- .6 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
- .7 Clean lighting reflectors, lenses, and other lighting surfaces.
- .8 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .9 Clean and polish surface finishes, as recommended by manufacturer.
- .10 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .11 Clean equipment and fixtures to a sanitary condition; replace filters of mechanical equipment.

3.3 FINAL PRODUCT CLEANING

- .1 Execute final cleaning prior to final project assessment.
- .2 Clean interior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- .3 Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- .4 Replace filters of operating equipment.
- .5 Remove waste and surplus materials, rubbish, and construction facilities from the site.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2 DEFINITIONS

- .1 Construction and Demolition Waste: Solid wastes typically including but not limited to, building materials, packaging, trash, debris, and rubble resulting from construction, remodelling, repair and demolition operations.
- .2 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.
- .3 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and re-manufactured into a new product for reuse by others.
- .4 Recycle: To remove a waste material from the Project site to another site for re-manufacture into a new product for reuse by others.
- .5 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .6 Return: To give back reusable items or unused products to vendors for credit.
- .7 Reuse: To reuse a construction waste material in some manner on the Project site.
- .8 Salvage: To remove a waste material from the Project site to another site for resale or reuse by others.
- .9 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- .10 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- .11 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.
- .12 Waste Audit (WA): Relates to projected waste generation. Involves controlled separation of waste.
- .13 Waste Reduction Workplan (WRW): A written report which addresses opportunities for reduction, re-use or recycling of materials.

1.3 SUBMITTAL

- .1 Submit requested submittals in accordance with Section 01 33 00.
- .2 Provide Departmental Representative with receipts indicating quantity of material delivered to landfill.
- .3 Provide Departmental Representative with receipts indicating quantity and type of materials sent for recycling.

1.4 MATERIALS SOURCE SEPARATION

- .1 Before project start-up, prepare Materials Source Separation Program. Provide separate containers for reuse and/or recycling 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.

1.5 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 instruction on disposal practices.

1.6 THIRD PARTY RESPONSIBILITY

- .1 Subcontractors shall cooperate fully with Contractor to implement the Waste Reduction Workplan.

1.7 STORAGE, HANDLING AND APPLICATION

- .1 Do work in compliance with Waste Reduction Workplan.
- .2 Handle waste materials not reused, 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 Contractor's property.
- .6 On-site sale of salvaged/recyclable material is not permitted.

1.8 DISPOSAL OF WASTE

- .1 Burying and/or burning of rubbish and waste materials is prohibited.
- .2 Disposal of waste into waterways, storm, or sanitary sewers is prohibited.

1.9 CLEANING

- .1 Remove tools and waste materials on completion of work, and leave work area in clean and orderly condition.
- .2 Clean-up work area as work progresses.
- .3 Source separate materials to be reused/recycled into specified sort areas.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Inspections and declarations.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.

1.3 FINAL ACCEPTANCE OF WORK PROCEDURES

- .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.
- .2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify defects or deficiencies. Correct defective and deficient Work accordingly.
 - .1 Where inspection reveals work is deemed not substantially complete in accordance with the Contract requirements, Contractor shall pay costs for second, and any subsequent, inspection as may be required to verify acceptability of correct work. Costs to include professional fees, travel costs, and associated disbursements for the Departmental Representative and Consultant team.
- .3 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, balanced and are fully operational.
 - .4 Certificates required by authorities having jurisdiction have been submitted.
 - .5 Operation of systems have been demonstrated to Owner's personnel.
 - .6 Work is complete and ready for Final Inspection.
- .4 Declaration of Substantial Performance: When Departmental Representative considers deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, Departmental Representative will issue Certificate of Substantial Performance Completion.
- .5 Commencement of Warranty Periods: The date of Departmental Representative's acceptance of Substantial Performance of the Work shall be the date for commencement of the warranty period.

- .6 Final Inspection: When items noted above are completed, request final inspection of Work by Departmental Representative. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.
 - .1 Where inspection reveals work is deemed incomplete in accordance with the Contract requirements, Contractor shall pay costs for second, and any subsequent, inspection as may be required to verify acceptability of correct work. Costs to include professional fees, travel costs, and associated disbursements for the Departmental Representative and Consultant team.
- .7 Final Payment: When Departmental Representative considers final deficiencies and defects have been corrected and it appears requirements of Contract have been completed, make application for final payment.

1.4 FINAL CLEANING

- .1 Clean in accordance with Section 01 74 00 – Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 77 00 – Submittal Procedures.
- .3 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.2 SUBMISSION

- .1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .2 Copy will be returned with Departmental Representative's comments.
- .3 Revise content of documents as required prior to final submittal.
- .4 Two (2) weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, two (2) final copies of operating and maintenance manuals in Canadian English.
- .5 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.
- .6 If requested, furnish evidence as to type, source and quality of products provided.
- .7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .8 Pay costs of transportation.

1.3 FORMAT

- .1 Organize data in the form of an instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are required, correlate data into related consistent groupings. Identify contents of each binder on spine.
- .4 Cover: Identify each binder with type or printed title "PROJECT REORD DOCUMENTS"; list title of project and identify subject matter of contents.
- .5 Arrange content by systems under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: Manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.4 CONTENTS - EACH VOLUME

- .1 Table of Contents: Provide:
 - .1 Title of project.
 - .2 Date of submission.
 - .3 Names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
 - .4 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system, list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
- .4 Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

1.5 AS-BUILT DOCUMENTS

- .1 Contract drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .2 Field changes of dimension and detail.
 - .3 Changes made by change orders.
 - .4 Details not on original Contract drawings.
 - .5 References to related shop drawings and modifications.
- .2 Contract Specifications: legibly mark each item to record actual "Workmanship of Construction", including:
 - .1 Manufacturer, trade name, and catalogue number of each "Product/Material" actually installed, particularly optional items and substitute items.
 - .2 Changes made by addenda and change orders.
- .3 As-Built information:
 - .1 Record information on set of black line opaque drawings and within the Project Manual.
 - .2 Annotate with coloured felt tip marking pens, maintaining separate colours for each major system, for recording changed information.
 - .3 Record information concurrently with construction progress on 1 set of drawings, specifications, and shop drawings. Do not conceal Work of the Project until required information is accurately recorded.
 - .4 Prior to final inspection, neatly transfer notations to second set of drawings, specifications, and shop drawings.
 - .5 Submit all sets for the Departmental Representative.

- .4 Other Documents: Maintain manufacturer's certifications, field test records, and inspection certifications required by individual specifications sections.

1.6 EQUIPMENT AND SYSTEMS

- .1 Operating procedures – include the following:
 - .1 Start-up, break-in, and routine normal operating instructions and sequences.
 - .2 Regulation, control, stopping, shutdown, and emergency instructions.
 - .3 Summer, winter, and any special operating instructions.
- .2 List routine Maintenance Procedure requirements.
- .3 Provide servicing and lubrication schedule, and list of lubricants required.
- .4 Include manufacturer's printed operation and maintenance instructions.
- .5 Include sequence of operation by controls manufacturer.
- .6 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .7 Provide installed control diagrams by controls manufacturer.
- .8 Provide Contractor's coordination drawings with installed colour coded piping diagrams.
- .9 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .10 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .11 Additional requirements: as specified in individual specification Sections.

1.7 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 on-site location as directed; place and store.
- .4 Receive and catalogue all items. Submit inventory listing to the Departmental Representative. Include approved listings in maintenance manual.
- .5 Obtain receipt for delivered products and submit to Departmental Representative.

1.8 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 on-site location as directed; place and store.
- .4 Receive and catalogue all items. Submit inventory listing to the Departmental Representative. Include approved listings in maintenance manual.
- .5 Obtain receipt for delivered products and submit to Departmental Representative.

1.9 SPECIAL TOOLS

- .1 Provide special tools in quantities specified in individual specification Sections.
- .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 the Departmental Representative. Include approved listings in maintenance manual.

1.10 WARRANTIES, BONDS, TEST REPORTS, AND INSPECTION REPORTS

- .1 Separate each Document 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, Bonds, Test Reports, and Inspections executed in duplicate by subcontractors, suppliers, and manufacturers, within ten (10) days after completion of the applicable item of work.
- .4 Except for items put into use with Departmental Representative'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 submittals.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Demonstrate operation and maintenance of equipment and systems to Departmental Representative's personnel two (2) weeks prior to date of substantial performance.
- .2 Departmental Representative: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
- .3 Preparation:
 - .1 Verify conditions for demonstration and instructions comply with requirements.
 - .2 Verify designated personnel are present.
 - .3 Ensure equipment has been inspected and put into operation.
 - .4 Ensure testing, adjusting, and balancing have been performed and equipment and systems are fully operational.
- .4 Demonstration and Instructions:
 - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the designated location.
 - .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
 - .3 Review contents of manual in detail to explain aspects of operation and maintenance.
 - .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.
- .3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .4 Give time and date of each demonstration, with list of persons present.
- .5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Includes general requirements for commissioning facilities and facility systems.
- .2 Refer to sections of Mechanical, Electrical and Communications disciplines.

1.2 DEFINITIONS

- .1 Acronyms:
 - .1 AFD – Alternate Forms of Delivery, service provider.
 - .2 BMM – Building Management Manual.
 - .3 Cx – Commissioning.
 - .4 EMCS – Energy Monitoring and Control Systems.
 - .5 O&M – Operation and Maintenance.
 - .6 PI – Product Information.
 - .7 PV – Performance Verification.
 - .8 TAB – Testing, Adjusting and Balancing.
- .2 Cx – a required program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved.

1.3 QUALITY ASSURANCE

- .1 Testing organization: current member in good standing of AABC certified to perform specified services.
- .2 Comply with applicable procedures and standards of the certification sponsoring association.
- .3 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.

1.4 REFERENCES

- .1 Associated Air Balance Council (AABC): National Standards for Field Measurement and Instrumentation, Total Systems Balance, Air Distribution-Hydronics Systems.

1.5 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prior to start of Work, submit name of organization proposed to perform services. Designate who has managerial responsibilities for coordination of entire testing, adjusting and balancing.
- .3 Submit documentation to confirm organization compliance with quality assurance provision.

- .4 Submit three (3) preliminary specimen copies of each of report forms proposed for use.
- .5 Ten (10) days prior to Substantial Performance, submit three (3) copies of final reports on applicable forms.
- .6 Submit reports of testing, adjusting and balancing postponed due to seasonal, climatic, occupancy, or other reasons beyond Contractor's control, promptly after execution of those services.

1.6 PROCEDURES – GENERAL

- .1 Comply with procedural standards of certifying association under whose standard services will be performed.
- .2 Notify Departmental Representative three (3) days prior to beginning of operations.
- .3 Accurately record data for each step.
- .4 Report to Departmental Representative any deficiencies or defects noted during performance of services.

1.7 CONTRACTOR'S RESPONSIBILITIES

- .1 Prepare each system for testing and balancing.
- .2 Cooperate with testing organization and provide access to equipment and systems.
- .3 Provide personnel and operate systems at designated times, and under conditions required for proper testing, adjusting, and balancing.
- .4 Notify testing organization seven (7) days prior to time project will be ready for testing, adjusting, and balancing.

1.8 PREPARATION

- .1 Provide instruments required for testing, adjusting, and balancing operations.
- .2 Make instruments available to Departmental Representative to facilitate spot checks during testing.
- .3 Retain possession of instruments and remove at completion of services.
- .4 Verify systems installation is complete and in continuous operation.
- .5 Verify lighting is turned on when lighting is included in cooling load.
- .6 Verify equipment such as computers, laboratory and electronic equipment are in full operation.

1.9 FINAL REPORTS

- .1 Organization having managerial responsibility shall make reports.
- .2 Ensure each form bears signature of recorder, and that of supervisor of reporting organization.
- .3 Identify each instrument used, and latest date of calibration of each.

1.10 COMPLETION OF COMMISSIONING

- .1 Upon completion of Cx leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.
- .3 Cx deliverables have been submitted and accepted by Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 74 19 – Construction Waste Management and Demolition.

1.2 SECTION INCLUDES

- .1 Alteration project procedures.
- .2 Removal of designated building finishes, including flooring.
- .3 Removal of designated building equipment and fixtures.
- .4 Removal of designated construction.
- .5 Identification of utilities.

1.3 ALTERATION PROJECT PROCEDURES

- .1 Materials: As specified in Product sections; match existing Products and work for patching and extending work.
- .2 Employ skilled and experienced installer to perform alteration work.
- .3 Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- .4 Remove, cut, and patch Work in a manner to minimize damage and to provide means of restoring Products and finishes to original condition.
- .5 Refinish existing visible surfaces to remain in renovated rooms and spaces, to renewed condition for each material, with a neat transition to adjacent finishes.
- .6 Where new Work abuts or aligns with existing, provide a smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
- .7 When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and submit recommendation to Departmental Representative for review.
- .8 Where a change of plane of 6 mm or more occurs, submit recommendation for providing a smooth transition to Departmental Representative for review.
- .9 Patch or replace portions of existing surfaces which are damaged, lifted, discoloured, or showing other imperfections.
- .10 Finish surfaces as specified in individual Product sections.

1.4 CLOSEOUT SUBMITTALS

- .1 Section 01 78 00 for submission procedures.
- .2 Record Documentation: Accurately record actual locations of capped utilities.

1.5 REGULATORY REQUIREMENTS

- .1 Conform to applicable code for demolition work, dust control, products requiring electrical disconnection.
- .2 Obtain required permits from authorities having jurisdiction.
- .3 Do not close or obstruct egress width to any building or site exit.
- .4 Do not disable or disrupt building fire or life safety systems without five (5) days prior written notice to Departmental Representative.

1.6 PROJECT CONDITIONS

- .1 Conduct demolition to minimize interference with adjacent and occupied building areas.
- .2 Cease operations immediately if structure appears to be in danger and notify Departmental Representative. Do not resume operations until directed.

Part 2 Products

2.1 MATERIALS

- .1 Not Used.

Part 3 Execution

3.1 PREPARATION

- .1 Erect and maintain temporary partitions to prevent spread of dust, odours, and noise to permit continued tenant occupancy.
- .2 Protect existing materials and surfaces which are not to be demolished.
- .3 Inspect site and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .4 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .5 Notify affected utility companies before starting work, comply with their requirements.
- .6 Mark location and termination of utilities.
- .7 Provide appropriate temporary signage including signage for exit or building egress.

3.2 DEMOLITION

- .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 Disconnect, cap, and identify designated utilities within demolition areas.
- .6 Demolish in an orderly and careful manner. Protect existing to remain.

- .7 Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.
- .8 Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.
- .9 Remove temporary Work.

3.3 SALVAGED MATERIALS

- .1 Doors, frames, sidelights, and interior glazing to be salvaged for reuse as indicated on the drawings.
- .2 Remove doors, transoms, jambs, hardware, and glazing to be reused from existing demountable partition system.
- .3 Clearly mark each door/window assembly with identifying tag to be used for reinstallation in new partition walls.
- .4 Store all salvaged items, protect from movement and damage to finishes.
- .5 Catalogue and store hardware for reuse.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CSA International
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .2 CSA O121-08, Douglas Fir Plywood.
 - .3 CSA O141-05(R2009), Softwood Lumber.
 - .4 CSA O151-09, Canadian Softwood Plywood.
 - .5 CAN/CSA-Z809-08, Sustainable Forest Management.
- .2 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .3 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2010.
- .4 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2010-2014 Standard.

1.2 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 grade mark in accordance with applicable CSA standards.
- .4 Sustainable Standards Certification:
 - .1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse in accordance with Section 01 74 19 - Construction Waste Management and Disposal.

Part 2 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 CAN/CSA-Z809 or FSC or SFI certified.
- .2 Furring, blocking, nailing strips, grounds, rough bucks:
 - .1 S2S is acceptable for concealed work.
 - .2 Board sizes: "Standard" or better grade.
 - .3 Dimension sizes: "Standard" light framing or better grade.
 - .4 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.
- .4 Primers and Paints: in accordance with Section 09 91 23.

2.2 ACCESSORIES

- .1 Fasteners: to CAN/CSA-G164, for treated lumber.
- .2 Nails, spikes and staples: to CSA B111.
- .3 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

Part 3 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.

3.2 INSTALLATION

- .1 Comply with requirements of NBC, supplemented by the following paragraphs.
- .2 Install members true to line, levels and elevations, square and plumb.
- .3 Construct continuous members from pieces of longest practical length.
- .4 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.
- .5 Align and plumb faces of furring and blocking to tolerance of 1:600.

- .6 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .7 Install electrical equipment backboards for mounting electrical equipment as indicated.
- .8 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.
- .9 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .10 Countersink bolts where necessary to provide clearance for other work.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - 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 00 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American National Standards Institute (ANSI)
 - .1 ANSI A208.2-09, Medium Density Fiberboard (MDF) for Interior Applications.
 - .2 ANSI/HPVA HP-1-10, Standard for Hardwood and Decorative Plywood.
- .2 ASTM International
 - .1 ASTM D2832-92(R2011), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
 - .2 ASTM D5116-10, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
- .3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
 - .1 Architectural Woodwork Quality Standards Illustrated, 8th edition, Version 1.0 (2009).
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
- .5 CSA International
 - .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
 - .2 CSA O112.10-08, Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
 - .3 CSA O121-08, Douglas Fir Plywood.
 - .4 CSA O141-05(R2009), Softwood Lumber.
 - .5 CSA O151-09, Canadian Softwood Plywood.
 - .6 CAN/CSA-Z809-08, Sustainable Forest Management.
- .6 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .7 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .8 International Organization for Standardization (ISO)
 - .1 ISO 14040-2006, Environmental Management-Life Cycle Assessment - Principles and Framework.
 - .2 ISO 14041-98, Environmental Management-Life Cycle Assessment - Goal and Scope Definition and Inventory Analysis.
- .9 National Electrical Manufacturers Association (NEMA)
 - .1 ANSI/NEMA LD-3-05, High-Pressure Decorative Laminates (HPDL).
- .10 National Hardwood Lumber Association (NHLA)

- .1 Rules for the Measurement and Inspection of Hardwood and Cypress 2011.
 - .11 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2010.
 - .12 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2010-2014 Standard.
- 1.2 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 architectural woodwork and include product characteristics, performance criteria, physical size, finish and limitations.
 - .3 Shop Drawings:
 - .1 Indicate materials, component profiles and elevations, assembly methods, surface graining, elevations of sheet paneling, accessory listings.
 - .2 Indicate details of construction, profiles, jointing, fastening and other related details.
 - .3 Indicate materials, thicknesses, finishes and hardware.
 - .4 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.
 - .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Submit duplicate samples of laminated plastic for colour selection.
 - .3 Submit duplicate samples of laminated plastic joints, edging, cutouts and post formed profiles.
 - .5 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- 1.3 QUALITY ASSURANCE**
 - .1 Perform work in accordance with AWI /AWMAC QSI Custom Quality.
 - .2 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
 - .3 Plywood, particleboard, OSB and wood based composite panels to CSA and ANSI standards.
- 1.4 DELIVERY, STORAGE AND HANDLING**
 - .1 Deliver, store and handle materials in accordance with Section 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.
 - .1 Protect millwork against dampness and damage during and after delivery.
 - .2 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse in accordance with Section 01 74 19 - Construction Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Canadian softwood plywood (CSP): to CSA O151, standard construction, CAN/CSA-Z809 or FSC or SFI certified.
 - .1 Graded in accordance with AWMAC Custom
 - .2 Plywood resin to contain no added urea-formaldehyde.
- .2 Hardwood plywood: to ANSI/HPVA HP-1, CAN/CSA-Z809 or FSC or SFI certified.
 - .1 Graded in accordance with AWMAC Custom
 - .2 Plywood resin to contain no added urea-formaldehyde.
- .3 Birch plywood: to AWMAC Paint Grade, CAN/CSA-Z809 or FSC or SFI certified.
 - .1 Graded in accordance with AWMAC Custom
 - .2 Plywood resin to contain no added urea-formaldehyde.
- .4 MDF (medium density fibreboard) core: to ANSI A208.2, thickness as indicated, density 769 kg/m³, CAN/CSA-Z809 or FSC or SFI certified.
 - .1 Medium density fibreboard performance requirements to: ANSI A208.2.
 - .2 MDF resin to contain no added urea-formaldehyde.
- .5 Laminated plastic for flatwork: to NEMA LD3, Grade VGL, 1.14 mm thick; based on printed pattern, multilayered, colour range with satin finish.
 - .1 Laminate schedule to be based on three (3) colours.
- .6 Laminated plastic for postforming work: to NEMA LD3, Grade VGL, 0.86 mm thick, based on printed pattern, multilayered, colour range with satin finish.
- .7 Laminated plastic backing sheet: Grade BK, minimum of 0.5 mm thick or same thickness and colour as face laminate.
- .8 Nails and staples: to CSA B111.

- .9 Wood screws: plain, type and size to suit application.
- .10 Laminated plastic adhesive: as recommended by plastic laminate manufacturer.

2.2 **HARDWARE**

- .1 Hardware: BHMA A156.9 as indicated on Drawings.
- .2 Cabinet Door Pulls: D shaped pull, metal construction, brushed nickel finish, 28 mm projection from cabinet face, 128 mm centre to centre.
- .3 Shelf Standards and Rests: Formed steel channels and rests, cut for fitted rests spaced at 1 inch centres, recessed standard, satin nickel finish.
- .4 Drawer slides: Nickel finish or bright zinc plated steel construction with metal ball bearings/ retainers/rollers, side mounting, full extension style, automatic stops to prevent accidental dropping of drawers when pulled out. 45Kg capacity.
- .5 Hinges: soft close, nickel plated.

2.3 **FABRICATION**

- .1 Fabricate cabinets, millwork and shelving to AWI /AWMAC AWS Custom standards.
- .2 Set nails and countersink screws apply plain wood filler to indentations, sand smooth and leave ready to receive finish.
- .3 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.
- .4 When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- .5 Shelving in cabinetwork to be adjustable unless otherwise noted.
- .6 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.
- .7 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.
- .8 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.
- .9 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .10 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 2400 mm. Keep joints 600 mm from sink cutouts.
- .11 Form shaped profiles and bends as indicated, using postforming grade laminate to laminate manufacturer's instructions.
- .12 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.
- .13 Apply laminate backing sheet to reverse side of core of plastic laminate work.

Part 3 Execution

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Do architectural woodwork to Custom Quality Standards of AWMAC.
- .2 Install prefinished millwork at locations shown on drawings.
 - .1 Position accurately, level, plumb straight.
- .3 Fasten and anchor millwork securely.
 - .1 Supply and install heavy-duty fixture attachments for wall mounted cabinets.
- .4 Use draw bolts in countertop joints.
- .5 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.
- .6 At junction of plastic laminate counter and adjacent wall finish, apply small bead of sealant.
- .7 Fit hardware accurately and securely in accordance with manufacturer's written instructions.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - 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 00 - Cleaning.
 - .1 Clean millwork, outside and inside surfaces.
 - .2 Remove excess glue from surfaces.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

- .1 Protect millwork from damage until final inspection.
- .2 Protect installed products and components from damage during construction.
- .3 Repair damage to adjacent materials caused by architectural woodwork installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 ASTM International
 - .1 ASTM C919-08, Standard Practice for Use of Sealants in Acoustical Applications.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
 - .2 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
 - .3 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.2 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 joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Manufacturer's product to describe:
 - .1 Caulking compound.
 - .2 Primers.
 - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- .3 Manufacturer's Instructions:
 - .1 Submit instructions to include installation instructions for each product used.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .4 Develop Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
- .5 Packaging Waste Management: remove for reuse and return of packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 19 - Construction Waste Management and Disposal.

1.5 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Proceed with installation of joint sealants only when:
 - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
 - .2 Joint substrates are dry.
 - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 Joint-Width Conditions:
 - .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
 - .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.6 ENVIRONMENTAL REQUIREMENTS

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

Part 2 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 off gas to exterior, or are contained behind air barriers.

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

2.2 SEALANT MATERIAL DESIGNATIONS

- .1 Silicones one part: to CAN/CGSB-19.13.
- .2 Acrylics one part: to CGSB 19-GP-5M.
- .3 Acrylic latex one part, non-sag siliconized acrylic polymer: to CAN/CGSB-19.17. Paintable when cured.
- .4 Acoustical sealant: to ASTM C919.
- .5 Preformed compressible and non-compressible back-up materials:
 - .1 Polyethylene, urethane, neoprene or vinyl foam:
 - .1 Extruded closed cell foam backer rod.
 - .2 Size: oversize 30 to 50 %.

2.3 SEALANT SELECTION

- .1 Perimeters of interior frames to make junctions filled, smooth and invisible suitable for subsequent 'painting out' with interior wall finish:
 - .1 Sealant type: Acrylic latex.
- .2 Junctions between counter tops and walls, and junctions between plumbing fixtures and walls/floors/counter tops to produce permanent sanitary and watertight seal, coordinate with plumbing trade to avoid omission/duplication:
 - .1 Sealant type: Mildew resistant silicone.
- .3 Exposed interior control joints in drywall to make joints suitable for subsequent 'painting out' with interior wall finish:
 - .1 Sealant type: Acrylic latex.

2.4 JOINT CLEANER

- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.
- .2 Primer: in accordance with sealant manufacturer's written recommendations.

Part 3 Execution

3.1 EXAMINATION

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

3.2 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.
 - .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.

3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean adjacent surfaces immediately.
 - .3 Remove excess and droppings, using recommended cleaners as work progresses.
 - .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 PROTECTION

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 08 14 16 – Flush Wood Doors.
- .2 Section 08 71 00 – Door Hardware.
- .3 Section 09 91 23 – Interior Painting.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A653/A653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
- .3 Canadian Steel Door Manufacturers' Association (CSDMA)
 - .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
- .4 Steel Door Institute (SDI)
 - .1 SDI 100, Recommended Specifications for Standard Steel Doors and Frames.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: Indicate frame configuration and finishes. Indicate door configurations, location of cut-outs for hardware reinforcement.
- .3 Shop drawings:
 - .1 Indicate each type of door elevation, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, cut outs for glazing, louvres, arrangement of hardware, fire rating if applicable, and finishes.
 - .2 Indicate each type of frame elevation, material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings, reinforcing, fire rating if applicable, and finishes.
 - .3 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:

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

1.5 QUALITY ASSURANCE

- .1 Conform to requirements of CSDFMA, SDI-100 and ANSI A117.1.

Part 2 Products

2.1 MATERIALS

- .1 Hot dipped galvanized steel sheet: to ASTM A653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.
- .2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653M, ZF75.

2.2 DOOR CORE MATERIALS

- .1 Honeycomb construction:
 - .1 Structural small cell, 24.5 mm maximum kraft paper 'honeycomb', weight: 36.3 kg per ream minimum, density: 16.5 kg/m³ minimum sanded to required thickness.

2.3 ADHESIVES

- .1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
 - .1 Adhesive: maximum VOC content 50 g/L.

2.4 PRIMER

- .1 Touch-up prime CAN/CGSB-1.181.

2.5 PAINT

- .1 Field paint steel frames in accordance with Section 09 91 23 – Interior Painting. Provide final finish free of scratches or other blemishes.

2.6 ACCESSORIES

- .1 Door silencers: single stud rubber/neoprene type.
- .2 Interior top and bottom caps: steel.
- .3 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
- .4 Door bottom seal: smoke seal.
- .5 Metallic paste filler: to manufacturer's standard.
- .6 Sealant: in accordance with Section 07 92 00 - Joint Sealing.

- .7 Glazing: Safety Glass to CAN/CGSB-12.1, transparent, 6 mm thick.
 - .1 Type 2-tempered.
 - .2 Class B-float.
 - .3 Category 1.

2.7 FRAMES FABRICATION GENERAL

- .1 Fabricate frames in accordance with CSDMA specifications.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Interior frames: 1.2 mm welded type construction.
- .4 Reinforce frames wider than 1200mm with roll formed steel channels fitted tightly into frame head, flush with top.
- .5 Blank, reinforce, drill and tap frames for mortised, templated hardware, using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
- .6 Prepare frame for door silencers, 3 for single door and mullions of double doors on strike side, 2 at head for double door without mullions.
- .7 Manufacturer's nameplates on frames and screens are not permitted.
- .8 Conceal fastenings except where exposed fastenings are indicated.
- .9 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

2.8 FRAME ANCHORAGE

- .1 Provide appropriate anchorage to floor and wall construction.
- .2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
- .3 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.
- .4 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

2.9 FRAMES: WELDED TYPE

- .1 Welding in accordance with CSA W59.
- .2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.
- .3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.
- .4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
- .5 Securely attach floor anchors to inside of each jamb profile.
- .6 Attach channel spreaders at bottom of frame to maintain proper alignment during shipment.

2.10 DOOR FABRICATION GENERAL

- .1 Doors: swing type, flush, with provision for glass openings as indicated.
- .2 Interior doors: hollow steel construction.
- .3 Fabricate doors with longitudinal edges welded. Seams: grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.
- .4 Blank, reinforce, drill doors and tap for mortised, templated hardware, and electronic hardware.
- .5 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.
- .6 Reinforce doors where required, for surface mounted hardware. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.
- .7 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
- .8 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in conformance with CAN4-S104 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.
- .9 Manufacturer's nameplates on doors are not permitted.

2.11 HOLLOW STEEL CONSTRUCTION

- .1 Form face sheets for interior doors from 1.2 sheet steel.
- .2 Reinforce doors with vertical stiffeners, securely welded to face sheets at 150 mm on centre maximum.
- .3 Fill voids between stiffeners of interior doors with honeycomb core.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION GENERAL

- .1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.
- .2 Install doors and frames to CSDMA Installation Guide.

3.3 FRAME INSTALLATION

- .1 Install frames in accordance with CSDFMA.
- .2 Coordinate with framing and gypsum board construction for anchor placement.

- .3 Set frames plumb, square, level and at correct elevation.
- .4 Secure anchorages and connections to adjacent construction.
- .5 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.
- .6 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.
- .7 Caulk perimeter of frames between frame and adjacent material.

3.4 DOOR INSTALLATION

- .1 Coordinate with installation of wood doors.
- .2 Install wood doors in accordance with Section 08 14 16 – Flush Wood Doors, and manufacturer's instructions.
- .3 Install hardware in accordance with hardware templates, and manufacturer's instructions and Section 08 71 00 - Door Hardware.
- .4 Provide even margins between doors and jambs, and doors and finished floor as follows:
 - .1 Hinge side: 1.0 mm.
 - .2 Latchside and head: 1.5 mm.
 - .3 Finished floor, top of carpet: 13 mm.
- .5 Adjust operable parts for correct function.

3.5 FINISH REPAIRS

- .1 Touch up with primer finishes damaged during installation.
- .2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.6 GLAZING

- .1 Install glazing for doors GANA Glazing Manual for glazing installation methods.

3.7 ERECTION TOLERANCES

- .1 Maximum Diagonal Distortion: 1.5 mm measured with straight edges, crossed corner to corner.

3.8 ADJUSTING

- .1 Adjust door for smooth and balanced door movement.

3.9 CLEANING

- .1 Do cleaning in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 08 11 00 – Metal Doors And Frames.
- .2 Section 08 71 00 – Door Hardware.
- .3 Section 09 91 23 – Interior Painting.

1.2 REFERENCES

- .1 Architectural Woodwork Manufacturers Association of Canada (AWMAC).
 - .1 Quality Standards for Architectural Woodwork, current edition.
- .2 Canadian Standards Association (CSA International).
 - .1 CAN/CSA O132.2 Series-90(R1998), Wood Flush Doors.
 - .2 CAN/CSA-Z808-96, A Sustainable Forest Management System: Guidance Document.
 - .3 CSA Certification Program for Windows and Doors 00.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate door core materials and construction, veneer species, type and characteristics.
- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate door types and cutouts for lights, sizes, core construction, transom panel construction and cutouts.

1.4 QUALITY ASSURANCE

- .1 Perform work in accordance with AWI/AWMAC QSI, Custom Finish doors in accordance with AWI/AWMAC QSI Quality Standard.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Storage and Protection:
 - .1 Package, deliver and store doors in accordance with AWI/AWMAC QSI.
 - .2 Protect doors from dampness. Arrange for delivery after work causing abnormal humidity has been completed.
 - .3 Store doors in well ventilated room, off floor, in accordance with manufacturer's recommendations.

- .4 Protect doors from scratches, handling marks and other damage. Wrap doors.
- .5 Store doors away from direct sunlight.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Dispose of all packaging material in appropriate on-site bin for recycling in accordance with site waste management program.
- .3 Do not dispose of unused paint materials into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

Part 2 Products

2.1 WOOD FLUSH DOORS

- .1 Solid core: to CAN/CSA-O132.2.1.
 - .1 Construction:
 - .1 Solid particleboard core: stile and rail frame bonded to particleboard core with wood lock blocks, 3-ply construction.
 - .2 Face Panels:
 - .1 Hardwood: Grade A wood veneer, paint grade MDO.
 - .3 Adhesive: Type I (waterproof) for interior doors.

2.2 GLAZING

- .1 Safety Glass: to CAN/CGSB-12.1, transparent, 6 mm thick.
 - .1 Type 2-tempered.
 - .2 Class B-float.
 - .3 Category 1.

2.3 FABRICATION

- .1 Fabricate non-rated doors in accordance with QSI Custom Grade Quality Standards requirements.
- .2 Provide lock blocks at lock edge and top of door for closer for hardware reinforcement.
 - .1 Door Edge Detail to conform to QSI No. 1 Edge, hardwood vertical edges of species to match face veneer.
- .3 Bond edge banding to cores.
- .4 Prepare doors for glazing. Provide glazing stops with mitred corners.
- .5 Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware
- .6 Provide edge clearances in accordance with AWMAC unless otherwise noted.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

- .1 Verify that opening sizes and tolerances are acceptable.
- .2 Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.3 INSTALLATION

- .1 Section 08 11 00: coordinate metal frame installation.
- .2 Install doors in accordance with manufacturer's instructions.

3.4 ADJUSTMENT

- .1 Adjust door for smooth and balanced door movement.
- .2 Adjust closer for full closure
- .3 Re-adjust doors and hardware just prior to completion of building to function freely and properly.

3.5 CLEANING

- .1 Perform cleaning in accordance with Section 01 74 00 - Cleaning.
- .2 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .3 Remove traces of primer, caulking; clean doors and frames.
- .4 Clean glass and glazing materials with approved non-abrasive cleaner.
- .5 On completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 08 11 00 - Metal Doors and Frames.
- .2 Section 08 14 16 – Flush Wood Doors.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
 - .1 ANSI/BHMA A156.2-[2003], Bored and Preamsembled Locks and Latches.
 - .2 ANSI/BHMA A156.4-[2000], Door Controls - Closers.
 - .3 ANSI/BHMA A156.13-[2002], Mortise Locks and Latches Series 1000.
 - .4 ANSI/BHMA A156.15-[2006], Release Devices - Closer Holder, Electromagnetic and Electromechanical.
 - .5 ANSI/BHMA A156.16-[2002], Auxiliary Hardware.
 - .6 ANSI/BHMA A156.18-[2006], Materials and Finishes.
- .2 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
 - .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Hardware List:
 - .1 Submit contract hardware list.
 - .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
 - .3 Indicate locations and mounting heights of each type of hardware.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data of door hardware for incorporation into manual.
- .3 Keys: Deliver with identifying tags to Departmental Representative by security shipment direct from hardware supplier.

1.5 MAINTENANCE MATERIALS SUBMITTALS

- .1 Extra Stock Materials:
 - .1 Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

- .2 Tools:
 - .1 Provide maintenance tools and accessories supplied by hardware component manufacturer.
 - .2 Supply 2 sets of wrenches and tools applicable to each different or special hardware component.

1.6 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum ten (10) years documented experience.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with 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 indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect from nicks, scratches, and blemishes.
 - .3 Protect prefinished surfaces with wrapping.
 - .4 Replace defective or damaged materials with new.
- .5 Packaging Waste Management: remove for recycle in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 HARDWARE ITEMS

- .1 Use one manufacturer's products only for similar items.

2.2 DOOR HARDWARE

- .1 Locks and latches:
 - .1 Mortise locks and latches: to ANSI/BHMA A156.13, series 1000 mortise lock, grade 1, designed for function as stated in Hardware Schedule.
 - .2 Lever handles: plain design to match existing.
 - .3 Normal strikes: box type, lip projection not beyond jamb.
 - .4 Cylinders: key into keying system as directed.
- .2 Butts and hinges:
 - .1 Butts and hinges: to ANSI/BHMA A156.1, designated numeral identifiers, followed by size and finish, listed in Hardware Schedule.

- .3 Door Closers and Accessories:
 - .1 Door controls (closers): to ANSI/BHMA A156.4, designated numeral identifiers listed in Hardware Schedule, size in accordance with ANSI/BHMA A156.4, table A1, finished to BHMA 689.
- .4 Auxiliary locks and associated products: to ANSI/BHMA A156.5, designated by numeral identifiers listed in Hardware Schedule, finished to BHMA 626.
 - .1 Dead bolt, ANSI E06071, type cylinder x thumbturn lock, finished to BHMA 626. Key into keying system as directed.
- .5 Architectural door trim: to ANSI/BHMA A156.6, finish to BHMA 626.
 - .1 Door protection plates: kick plate type, 1.27 mm thick brass, 203.2 mm high, finished to BHMA 626.

2.3 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.

2.4 KEYING

- .1 Doors to be keyed differently and master keyed as directed. Prepare detailed keying schedule in conjunction with Departmental Representative.
- .2 Supply keys in duplicate for every lock in this Contract.
- .3 Supply three (3) master keys.
- .4 Stamp keying code numbers on keys and cylinders.
- .5 Supply construction cores.
- .6 Hand over keys to Departmental Representative.

Part 3 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.
- .5 Remove construction cores when directed by Departmental Representative.
 - .1 Install permanent cores and ensure locks operate correctly.

3.2 ADJUSTING

- .1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, and safety.
- .2 Lubricate hardware, operating equipment and other moving parts.
- .3 Adjust door hardware to ensure tight fit at contact points with frames.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
 - .3 Remove protective material from hardware items where present.
 - .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

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

3.5 SCHEDULE

- .1 Hardware Group No. 1: D207 – Repair hole from removal of thumb turn.

Qty	Description	Catalogue Number	Finish	Mfr
3	Hinge	Reuse Existing		
1	Mortise Lock	Remove Existing Lockset		
1	Classroom Lock	L9070L 03B	626	SCH
1	Cylinder	ML2057	626	MED
1	Closer	Reuse Existing		
1	Kick Plate	8400 203mm X 40mm LDW B4E	630	IVE

.2 Hardware Group No. 2: D208

Qty	Description	Catalogue Number	Finish	Mfr
3	Hinge	5BB1 114 x 102	652	IVE
1	Mortise Lock	Remove Existing Lockset		
1	Classroom Lock	L9070L 03B	626	SCH
1	Cylinder	ML2057	626	MED
1	Closer	1461 REG	689	LCN
1	Wall Stop	WS406/407CVX	630	IVE

.3 Hardware Group No. 3: D211

Qty	Description	Catalogue Number	Finish	Mfr
3	Hinge	Reuse Existing		
1	Mortise Lock	Remove Existing Lockset		
1	Classroom Lock	L9070L 03B	626	SCH
1	Cylinder	ML2057	626	MED
1	Wall Stop	WS406/407CVX	630	IVE

.4 Hardware Group No. 4: D212

Qty	Description	Catalogue Number	Finish	Mfr
To be confirmed.				

.5 Hardware Group No. 5: D400

Qty	Description	Catalogue Number	Finish	Mfr
3	Hinge	Reuse Existing		
1	Lockset	Reuse Existing		
1	Electric Strike	8500 x 8XXX (Face Plate)	630	HES
1	Surface Closer	4040XP REG	689	LCN
1	Kick Plate	8400 203mm X 40mm LDW B4E	630	IVE
1	Smoke Seal (Set)	W-21 (1 x Width, 2 x Height)	BLK	KNC
1	Card Reader	By Others		UNK
1	Power Supply	PS902	LGR	VON

.6 Hardware Group No. 6: D401A – Confirm door has existing door closer installed.

Qty	Description	Catalogue Number	Finish	Mfr
3	Hinge	Reuse Existing		
1	Lockset	Reuse Existing		
1	Electric Strike	8500 x 8XXX (Face Plate)	630	HES
1	Closer	Reuse Existing (Confirm)		
1	Kick Plate	8400 203mm X 40mm LDW B4E	630	IVE
1	Smoke Seal (Set)	W-21 (1 x Width, 2 x Height)	BLK	KNC
1	Card Reader	By Others		UNK

	1	Power Supply	PS902	LGR	VON
	1	Kick Down Holder	Remove Existing		
.7	Hardware Group No. 7: D402 – Key to match existing key way.				
	<u>Qty</u>	<u>Description</u>	<u>Catalogue Number</u>	<u>Finish</u>	<u>Mfr</u>
	3	Hinge	Reuse Existing		
	1	Mortise Lock	Remove Existing		
	1	Office w/ SIM Retract	L9056P 03B	626	SCH
.8	Hardware Group No. 8: D407 – Key to match existing key way, repair hole from removal of thumb turn.				
	<u>Qty</u>	<u>Description</u>	<u>Catalogue Number</u>	<u>Finish</u>	<u>Mfr</u>
	3	Hinge	Reuse Existing		
	1	Mortise Lock	Remove Existing		
	1	Storeroom Lock	L9080P 03B	626	SCH
.9	Hardware Group No. 9: D415 – Repair hole from removal of thumb turn.				
	<u>Qty</u>	<u>Description</u>	<u>Catalogue Number</u>	<u>Finish</u>	<u>Mfr</u>
	3	Hinge	Reuse Existing		
	1	Mortise Lock	Remove Existing		
	1	Electric Strike	8500 x 8XXX (Face Plate)	630	HES
	1	Closer	Reuse Existing		
	1	Kick Plate	8400 203mm X 40mm LDW B4E	630	IVE
	1	Card Reader	By Others		UNK
	1	Power Supply	PS902	LGR	VON
.10	Hardware Group No. 10: D401B, D403 – Re-key to match existing key way.				

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 09 91 23 – Interior Painting.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM C475-02(2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - .2 ASTM C514-04(2009e1), Standard Specification for Nails for the Application of Gypsum Board.
 - .3 ASTM C840-08, Standard Specification for Application and Finishing of Gypsum Board.
 - .4 ASTM C954-07, 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.
 - .5 ASTM C1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - .6 ASTM C1396/C1396M-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 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.
- .4 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 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 gypsum board assemblies materials level indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect 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 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for recycling in accordance with Section 01 74 19 - Construction Waste Management and Disposal.

1.4 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.

Part 2 Products

2.1 MATERIALS

- .1 Standard board: to ASTM C1396/C1396M, 15.9 mm thick, 1200 mm wide x maximum practical length, ends square cut, wrapped tapered edges.
- .2 Steel drill screws: to ASTM C1002.
- .3 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, all metal construction without paper flanges, zinc-coated by hot-dip process or zinc-coated by electrolytic process, 0.5 mm base thickness, perforated flanges, one piece length per location.
- .4 Metal Security Mesh: 19 mm, 10 gauge rolled and flattened steel, rippled diamond design, no openings larger than 50 mm square.
- .5 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
 - .1 Acoustic sealant: in accordance with Section 07 92 00 - Joint Sealants.
- .6 Joint compound: to ASTM C475, asbestos-free.
- .7 Tape:
 - .1 Paper face gypsum board applications: spark perforated paper tape.
 - .2 Paperless face gypsum board applications: self-adhesive glass fibre mesh tape to further reduce risk of mould growth on face of board surfaces.

Part 3 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.

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

3.2 ERECTION

- .1 Do application and finishing of gypsum board to ASTM C840 except where specified otherwise.
- .2 Install work level to tolerance of 1:1200.
- .3 Frame with furring channels, perimeter of openings for access panels, diffusers, grilles.
- .4 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.
- .5 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

3.3 APPLICATION

- .1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work has been approved.
- .2 Apply single gypsum board to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.
 - .1 Single-Layer Application:
 - .1 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.
- .2 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.
- .3 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 Level 1: embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable.
 - .1 Use: where assembly will be completely concealed from view such as in plenum space and behind solid wall finishes.
- .2 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 ridges.
 - .1 Use: where assembly will receive paint finish.
- .4 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.
- .5 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.
- .6 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .7 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - 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 00 - Cleaning.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

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

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 ASTM International
 - .1 ASTM C645-11a, Standard Specification for Nonstructural Steel Framing Members.
 - .2 ASTM C754-11, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.2 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 metal framing and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 QUALITY ASSURANCE

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

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Non-load bearing channel stud framing: to ASTM C645, 92 mm stud size, roll formed from 0.53 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board.
 - .1 Knock-out service holes at 460 mm centres.
- .2 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, 32 mm flange height.
- .3 Metal channel stiffener: size to suit, 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.
- .4 Insulating strip: rubberized, moisture resistant 3 mm thick foam strip, 12 mm wide, with self sticking adhesive on one face, lengths as required.

Part 3 Execution

3.1 EXAMINATION

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

3.2 ERECTION

- .1 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.
- .2 Place studs vertically at 600 mm on centre and not more than 50 mm from abutting walls, and at each side of openings and corners.
 - .1 Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
- .3 Erect metal studding to tolerance of 1:1000.
- .4 Attach studs to bottom track using screws.
- .5 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.
- .6 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.
- .7 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified.
 - .1 Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

- .8 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs.
 - .1 Secure track to studs at each end, in accordance with manufacturer's instructions.
 - .2 Install intermediate studs above and below openings in same manner and spacing as wall studs.
- .9 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.
- .10 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures attached to steel stud partitions.
- .11 Install steel studs or furring channel between studs for attaching electrical and other boxes.
- .12 Extend partitions to ceiling height except where noted otherwise on drawings.
- .13 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.
 - .1 Use double track slip joint.
- .14 Install continuous insulating strips to isolate studs from uninsulated surfaces.
- .15 Install insulating strip under studs and tracks around perimeter of sound control partitions.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - 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 00 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

Part 1 General

1.1 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 A118.6-92, Specification for Ceramic Tile Grouts (included in ANSI A108.1).
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-75.1-M88, Tile, Ceramic.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000-03(R2006), Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .4 Terrazzo Tile and Marble Association of Canada (TTMAC)
 - .1 Tile Specification Guide 09 30 00 2006/2007, Tile Installation Manual.
 - .2 Tile Maintenance Guide 2000.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 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 Dry-set cement mortar and grout.
- .3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Wall tile: submit duplicate sample of each colour, texture, size, and pattern of tile.

1.3 QUALITY ASSURANCE

- .1 Quality Assurance Submittals:
 - .1 Manufacturer's Instructions: manufacturer's installation instructions.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Construction Waste Management and Disposal.

1.5 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.

1.6 MAINTENANCE

- .1 Extra Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 00 – Closeout Submittals.
 - .2 Provide minimum 5% 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.

Part 2 Products

2.1 WALL TILE

- .1 Ceramic tile: to CAN/CGSB-75.1, Type 5, Class MR 4, 76 x 152 x 6 mm size, square edges, glazed surface, uniform appearance, colour as selected by Departmental Representative from standard colour range. Matching bullnose trim to suit application.

2.2 MORTAR AND ADHESIVE MATERIALS

- .1 Cement: to CSA-A5, type 10.
- .2 Sand: to ASTM C144, passing 16 mesh.
- .3 Hydrated lime: to ASTM C207.
- .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.

2.3 BOND COAT

- .1 Dry set cement mortar: to ANSI A108.1.
- .2 Thin set bond coat: to tile manufacturers recommendations.

2.4 GROUT

- .1 Colouring Pigments:
 - .1 Pure mineral pigments, limeproof and nonfading, complying with ASTM C979.
 - .2 Colouring pigments to be added to grout by manufacturer.
 - .3 Job coloured grout are not acceptable.
 - .4 Use in Commercial Cement Grout, Dry-Set Grout, and Latex Cement Grout.

- .5 Colour as selected by Departmental Representative from standard colour range.
- .2 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.

2.5 ACCESSORIES

- .1 Sealant: in accordance with Section 07 92 00 - Joint Sealing.
- .2 Sealer and protective coating: to tile and grout manufacturers recommendations.

2.6 MIXES

- .1 Measure mortar ingredients by volume.
- .2 Dry set mortar: mix to manufacturer's instructions.
- .3 Mix bond and levelling coats, and grout to manufacturer's instructions.
- .4 Adjust water volumes to suit water content of sand.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 WORKMANSHIP

- .1 Do tile work in accordance with TTMAC Tile Installation Manual 2006/2007, "Ceramic Tile", except where specified otherwise.
- .2 Apply tile 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.
- .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 Use bullnose edged tiles at termination of wall tile panels, except where panel abuts projecting surface or differing plane.
- .9 Clean installed tile surfaces after installation and grouting cured.

3.3 WALL TILE

- .1 Install in accordance with TTMAC details using acrylic modified thinset bond coat and polymer modified grout. Grout colour to be chosen from manufacturers standard colour range.

3.4 SEALER AND PROTECTIVE COATING

- .1 Apply in accordance with manufacturer's instructions.

3.5 CLEANING

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 ASTM International
 - .1 ASTM C635/C635M-07, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
 - .2 ASTM C636/C636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - .3 ASTM E1477-98a(2008), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-2007, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.2 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 ceiling panels and ceiling suspension system and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors 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.
- .4 Develop Waste Reduction Workplan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return as specified in Waste Reduction Workplan in accordance with Section 01 74 19 - Construction Waste Management and Disposal.

Part 2 Products

2.1 COMPONENTS

- .1 Acoustic units for suspended ceiling system: to CAN/CGSB-92.1.
 - .1 Acoustic units to match existing.
 - .2 Existing Acoustic Units: Armstrong Cortega Square Lay-In
 - .3 Product Number: 823
 - .4 Material: mineral fibre.
 - .5 Size: 610 x 1220 mm.
 - .6 Fire Rating: Fire Guard
 - .7 Finish: colour to match existing.
- .2 Acoustical Suspension: non-fire rated to ASTM C635/C635M.
 - .1 Suspension system to match existing.
 - .2 Existing Suspension System: Prelude Fire Guard
 - .3 Type: 15/16" two directional exposed tee.
 - .4 Material: commercial quality cold rolled steel, zinc coated.
 - .5 Components: die cut and interlocking.
 - .6 Finish: shop painted, colour to match existing.
 - .7 Hanger wire: galvanized soft annealed steel wire, 3.6 mm diameter for access tile ceilings.
 - .8 Hanger inserts: purpose made.
 - .9 Accessories: splices, clips, wire ties, retainers and wall moulding flush, to complement suspension system components, as recommended by system manufacturer.
- .3 Performance/Design Criteria:
 - .1 Maximum deflection: 1/360th of span to ASTM C635 deflection test.

2.2 ACCESSORIES

- .1 Touch-up paint: in accordance with manufacturer's recommendations for surface conditions.

Part 3 Execution

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Installation: in accordance with ASTM C636 except where specified otherwise.
- .2 Patch, repair, and make good acoustic ceiling system where demising wall has been demolished.
- .3 Supply and install new acoustical panel units as required to complete other portions of work.
- .4 Suspension System:
 - .1 Erect ceiling suspension system after work above ceiling has been inspected by Departmental Representative.
 - .2 Secure hangers to overhead structure using attachment methods as indicated.
 - .3 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.
 - .4 Lay out system to match existing system layout.
 - .5 Install wall moulding to provide correct ceiling height.
 - .6 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, and grilles.
 - .7 Support light fixtures and 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.
- .5 Acoustic Panels:
 - .1 Install acoustical panels and tiles in ceiling suspension system.
 - .2 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.
 - .3 Co-ordinate work of this section to accommodate components of other sections, such as light fixtures, diffusers, speakers, and sprinkler heads, to be built into acoustical ceiling components.

3.3 CLEANING

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

Part 1 General

1.1 REFERENCES

- .1 ASTM E84-12c - Standard Test Method for Surface Burning Characteristics of Building Materials.
- .2 ASTM F1861-08(2012)e1 - Standard Specification for Resilient Wall Base.
- .3 ASTM F1913-04(2010) - Standard Specification for Vinyl Sheet Floor Covering Without Backing.
- .4 CAN/ULC-S102.2-10 - Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.

1.2 SUBMITTALS FOR REVIEW

- .1 Section 01 33 00: Submission procedures.
- .2 Product Data: Provide data on specified products, describing performance, physical characteristics; sizes, patterns and colours available.
- .3 Shop Drawings: Indicate seaming plan.
- .4 Samples:
 - .1 Submit two (2) samples, 200 x 200 mm in size illustrating colour and pattern for each floor material for each colour specified.

1.3 CLOSEOUT SUBMITTALS

- .1 Section 01 78 00 for submission procedures.
- .2 Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- .1 Section 01 78 00: Maintenance and extra material requirements
- .2 Extra Stock Materials: Provide 5 sq.m of flooring, 10 lin m of base material specified.

1.5 QUALITY ASSURANCE

- .1 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented.

1.6 DELIVERY, STORAGE, AND PROTECTION

- .1 Section 01 61 00: Transport, handle, store, and protect products.
- .2 Protect roll materials from damage by storing on end.

1.7 ENVIRONMENTAL REQUIREMENTS

- .1 Store materials for three (3) days prior to installation in area of installation to achieve temperature stability.

- .2 Maintain ambient temperature required by adhesive manufacturer three (3) days prior to, during, and twenty-four (24) hours after installation of materials.

Part 2 Products

2.1 MATERIALS - SHEET FLOORING

- .1 Vinyl Sheet without Backing: ASTM F1913, homogeneous vinyl sheet flooring:
 - .1 Colour and pattern through total thickness.
 - .2 Total Thickness: 2 mm.
 - .3 Sheet Width: 2000 mm.
 - .4 Wear Layer: 50% minimum binder content, urethane reinforced.
 - .5 Maintenance: No wax, no polish, no finish for the life of the product.
 - .6 Colour: to be selected from manufacturers standard colour range.

2.2 MATERIALS - BASE

- .1 Base: ASTM F1861, Type TV thermoplastic vinyl; top set; premoulded end stops and external corners:
 - .1 Profile: coved.
 - .2 Thickness: minimum 3 mm.
 - .3 Heights: 102 mm, unless noted otherwise.
 - .4 Lengths: roll.
 - .5 Colours: selected by Departmental Representative from standard colour range.

2.3 MATERIALS - STAIRS

- .1 Resilient stair system: ASTM F2169, rubber, Type TS, 5 mm thick, single piece stair tread with integrated riser:
 - .1 Nosing: square nose, 50 mm vertical face.
 - .2 Tread: full tread deep, diamond surface with 50 mm contrasting strip to comply with ADA requirements.
 - .3 Riser: full riser height.
 - .4 Width: one piece for full width of stair.
 - .5 Pattern: solid.
 - .6 Colour: selected by Departmental Representative from standard colour range.

2.4 ACCESSORIES

- .1 Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- .2 Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
- .3 Edge Strips: Metal.
- .4 Sealer and Wax: Types recommended by flooring manufacturer.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify floor and lower wall surfaces are free of substances that may impair adhesion of new adhesive and finish materials.

3.2 PREPARATION

- .1 Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- .2 Prohibit traffic until filler is cured.
- .3 Vacuum clean substrate.

3.3 INSTALLATION - SHEET FLOORING

- .1 Install sheet flooring to manufacturer's written instructions.
- .2 Spread only enough adhesive to permit installation of materials before initial set.
- .3 Set flooring in place, press with heavy roller to attain full adhesion.
- .4 Lay flooring with joints and seams to produce minimum number of seams.
- .5 Install sheet flooring parallel to length of room. Provide minimum of one third (1/3) full roll width. Double cut sheet; provide butt joint.
- .6 Terminate flooring at centreline of door openings where adjacent floor finish is dissimilar.
- .7 Install edge strips at unprotected or exposed edges, and where flooring terminates.
 - .1 Secure metal strips after installation of flooring with stainless steel screws.
- .8 Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.4 INSTALLATION - STAIRS

- .1 Install stair system to manufacturer's written instructions.
- .2 Install stair system one piece for full width of stair. Adhere over entire surface and fit accurately.

3.5 INSTALLATION - BASE

- .1 Fit joints tight and vertical. Maintain minimum measurement of 450 mm between joints.
- .2 Mitre internal corners. At external corners, use premoulded units. At exposed ends, use premoulded units.
- .3 Install base in full bed of adhesive using full spread notched trowel. Cut and fit base neatly at corners, to tight fitting tolerances.
- .4 Install base straight and level to maximum variation of 1:1000.
- .5 Install base on toe kick of cabinets which occur in rooms and areas where resilient flooring is scheduled.

- .6 Scribe and fit to door frames and other interruptions.
- .7 Keep joints tight and well fitted.

3.6 CLEANING

- .1 Section 01 74 00: Cleaning installed work.
- .2 Remove excess adhesive from floor, base, and wall surfaces without damage.
- .3 Clean, seal, and wax floor and base surfaces in accordance with manufacturer's written instructions.

3.7 PROTECTION OF FINISHED WORK

- .1 Prohibit traffic on floor finish for forty-eight (48) hours after installation.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 09 21 16 - Gypsum Board Assemblies: Wall materials to receive application of base.
- .2 Section 09 65 16 - Resilient Flooring: Base finish.

1.2 REFERENCES

- .1 CAN/CGSB-4.129-93(R1997), Carpets for Commercial Use.
- .2 ASTM D2859-06(2011) - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
- .3 ASTM E84-12c - Standard Test Method for Surface Burning Characteristics of Building Materials.
- .4 CAN/ULC-S102-10 - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .5 CRI Carpet Installation Standard - 2011

1.3 SUBMITTALS FOR INFORMATION

- .1 Section 01 33 00 for submission procedures.
- .2 Installation Data: Manufacturer's installation requirements indicating procedures, general requirements, and perimeter conditions requiring special attention.

1.4 CLOSEOUT SUBMITTALS

- .1 Section 01 78 00: Submission procedures.
- .2 Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.5 MAINTENANCE DATA AND MATERIAL SUBMITTALS

- .1 Section 01 78 00: Maintenance and extra material requirements.
- .2 Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- .3 Extra Stock Materials: Include 10 sq.m of additional carpet tile for maintenance purposes when providing quantity requirements to Departmental Representative.

1.6 QUALITY ASSURANCE

- .1 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience.

1.7 ENVIRONMENTAL REQUIREMENTS

- .1 Store materials for three (3) days prior to installation in area of installation, to achieve temperature stability.
- .2 Maintain minimum 21 degrees C ambient temperature three (3) days prior to, during and twenty-four (24) hours after installation materials.

Part 2 Products

2.1 MATERIAL - CARPET TILE

- .1 Carpet Tile (CT-1): Patch and repair existing with carpet tile to be removed from areas of demolition.
- .2 Carpet Tile (CT-2): Tufted, manufactured in one colour dye lot, conforming to the following criteria:
 - .1 Construction: textured pattern loop.
 - .2 Pile Fibre: Nylon 6.
 - .3 Dye Method: solution dyed.
 - .4 Pattern Repeat: none.
 - .5 Max. Electrostatic Charge: <3.5 kV.
 - .6 Gauge: 47.24 / 10 cm.
 - .7 Pile Height: >2.25 mm, < 3.00 mm.
 - .8 Pile Weight: > 625 g/sq m.
 - .9 Density Factor: > 12.50 kilotex.
 - .10 Stitch Count: > 34.50 per 10 cm.
 - .11 Light Fastness: colourfast to light and atmospheric contaminants for the warranty period.
 - .12 Primary Backing Material: 100% synthetic.
 - .13 Secondary Backing Material: polyolefin composite; does not contain PVC, phthalates, or PBD/PBDE.
 - .14 Size: 610 x 610 mm.
 - .15 Warranty: lifetime limited commercial warranty.
 - .16 Colour: selected from manufacturers standard colour range.
 - .17 Pattern: abstract, multi-colour.

2.2 MATERIAL - BASE

- .1 Base (RB-1): To match existing.
- .2 Base (RB-2): ASTM F1861, Type TV thermoplastic vinyl; top set; premoulded end stops and external corners:
 - .1 Profile: coved.
 - .2 Thickness: minimum 3 mm.
 - .3 Heights: 102 mm, unless noted otherwise.

- .4 Lengths: roll.
- .5 Colours: selected by Departmental Representative from standard colour range.

2.3 ACCESSORIES

- .1 Sub-Floor Filler: type recommended by flooring material manufacturer.
- .2 Primers and Adhesives: Recommended by carpet manufacturer.
- .3 Edge Strips: metal type, anodized finish.

Part 3 Execution

3.1 ADMINISTRATION

- .1 Use experienced and qualified technicians to carry out assembly and installation of tile carpet.

3.2 EXAMINATION

- .1 Verify that surfaces are smooth and flat with maximum variation of 6 mm in 3 m, and are ready to receive work.
- .2 Verify concrete floors are dry to a maximum moisture content of 7%; and exhibit negative alkalinity, carbonization, or dusting.

3.3 PREPARATION

- .1 Remove existing carpet, refer to Section 01 74 19 – Construction Waste Management And Disposal for disposal.
- .2 Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- .3 Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- .4 Vacuum clean substrate.

3.4 INSTALLATION – CARPET TILE

- .1 Install carpet tile accessories and adhesive in accordance with manufacturer's written instructions.
- .2 Integrate and blend carpet from different cartons to ensure minimal variation in colour match.
- .3 Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- .4 Lay carpet tile to quarter turn pattern, set parallel to building lines.
- .5 Locate change of colour or pattern between rooms under door centerline.
- .6 Fully adhere carpet tile to substrate.
- .7 Place carpet tile dry over substrate.
- .8 Bind cut edges where not concealed by edge strips.

3.5 INSTALLATION - BASE

- .1 Fit joints tight and vertical. Maintain minimum measurement of 450 mm between joints.
- .2 Mitre internal corners. At external corners, use premoulded units. At exposed ends, use premoulded units.
- .3 Install base in full bed of adhesive using full spread notched trowel. Cut and fit base neatly at corners, to tight fitting tolerances.
- .4 Install base straight and level to maximum variation of 1:1000.
- .5 Install base on toe kick of cabinets which occur in rooms and areas where resilient flooring is scheduled.
- .6 Scribe and fit to door frames and other interruptions.
- .7 Keep joints tight and well fitted.

3.6 CLEANING

- .1 Section 01 74 00: Cleaning installed work.
- .2 Remove excess adhesive without damage, from floor, base, and wall surfaces.
- .3 Clean and vacuum carpet surfaces.

3.7 PROTECTION OF FINISHED WORK

- .1 Do not permit traffic over unprotected floor surface.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Surface preparation.
- .2 Painting.

1.2 REFERENCES

- .1 MPI (Master Painters Institute) - Architectural Painting Specifications Manual and Maintenance Repainting Manual.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate with other Work having a direct bearing on Work of this section.
- .2 Scheduling:
 - .1 Schedule painting operations to prevent disruption of and by other trades.

1.4 SUBMITTALS FOR REVIEW

- .1 Section 01 33 00: Submission procedures.
- .2 Product Data:
 - .1 Submit product data and instructions on all finishing products to be used.
 - .2 Submit product data for the use and application of paint thinner.
 - .3 Submit copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).
 - .4 Submit manufacturer's installation application instructions.
- .3 Samples:
 - .1 Submit two (2) samples, 200 mm x 200 mm in size illustrating selected colours for each colour selected.
 - .2 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

1.5 CLOSEOUT SUBMITTALS

- .1 Section 01 78 00: submission procedures.
- .2 Record Documentation: Upon completion, provide itemized list of products used including the following:
 - .1 Manufacturer's name.
 - .2 Product name, type and use.
 - .3 Colour coding number.
 - .4 Manufacturer's Material Safety Data Sheets (MSDS).

1.6 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Materials:
 - .1 Deliver to extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.
 - .2 Quantity: provide one - four litre can of each type and colour of primer, stain, and finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
 - .3 Delivery, storage and protection: comply with Departmental Representative requirements for delivery and storage of extra materials.

1.7 QUALITY ASSURANCE

- .1 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience.
- .2 Conform to MPI Painting Manual requirements for materials, preparation and workmanship.
- .3 Paint Products: Paint manufacturers and paint Products listed under the Approved Product List section of the MPI Painting Manual.

1.8 REGULATORY REQUIREMENTS

- .1 Conform to applicable code for flame and smoke rating requirements for finishes, storage, mixing, application and disposal of paint and related waste materials.

1.9 DELIVERY, STORAGE, AND PROTECTION

- .1 Section 01 61 00: Transport, handle, store, and protect products.
- .2 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.
- .3 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.
- .4 Remove damaged, opened and rejected materials from site.
- .5 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.

- .6 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
- .7 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.
- .8 Remove paint materials from storage only in quantities required for same day use.
- .9 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.10 SITE CONDITIONS

- .1 Surface and Environmental Conditions:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
 - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
 - .3 Apply paint when previous coat of paint is dry or adequately cured.
- .2 Additional interior application requirements:
 - .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

1.11 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Unused coating materials must be disposed of at official hazardous material collections site as approved by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Use only materials (primers, paints, coatings, varnishes, stains, lacquers, fillers) listed in the latest edition of the MPI Approved Product List (APL) on this project.
- .2 Ancillary materials such as linseed oil, shellac, thinners, solvents to be of highest quality product and provided by an MPI listed manufacturer, and compatible with paint materials being used.
- .3 Where possible, all materials to be lead and mercury free with low VOC content.
- .4 Provide all material for each system from a single manufacturer.
- .5 Fire Hazard: Flame spread and smoke developed ratings in accordance with applicable code.
- .6 Patching Materials: Latex filler.

- .7 Fastener Head Cover Materials: Latex filler.

2.2 FINISH AND COLOUR

- .1 Colours and Finishes: Refer to Colour Schedule to be provided after award of Contract.
- .2 Colour Schedule will be based on five (5) base colours and three (3) accent colours with a maximum of one (1) deep or bright colour. No more than eight (8) colours will be selected for entire project and no more than three (3) colours will be selected in each area.
- .3 Selection of colours from manufacturers full range of colours.
- .4 Where specific products are available in restricted range of colours, selection based on limited range.

2.3 INTERIOR PAINT SYSTEMS

- .1 Paint interior surfaces in accordance with the following MPI Painting Manual requirements.
- .2 Galvanized Metal: (frames)
 - .1 INT 5.3A: Latex (over shop primed surface), G6 finish.
- .3 Galvanized Metal: (doors)
 - .1 INT 5.3A: Latex (over shop primed surface), G5 finish.
- .4 Dimension lumber: (plywood for electrical equipment backboards)
 - .1 INT 6.2F - Pigmented fire retardant coating (ULC rated), G1 finish.
- .5 Dressed lumber: (doors).
 - .1 INT 6.3E - Polyurethane varnish, gloss level to match existing, (over stain).
- .6 Plaster and Gypsum Board: (gypsum wallboard and textured finishes).
 - .1 INT 9.2A: Latex (over latex sealer), G3 finish.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

- .1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

- .1 Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- .2 Examine surfaces scheduled to be finished prior to commencement of work. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

3.4 PREPARATION

- .1 Protection:
 - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative
 - .2 Remove and store miscellaneous hardware and surface fittings such as electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to painting. Clean and replace upon completion of painting Work in each area.
 - .3 Protect items that are permanently attached such as Fire Labels on doors and frames.
 - .4 Protect adjacent surfaces and areas, including rating and instruction labels on doors, frames, equipment, piping, from painting operations with drop cloths, shields, masking, templates, or other suitable protective means.
 - .5 Protect factory finished products and equipment.
 - .6 Protect building occupants and general public in and about the building.
- .2 Prepare surfaces in accordance with MPI requirements.
- .3 Correct defects and clean surfaces which affect work of this section. Start of finish painting of defective surfaces indicates acceptance of substrate and making good defects will be at no cost to Owner.
- .4 Seal marks which may bleed through surface finishes.
- .5 Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- .6 Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.
- .7 Interior Wood Items Scheduled to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.
- .8 Wood and Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.

3.5 APPLICATION

- .1 Apply products to adequately prepared surfaces, within moisture limits and acceptable environmental conditions.
- .2 Apply paint finish in areas where dust is no longer being generated or when wind or ventilation conditions will not affect quality of finished surface.

- .3 Apply each coat to uniform finish.
- .4 Tint each coat of paint progressively lighter to enable confirmation of number of coats.
- .5 Unless otherwise approved, apply a minimum of four (4) coats of paint where deep or bright colours are used to achieve satisfactory results.
- .6 Sand and dust between each coat to provide an anchor for next coat and to remove defects visible from a distance up to 1000 mm.
- .7 Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
- .8 Allow applied coat to dry before next coat is applied.
- .9 Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- .10 Continue paint finish behind wall-mounted items such as chalk and tack boards.

3.6 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- .1 Refer to Mechanical and Electrical specification sections for schedule of colour coding and identification banding of equipment, duct work, piping, and conduit.
- .2 Do not paint over nameplates.

3.7 FIELD QUALITY CONTROL

- .1 Acceptable Surfaces:
 - .1 No visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 1000 mm.
 - .2 No visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 1000 mm.
 - .3 No visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.
 - .4 Uniformity of colour, sheen, texture, and hiding across full surface area.

3.8 CLEANING

- .1 Section 01 74 00: Cleaning installed work.
- .2 Collect waste material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

- .1 CAN/CSA-B651-04 (R2010) - Accessible Design for the Built Environment.

1.3 PERFORMANCE REQUIREMENTS

- .1 Corner Guards: Resist lateral impact force of 100 lbs at any point without damage or permanent set.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordinate with other work having a direct bearing on work of this section.

1.5 SUBMITTALS FOR REVIEW

- .1 Section 01 33 00: Submission procedures.
- .2 Product Data: Indicate physical dimensions, features, anchorage details, wall mounting brackets with mounted measurements.

1.6 CLOSEOUT SUBMITTALS

- .1 Section 01 78 00: Submission procedures.

Part 2 Products

2.1 COMPONENTS

- .1 Corner Guard - Surface Mounted:
 - .1 Material: Stainless steel.
 - .2 Finish: Type 304 stainless steel with No. 4 finish.
 - .3 Projection From Wall to Outside of Guard: 89 mm.
 - .4 Length: One (1) piece.
 - .5 Height: to meet installation requirements.
- .2 Mounting Brackets and Attachment Hardware: Appropriate to component and substrate.

2.2 FABRICATION

- .1 Pre-drill bevelled holes for attachment.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify field measurements.
- .2 Verify that rough-in for components are correctly sized and located.

3.2 INSTALLATION

- .1 Install components to manufacturer's written instructions.
- .2 Install components level and plumb, secured rigidly in position to wall framing members only.
- .3 Position corner guard to align with the top of resilient base, length to extend to underside of ACT ceiling.

3.3 ERECTION TOLERANCES - HORIZONTAL RAILS

- .1 Maximum Variation From Required Height: 6 mm.
- .2 Maximum Variation From Level or Plane For Visible Length: 6 mm.

END OF SECTION

PART 1 - GENERAL

- | | | |
|---|----|---|
| <u>1.1 References</u> | .1 | ANSI/NFPA 13, Installation of Sprinkler Systems. |
| | .2 | FM, Factory Mutual Research Corporation for Property Conservation. |
| <u>1.2 Scope of Work</u> | .1 | The sprinkler system shall conform to NFPA 13. Piping shall be seismically restrained in accordance with the referenced standard. |
| | .2 | The contractor shall allow for the installation of up to 2 addition sprinkler heads, separate from what is shown on the plans, to account for unforeseen conflicts with structural members and light fixtures, etc. The contractor shall allow for 3m of 25mm pipe for each of the additional heads. |
| <u>1.3 Shop Drawings and Product Data</u> | .1 | Submit shop drawings and product data in accordance with Section 23 05 10 - Mechanical General. |
| | .2 | Submit for: <ul style="list-style-type: none">.1 Pipes..2 Sprinkler Heads |
| | .3 | All equipment and materials to be FM approved for fire protection use. |
| | .4 | Engineered shop drawings are not required unless the planned installation varies from that indicated on the drawings. If so, the engineered shop drawings are to include all information required by the appropriate sections of the referenced standard, and be sealed by a Mechanical Engineer registered in the Yukon Territory. |
| <u>1.4 Maintenance Data</u> | .1 | Provide maintenance data for incorporation into manual specified in Section 23 05 10 - Mechanical General. |
| | .2 | Submit for: <ul style="list-style-type: none">.1 Pipes..2 Sprinkler Heads |
| <u>1.5 Maintenance Materials</u> | .1 | Provide maintenance materials in accordance with NFPA 13. |
| | .2 | Provide spare sprinklers and tools as required by ANSI/NFPA 13. |

1.6 Related Work .1 Section 23 05 10 - Mechanical General.

PART 2 - PRODUCTS

- 2.1 Pipe, Fittings and Valves .1 Ferrous: Schedule 10, roll grooved; thinwall, threaded, to ANSI/NFPA 13, ASTM A-135, ASTM A-53, and ASTM A-795, Corrosion Resistance Ratio 1.00 minimum, ULC listed and FM approved.
- .1 Standard of Acceptance: Allied Dyna-Flow for roll grooved pipe 4 inch and under, Allied Dyna-Thread for threaded pipe 2 inch and under.
- .2 Fittings and joints to ANSI/NFPA 13, ANSI/AWWA C606, 170 psi, FM approved:
- .1 Mechanical Room: rigid roll grooved couplings.
- .1 Standard of Acceptance: Victaulic 005 Firelock.
- .2 Flexible, roll grooved.
- .1 Standard of Acceptance: Victaulic.
- .3 Pipe hangers:
- .1 ULC listed and FM approved for fire protection services.
- 2.2 Sprinkler Heads .1 General: to ANSI/NFPA 13, FM approved and ULC listed for fire services.
- .2 Pendant: Chrome, adjustable recessed bulb type design, quick response, 155F temperature rating (unless otherwise required), 1/2 inch orifice, K factor 5.6, complete with chrome plated escutcheon.
- .1 Standard of Acceptance: Victaulic Model V2708.

PART 3 - EXECUTION

- 3.1 Installation .1 Install, inspect and test to acceptance in accordance with ANSI/NFPA 13, NFPA 25, and manufacturer's written installation instructions.
- .1 Ensure rods for last hanger are in contact with pipe for all pendent heads.
- .2 Ensure proper grooving depths using Manufacturer's measuring tape (Victaulic Pie Tape PT-100) and Field Installation Manual (Victaulic I-100).
- .3 For cold spaces, lubricate gaskets.
- .4 Ensure correct slope on piping.

- .2 Testing to be witnessed by authority having jurisdiction.
 - .1 Hydraulically test sprinkler systems at 1380 kPa for two hours, inclusive of fire department connection.
 - .3 Backflow prevention assembly:
 - .1 Test in accordance with manufacturer's written installation instructions, CAN/CSA-B64.10, and authorities having jurisdiction.
 - .2 Forward flow test at minimum flow rate equal to system demand including hose stream allowance.
 - .2 Rework and retest if there is any drop in gauge pressure or visual leakage.
 - .3 Operationally test waterflow devices and associated alarm circuits.
 - .4 Complete main drain tests.
 - .5 Provide "Contractor's Material and Test Certificate" forms.
- .3 Maintain sprinkler clearance from obstructions such as lights, beams, columns, and partitions. Centre heads in two directions in ceiling tile. Relocate as required at discretion of Engineer.
- .4 Brace piping in accordance with NFPA 13 and seismic shop drawings.
- .5 Use roll grooved fittings where possible in order to maximize system flexibility. Use static and flexible fittings to meet NFPA 13 seismic requirements.
- .6 Arrange sprinkler piping such that it is completely drainable. Install auxiliary drains in all trapped sections of piping and where indicated on the drawings. Extend drain lines within the reach of a floor drain with a 15 meter hose. Coordinate cleanout in sprinkler room for main drain test and floor drain location with others.
- .7 Provide training as per Section 23 05 10 and Division 1 requirements.
- .8 Provide copies of all acceptance materials, test certificates, and equipment installation, operation and maintenance information to Commissioning Agent for inclusion in operation and maintenance manuals.

END OF SECTION

PART 1 - GENERAL

- | | | |
|---|----|--|
| <u>1.1 Scope of Work</u> | .1 | Supply and install equipment and materials as specified. |
| <u>1.2 Product Data</u> | .1 | Submit product data for review as per Section 23 05 10. |
| | .2 | Shop drawings are required for: |
| | .1 | Sinks c/w hardware |
| <u>1.3 Operation and Maintenance Data</u> | .1 | Provide maintenance data for incorporation into maintenance manual specified in Section 23 05 10. |
| | .2 | Operating and maintenance data is required for: |
| | .1 | Sink c/w hardware |
| <u>1.4 Reference Standards</u> | .1 | NBC, National Building Code of Canada. |
| | .2 | NPC, National Plumbing Code of Canada. |
| <u>1.5 Related Work</u> | .1 | Section 23 05 10 - Mechanical - General |
| <u>1.6 Fixtures and Trim</u> | .1 | Architectural drawings to govern in determination of number and location of fixtures. |
| | .2 | Trim and fixtures to be product of one manufacturer and of same type in any one washroom or location. |
| | .3 | Exposed plumbing brass to be chrome plated. Provide caulking between fixtures and wall, counters, and floors where required. |
| | .4 | All fixtures and trim to be CSA certified. |

PART 2 - PRODUCTS

- | | | |
|------------------|----|--|
| <u>2.2 Sinks</u> | .1 | Double Bowl: stainless steel sink double bowl with one-hole faucet ledge, 20 gauge, satin finish, countertop installation, strainer, nominal dimensions 560x640x200mm. |
| | .1 | Standard of Acceptance: Kindred QSLA2225/8 |

- .2 Trim: Single lever handle deck faucet, solid brass body with ceramic disc, 8.3L/min spray, 200mm swing spout, aerator.
 - .1 Standard of Acceptance: Kindred KFPD1100.

PART 3 - EXECUTION

- 3.1 Fixture Installation
- .1 Connect fixtures complete with supplies and drains, trapped, supported level and square. Hot water faucets shall be on left. Fixtures to be served from wall or floor. Provide expansion joint in vent stack.

- 3.2 Piping
- .1 Install as indicated on the drawings and in accordance with the Canadian Plumbing Code, authorities having jurisdiction, and manufacturer's written installation instructions.
 - .2 Cut square, ream, and clean piping, tubing, and ends, clean recesses of fittings and assemble without binding.
 - .3 Assemble all piping using fittings manufactured to ANSI standards. Install PVC-DWV drain, waste, and vent pipe and pipe fittings in accordance with CSA B181.2.
 - .4 Install close to building structure to minimize furring, conserve headroom and space. Group exposed piping, and run piping parallel to walls. Maintain adequate grade for drainage of waste piping.
 - .5 Connect to fixtures and equipment in accordance with manufacturer's instructions unless otherwise indicated.
 - .6 Install intumescent devices at all locations where combustible piping penetrates a fire separation. Devices to be installed in strict accordance with manufacturers written installation instructions and conditions of ULC listing.
 - .7 Isolate equipment, fixtures, and branches with ball valves.
 - .8 Flush out, disinfect, and rinse water supply system to requirements of authority having jurisdiction.
 - .9 Test all systems to the requirements of the Authority having jurisdiction and requirements of Section 23 05 10 and provide inspection reports to substantiate test approval.

- 3.3 Insulation
- .1 Apply insulation to pipe with all joints butted tightly. Seal circumferential joint with a minimum of 75 mm wide butt strip. Staple lap of jacket in place on 75 mm centres. Seal with vapour barrier adhesive or with a heavy brush

coat of barrier coating for cold water piping. Insulate fittings and valves. Do not insulate unions, flanges except on flanged valves, mechanical couplings, and strainers. Terminate insulation neatly on bevel. Cover joints with jacket finishing tape. Provide recovering jackets on exposed insulation throughout. Runouts within walls do not require insulating.

END OF SECTION

- 1 General .1 This section covers items common to all sections of Division 21, 22, 23 and 25 and is intended to supplement the requirements of Division 1.
- .2 When reference is made to Codes and Standards in these specifications, the most recent edition of the Code or Standard is assumed
- 2 Scope of Work .1 Requirements include the provision of all labour and materials to carry out the installation of the mechanical components of the CAN NOR Relocation at the Elijah Smith Building in Whitehorse, Yukon, as described in these specifications. The scope of work includes, but is not limited to the provision of the following items:
- .1 Automatic sprinkler system revisions
 - .2 Fire extinguisher relocation.
 - .3 New kitchen sink and trim.
 - .4 New heat pump system
 - .5 Ventilation system revisions.
 - .6 thermostat relocation.
 - .7 TAB.
 - .8 Record documents.
 - .9 Operating and Maintenance manuals.
 - .10 Training.
 - .11 Seismic Engineering
- 3 Seismic Restraint Systems .1 The Contractor shall retain a seismic engineer registered in the Yukon to determine the seismic restraint requirements for this project and become the Engineer of Record for this discipline. Verification and certification to the satisfaction of the Authorities Having Jurisdiction will be required prior to Substantial Completion.
- 4 Materials .1 Standard of Acceptance means that 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 Equipment and material shall be installed and tested in accordance with the detailed recommendations of the manufacturer. Where there is a discrepancy between the drawings and/or the specifications and the manufacturer's written installation instructions, the most stringent shall be followed.
- .3 All materials shall be CSA certified.
- 5 Substitution .1 No substitutions shall be permitted without prior written approval of

Owner's Representative.

- .2 Proposals for substitution may only be submitted up to 7 working days prior to tender closing. Proposals after award of contract must include statements of respective costs of items originally specified and the proposed substitution.
- .3 Proposals after award of contract will be considered by Owner's Representative if:
 - .1 materials selected by tenderer from those specified are not available;
 - .2 delivery date of materials selected from those specified would unduly delay completion of contract; or
 - .3 alternative material to those specified, which are brought to the attention of and considered by Owner's Representative as equivalent to the material specified and will result in a credit to the Contract amount.
- .4 Should proposed substitution be accepted, either in part or in whole, assume full responsibility and costs when substitution affects other work on project. Pay for design or drawing changes required as result of substitution.
- .5 Amounts of all credits arising from approval of substitutions will be determined by Owner's Representative and Contract Price will be reduced accordingly.

6 Intent

- .1 Work shall be in accordance with the specifications and their complete with all necessary components, including those not normally shown or called for, and ready for operation before acceptance.

7 Responsibility

- .1 Promptly advise the Owner of any specified equipment and/or material which appears inadequate or unsuitable; in violation of laws, ordinances, rules, or regulation of authorities having jurisdiction; of any necessary items of work omitted from the Contract Documents; or of any discrepancies in the Specification.
- .2 Check drawings of all trades to verify space and headroom limitations for work to be installed. Co-ordinate work with all trades and make changes to facilitate a satisfactory installation. Make no deviations to the design intent involving extra costs to the Owner without the Owner's written approval.
- .3 Ensure that equipment does not transmit noise and/or vibration to other parts of the building as a result of poor installation practice.
- .4 Pay for permits required by the Authority Having Jurisdiction. Arrange for applicable inspections.

- .5 Prior to tendering, a site visit is recommended for the Contractor to familiarize himself with local and existing conditions on which the work is dependent. No additional charges will be considered for items which are not concealed.

8 Workmanship

- .1 Workmanship shall be in accordance with well established practice and standards accepted and recognized by Engineer and the Trade.
- .2 The Owner 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 Trade Qualification Certificates. Tradesmen shall perform only work that their certificate permits. Certificates shall be available for inspection by the Engineer.
- .4 On request by the Owner, the Contractor shall demonstrate thorough knowledge of system and equipment being installed.

9 Drawings and Specifications

- .1 Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of work. Do not scale the drawings.
- .2 Consult the architectural drawings and details for exact locations of fixtures and equipment. Obtain this information from the Engineer where definite locations are not indicated.
- .3 Take field measurements where equipment and material dimensions are dependent upon building dimensions.
- .4 The drawings and specifications are complimentary to each other, and what is called for in one shall be binding as if called for in both.
- .5 Should any discrepancy between the drawings and specifications be present, it is the responsibility of the contractor to notify the Engineer prior to the closing of the tender. If not done, it will be assumed that the contractor has allowed for the most expensive option.

10 Equipment Installation

- .1 Provide unions and flanges to permit equipment maintenance and disassembly and to minimize disturbance to piping and duct systems and without interfering with building structure or other equipment.
- .2 Provide means of access for servicing, disassembly, and removal of equipment and components including permanently lubricated bearings.
- .3 Pipe equipment drains to floor drains.

- .4 Line up equipment, rectangular cleanouts and similar items parallel to or perpendicular to building walls.
- .5 Flexible couplings: Install to provide for differential movement during seismic events between attachment points.
- .6 Expansion joints: Install on any straight run of heating pipe longer than 100 feet (30m).

11 Protection of Openings

- .1 Protect equipment and systems openings from dirt, dust, and other foreign material with materials appropriate to system

12 Electrical

- .1 Electrical work is to conform to Division 26 specifications. The following electrical work is included in Division 25.
 - .1 All conduit, wiring, and connections 50V and under relating to mechanical systems including installation of transformers. Refer to Division 26 for further clarification.

13 Pipe Hangers and Supports

- .1 Fabricate hangers, supports and sway braces in accordance with the most recent edition of ANSI B31.1 and MSS-SP58. Support from structural members with three piece clevis hangers. Use copper plated hangers for copper piping.
 - .1 Standard of Acceptance: Myatt.
 - .2 Space hangers as per manufacturer's recommendations, and as follows:
 - .1 Plumbing piping: to most stringent requirements of Canadian Plumbing Code, Territorial Code, or authority having jurisdiction.
 - .2 Fuel oil piping: to most stringent requirements of CAN/CSA-B139 or authority having jurisdiction.
 - .3 Within 300mm of each horizontal elbow.
 - .4 Within 300mm of each expansion joint.
 - .5 Not less than one hanger at joints of flexible joint roll groove pipe.
 - .6 Copper: rod diameter 10mm, spacing as follows:
 - .1 Up to and including NPS 1-1/4: 1.8m.
 - .2 NPS 1-1/2: 2.4m.
 - .3 NPS 2: 2.7m.
 - .4 NPS 2-1/2 and NPS 3: 3.0m.
 - .7 Steel: rod diameter 12mm up to NPS 4, 16mm for NPS 4 and above, spacing as follows:
 - .1 Up to and including NPS 1-1/4: 2.7m.
 - .2 NPS 1-1/2: 2.7m.
 - .3 NPS 2: 3.0m.
 - .4 NPS 2-1/2 and NPS 3: 3.6m.

- .5 NPS 4: 4.0m.
- .3 Offset hangers so that rod is vertical in operating position. Adjust hangers to equalize load.
- 14 Escutcheons
- .1 On pipes passing through walls, partitions, floors, and ceilings which are not concealed.
- .2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.
- .3 Outside diameter to cover opening or sleeve.
- .4 Inside diameter to fit around finished pipe.
- 15 Sleeves
- .1 Pipe sleeves: at points where pipes pass through concrete and exterior walls.
- .2 Schedule 10 steel pipe, Schedule 40 PVC or wood blocking.
- .3 Sizes: minimum 6mm clearance all around, between sleeve and un-insulated pipe or between sleeve and insulation.
- .4 Terminate sleeves flush with surface of concrete floor, and 25mm proud of other penetrations.
- .5 Fill voids around pipes:
- .1 Where sleeves pass through exterior walls or concrete, caulk with water resistant caulking.
- .2 Ensure no contact between copper tube or pipe and ferrous sleeve.
- 16 Birdscreen
- .1 Protect all exterior mechanical openings with 12 mm x 12 mm birdscreen.
- 17 Tests
- .1 Give 72 hours notice of date for tests, during regular working hours.
- .2 Insulate or conceal work only after testing and approval by Engineer.
- .3 Conduct tests in presence of Engineer.
- .4 Bear costs, including fuel oil, for all testing under this division and Division 26, retesting, and making good.
- .5 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.
- .6 Piping:

- .1 General: maintain test pressure without loss for 4 hours unless otherwise specified.
- .2 Test domestic water, drainage, waste, and vent piping to NBC Plumbing Code and authorities having jurisdiction.
- .3 Hydraulically test hydronic piping systems at 700 kPa.
- .4 Test fuel oil systems to CAN/CSA-B139 and authorities having jurisdiction.

18 Drain Valves

- .1 Minimum NPS 3/4 unless otherwise specified: straight pattern bronze with hose end male thread.
- .2 Locate at all low points and section isolating valves unless otherwise specified.

19 Shop Drawings and Product Data

- .1 Submit shop drawings as required in individual sections of Division 21, 22, 23 and 25. Do not proceed with work until relevant submissions are reviewed by the consultant.
- .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 Certification of compliance to applicable codes.

20 Record Drawings

- .1 Maintain and submit record drawings as outlined below.
- .2 Site records:
 - .1 Engineer of Record will provide 1 set of mechanical drawings. Mark thereon all changes as work progresses and as changes occur.
 - .2 Make available for reference purposes and inspection at all times on site during construction.
- .3 Record drawings:
 - .1 Prior to start of Testing, Adjusting, and Balancing (TAB), finalize production of record drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: "RECORD DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).
 - .3 Following acceptance by Engineer, submit to Owner.
 - .4 TAB to be performed using Record Drawings.

- 21 Cleaning .1 In preparation for final acceptance, clean and refurbish all equipment, and leave in operating condition including replacement of all filters and strainers in all air and piping systems.
- 22 Access Doors .1 Provide access doors at all mechanical devices requiring operation, inspection, adjusting, or maintenance which are concealed behind drywall surfaces, including fire dampers, and all devices and equipment as required. Ensure access door is adequate in size for removal of equipment if necessary.
- 23 Firestopping .1 General: Firestopping to be completed in accordance with Division 7 and schedule below with listed intumescent sealant to manufacturer's and cUL listings for rated assembly penetration. Provide manufacturer's cUL shop drawing details for every different rated assembly penetration. Jobsite conditions of each through penetration firestop system must meet ALL details of the cUL-Classified System selected. If jobsite conditions do not match any cUL-classified systems in the schedules below, contact manufacturer for alternative systems. Coordinate work with other trades to assure that penetration opening sizes are appropriate for penetrant locations.
- .2 All piping/duct penetrations through 45 minute rated assemblies to be cold smoke sealed/fire sealed with listed intumescent sealant or approved cold smoke sealed at fire penetrations to sealant cUL listing.
- .3 Intumescent sealant:
.1 ULC/FM listed flexible intumescent sealant suitable as fire and smoke sealant.
.1 Standard of Acceptance: Hilti
- .4 Intumescent Fire Stop Collars:
.1 ULC/FM listed with galvanized metal collar, intumescent fire sealant for use with PVC and ABS schedule 40 DWV piping.
.1 Standard of Acceptance: Hilti CP 642/643.

SCHEDULE OF HILTI THROUGH PENETRATION FIRESTOP SYSTEMS

CONCRETE FLOORS

<u>TYPE OF PENETRANT</u>	<u>F-RATING(HR)</u>	<u>cUL-CLASSIFIED SYSTEM</u>
CIRCULAR BLANK	1	CAJ 0055, CAJ 0070
OPENINGS	2	CAJ 0055, CAJ 0070
	3	CAJ 0055
SINGLE METAL	1	CAJ 1226, CAJ 1184
PIPES	2	CAJ 1226, CAJ 1184

	3	CAJ 1226, CAJ 1184
	4	CBJ 1037, CBJ 1034
SINGLE NON-METALLIC PIPE (i.e. PVC, CPVC, ABS, FRP, ENT)	1	FA 2025, CAJ 2109 CAJ 2098, CAJ 2141 CAJ 2167, CBJ 2021
	2	FA 2025, CAJ 2109, CAJ 2098, CAJ 2141, CAJ 2167, CBJ-2021
	3	CAJ 2109, CAJ 2098
SINGLE INSULATED PIPES	1	CAJ 5090, CAJ 5091 CAJ 5098
	2	CAJ 5090, CAJ 5091, CAJ 5098
	3	CAJ 5090
	4	CBJ 5006
NON-INSULATED	1	CAJ 7046, CAJ 7051
MECHANICAL DUCTWORK	2	CAJ 7046, CAJ 7051
WITHOUT DAMPERS	3	CAJ 7046, CAJ 7051
MIXED PENETRANTS	1	CAJ 8041, CAJ 8056
	2	CAJ 8041, CAJ 8056
	3	CAJ 8041, CAJ 8056
	4	CBJ 8010

CONCRETE OR BLOCK WALLS

<u>TYPE OF PENETRANT</u>	<u>F-RATING(HR)</u>	<u>cUL-CLASSIFIED SYSTEM</u>
CIRCULAR BLANK	1	CAJ 0055, CAJ 0070
OPENINGS	2	CAJ 0055, CAJ 0070,
	3	CAJ 0055
SINGLE METAL PIPES	1	CAJ 1226, WJ 1021
	2	CAJ 1226, WJ 1021
	3	CAJ 1226, WJ 1041, WJ 1042
	4	CBJ 1034, CBJ 1037, WJ 1041, WJ 1042
SINGLE NON-METALLIC PIPE (i.e. PVC, CPVC, ABS, FRP, ENT)	1	CAJ 2109, CAJ 2098, CAJ 2167
	2	CAJ 2109, CAJ 2098, CAJ 2167
	3	CAJ 2109, CAJ 2098,
	4	WJ 2057
SINGLE INSULATED PIPES	1	CAJ 5090, CAJ 5091, CAJ 5061
	2	CAJ 5090, CAJ 5091, CAJ 5061
	3	CAJ 5090, CAJ 5061
	4	CBJ 5006, WJ 5028
NON-INSULATED	1	CAJ 7046, CAJ 7051, WJ 7021, WJ 7022
MECHANICAL DUCTWORK		
WITHOUT DAMPERS	2	CAJ 7046, CAJ 7051, WJ 7021, WJ 7022
	3	CAJ 7046, CAJ 7051
MIXED PENETRANTS	1	CAJ 8041, CAJ 8056, WJ 8007
	2	CAJ 8041, CAJ 8056, WJ 8007
	3	CAJ 8041, CAJ 8056, WJ 8007
	4	CBJ 8010, WJ 8007

WOOD FLOOR

TYPE OF PENETRANT	F-RATING(HR)	cUL-CLASSIFIED SYSTEM
METAL PIPES	1	FC 1009, FC 1059
	2	FC 1009, FC 1059
NON-METALLIC PIPE	1	FC 2025, FC 2030, FC 2160
	2	FC 2025, FC 2029, FC 2128
INSULATED PIPES	1	FC 5004, FC 3036, FC 3037
	2	FC 5004, FC 3036, FC 3037
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	FC 7013
MIXED PENETRANTS	1 F	C 8009, FC 8014

GYP SUM WALLBOARD ASSEMBLIES

TYPE OF PENETRANT	F-RATING(HR)	cUL-CLASSIFIED SYSTEM
METAL PIPES	1	WL 1054, WL 1058, WL 1164
	2	WL 1054, WL 1058, WL 1164
	4	WL 1110, WL 1111
NON-METALLIC PIPE	1	WL 2078, WL 2075, WL 2128
	2	WL 2078, WL 2075, WL 2128
	4	WL 2184
INSULATED PIPES	1	WL 5028, WL 5029, WL 5047 2 WL 5028, WL 5029, WL 5047
	4	WL 5073
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	WL 7017, WL 7040, WL 7042
MIXED PENETRANTS	2	WL 7040, WL 7042
	1	WL 1095, WL 8013
	2	WL 1095, WL 8013
	4	WL 8014

- 24 Painting
- .1 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.
 - .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.
 - .4 Refer to Section 09 91 00 for further detail.

- 25 Dielectric Couplings
- .1 To be compatible with and to suit pressure rating of piping system.
 - .2 Where pipes of dissimilar metals are joined in all open, non-treated fluid systems.

- 26 Motors
- .1 Provide motors for mechanical equipment as specified.
 - .2 Motors under 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 1/2 HP and larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 104F, 3 phase, 208 V, unless otherwise specified or indicated.
- 27 Belt Drives
- .1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.
 - .2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.
 - .3 Standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified rpm. Provide sheave of correct size for balancing.
 - .4 Minimum drive rating: 1.5 times the nameplate rating of the motor. Keep overhung loads within manufacturers design requirements on prime motor shafts.
 - .5 Motor slide rail adjustment plates to allow for centre line adjustment.
- 28 Guards
- .1 Provide guards for unprotected drives.
 - .2 Guards for belt drives:
 - .1 Expanded metal screen welded to steel frame.
 - .2 Minimum 1.2mm thick sheet metal tops and bottoms.
 - .3 38mm diameter holes on both shaft centres for insertion of tachometer.
 - .4 Removable for servicing.
 - .3 Provide means to permit lubrication and use of test instruments with guards in place.
 - .4 Install belt guards to allow movement of motors for adjusting belt tension.
- 29 Equipment Supports
- .1 Equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of Seismic Engineer.
 - .2 Mount base mounted equipment on housekeeping pads provided by General Contractor where indicated on the drawings.

30 Field Reviews

- .1 Provide for mechanical job foreman and representatives of all applicable mechanical sub-trades to be on site and available during periodic field reviews by Engineer.
- .2 Provide materials to Engineer as required to assist with field reviews, including but not limited to, drawings, specifications, scales, tape measures, ladders, lights, etc..
- .3 Notify Engineer in writing prior to all boarding or wall covering of the mechanical rough-in.
- .4 Notification is to be at least forty-eight (48) hours prior to actual site visit time.
- .5 The Mechanical Contractor is to ensure that all components of the installation are accessible or furnish accessibility as required by the Engineer or Commissioning Agent.
- .6 Take digital photographs before concealing any mechanical equipment, either underground or within walls, and submit on CD or via email as part of record documents.

31 Use of Mechanical Systems During Construction

- .1 Use of permanent heating and ventilating systems for supplying temporary heat or ventilation is permitted only under the following conditions:
 - .1 Entire system is complete, pressure tested, cleaned, flushed out.
 - .2 Specified water treatment system has been commissioned, water treatment is being continuously monitored.
 - .3 Building has been closed in, areas to be heated/ventilated are clean and will not thereafter be subjected to dust-producing processes.
 - .4 There is no possibility of damage from any cause.
 - .5 Supply ventilation systems are protected by MERV 8 filters, which shall be inspected daily, changed every week or more frequently as required and again prior to total performance.
 - .6 Return systems have approved filters over all openings, inlets, outlets.
 - .7 All systems will be:
 - .1 operated as per manufacturer's recommendations or instructions.
 - .2 operated by Contractor.
 - .3 monitored continuously by Contractor.
 - .8 Warranties and guarantees are not thereby relaxed.
 - .9 Regular preventive and all other manufacturers recommended maintenance routines are performed by Contractor at his own expense.
 - .10 Before static completion, entire system to be refurbished, cleaned

internally and externally, restored to "as-new" condition, filters in air systems replaced.

.2 Filters referred to herein are over and above those specified elsewhere in this specification.

.3 Exhaust systems are not included in any approvals for temporary heating ventilation.

32 Commissioning

.1 The Mechanical Contractor is responsible for commissioning, and shall ensure the equipment and systems are prepared, cleaned, adjusted, with start-up completed, and verified in accordance with the TAB specification section and meet requirements thereof prior to commencement by balancer. Schedule TAB work following the completion of the following items:

.1 Installation of ceilings, doors, windows, and other construction affecting TAB.

.2 Application of sealing, caulking, and weather-stripping.

.3 All provisions of TAB are installed and operational.

.4 Start-up, verification for proper, safe, and normal operation of mechanical and associated electrical and control systems affecting TAB including, but not limited to, the following:

.1 Proper thermal overload protection in place for electrical equipment.

.2 Filters in place and in clean condition.

.3 Duct systems clean of debris.

.4 Air shafts and ceiling plenums are airtight to within specified tolerances.

.5 Correct fan rotation.

.6 Fire and volume dampers in place and open.

.7 Coil fins cleaned and combed.

.8 Access doors closed and duct end caps in place.

.9 All outlets installed and connected.

.2 Resolve issues noted by balancer for completion of TAB work.

.3 Complete commissioning work as described in TAB procedures and Section 25 05 10. Both Mechanical Contractor and Controls Sub-contractor are responsible for being present during commissioning.

.4 Perform operation test of all fire dampers, witnessed by TAB contractor.

.5 Commissioning and TAB completion required prior to issue of certificate of Substantial Performance.

33 Cost Breakdown

.1 Within 30 days after the award of the contract, Division 21, 22, 23 and 25 is to submit a breakdown of the contract price. The breakdown is to be

detailed to the requirements of the Engineer. Breakdown is to include as applicable, but not be limited to the following categories:

- .1 Mobilization.
- .2 Vibration isolation and seismic restraint.
- .3 Identification.
- .4 Piping Insulation.
- .5 Ducting Insulation.
- .6 Fire protection equipment.
- .7 Fire protection labour.
- .8 Plumbing equipment.
- .9 Plumbing labour.
- .10 Heating equipment.
- .11 Heating labour.
- .12 Ventilation equipment.
- .13 Ventilation labour.
- .14 Controls equipment.
- .15 Controls labour.
- .16 Controls programming.
- .17 Controls training & warranty.
- .18 Commissioning.
- .19 TAB.
- .20 Warranty.
- .21 Project Closeout, including fire stopping, final cleaning, de-mobilization, operation & maintenance manuals, record drawings, system demonstration and training.

- .2 Breakdown to include hourly rates, including those for all subcontractors.

34 Training

- .1 The mechanical contractor, along with the sub-trades, are expected to provide two half-day training sessions for the building owners and staff. One training session during the heating season, and another in the summer. The contractors are expected to be available during the warranty period to answer questions and troubleshoot problems.

END OF SECTION

1.1 Tab Agency

- .1 General:
 - .1 All work described in this section to be performed by TAB Agency independent of controls, ventilation, and heating.
 - .2 TAB Agency to make one trip to site to view site conditions and confirm in writing to Owner and Engineer adequacy of provisions for TAB and all other aspects of installation pertinent to TAB. If any inadequacy is found, detail necessary requirements.
 - .3 TAB agency shall coordinate with Contractor regarding timing and adequacy of progress for TAB work. Coordinate and Work with Controls Contractor for on-site timing necessary for completion of TAB and to facilitate completion of acceptance requirements.
- .2 Certification:
 - .1 Submit documentation to confirm qualifications, experience of TAB Agency personnel for approval by Engineer.
- .3 Quality assurance:
 - .1 Perform TAB to standards of NEBB or AABC.
- .4 Co-ordination:
 - .1 Co-ordinate all work specified in this Section.
 - .2 Provide all facilities required by TAB Agency in order to carry out work of this Section.
- .5 Adequacy of work for TAB:
 - .1 Upon award, TAB Agency to review construction contract documents and confirm in writing to Engineer adequacy of provisions for TAB and all other aspects of installation pertinent to TAB.

1.2 General

- .1 TAB: means to test, adjust and balance all systems to perform in accordance with Contract Documents.
- .2 Follow start-up procedures as recommended by manufacturer unless otherwise specified.
- .3 Operate all systems to permit TAB to be performed.
- .4 TAB to apply to systems, equipment and related controls specified in Division 22 and 23.
- .5 Reference organization standards:
 - .1 Do TAB in accordance with recommended procedures of NEBB.
- .6 Start TAB only when building is essentially completed, including:
 - .1 Installation of ceilings, doors, windows and other construction affecting TAB.

- .2 Application of sealing, caulking and weather-stripping.
- .3 All provisions for TAB are installed and operational.
- .4 Start-up, verification for proper, safe and normal operation of mechanical and associated electrical and control systems affecting TAB including, but not limited to, the following:
 - .1 Proper thermal overload protection in place for electrical equipment.
 - .2 Air Systems:
 - .1 Filters in place and in clean condition.
 - .2 Duct systems clean of debris.
 - .3 Air shafts, ceiling plenums are airtight to within specified tolerances.
 - .4 Correct fan rotation.
 - .5 Fire and volume dampers in place and open.
 - .6 Coil fins cleaned and combed.
 - .7 Access doors closed and duct end caps in place.
 - .8 All outlets installed and connected.
 - .9 Greasing completed.
 - .5 Ensure above requirements have been met on site visit described above.
- .7 Accuracy tolerances:
 - .1 Do TAB to following tolerances of design values:
 - .1 HVAC systems and hydronic systems: Plus 10%; minus 10%.
- .8 Report:
 - .1 Format to be in accordance with TAB referenced organization standard, but using SI units.
 - .2 Report to include as-built full system schematics showing results of TAB, and fan and pump curves indicating point of operation.
 - .3 Submit 1 copy of TAB report, complete with index tabs for verification and approval of Engineer.
 - .4 Insert 1 copy of TAB report, complete with index tabs in each operation and maintenance manual.
- .9 Demonstration:
 - .1 Reported measurements shall be subject to demonstration to the Owner and the Engineer. Allow two hours for this demonstration. Rebalancing of all or part of the systems due to errors in methodology or data to be at the discretion of the Engineer at no cost to the Owner.
- .10 Settings: lock and permanently mark settings as required by reference standard.
- .11 Completion: TAB to be considered complete only when final reports are approved by Engineer.
- .12 Report is to contain as a minimum the following completed forms based on

the NEBB "Procedural Standards" Fifth Edition 1991.

- .1 Forms 1-91, 3-91, 4-91, 5-91, 8-91, 9-91 and/or 10-91 as appropriate, 11-91 and/or 11A-91 as appropriate, 15-91, 18-91, 19-91, and 21-91.

1.3 Air Moving Systems

- .1 General: measurements as required by referenced standards and as per forms listed, but specifically including:
 - .1 Mark minimum air settings clearly on damper. Set minimum outdoor air flows as listed in Section 25 05 10.
- .2 Have installed and set speed controllers as required for the transfer fans to suit the air flows given on the drawings.
- .3 Total air flow at the air handling unit and fans other than by the sum of the outlets.
- .4 Witness and report on operation of fire dampers as verified under Division 23 33 10.
- .5 Work with Division 25 05 10 for setting of damper operation.
- .6 Apply sticker with company name, date, and initials for each balancing damper and fire damper witnessed.

END OF SECTION

PART 1 - GENERAL

- | | | |
|---|----|---|
| <u>1.1 Scope of Work</u> | .1 | Supply and install equipment and materials as specified and as shown on the mechanical plans. |
| <u>1.2 Product Data</u> | .1 | Submit product data for review by the engineer. |
| | .2 | Shop drawings are required for: |
| | .1 | Heat Pump System |
| | .2 | Piping |
| | .3 | Insulation |
| <u>1.3 Operation and Maintenance Data</u> | .1 | Submit maintenance data for: |
| | .1 | Heat Pump System |
| <u>1.4 Reference Standards</u> | .1 | NBC, National Building Code of Canada. |
| | .2 | CSA B52-05 Mechanical Refrigeration Code. |
| | .3 | CSA B51-09 Pressure Vessels |

PART 2 - PRODUCTS

- | | | |
|-----------------------------|----|--|
| <u>2.1 A/C Split System</u> | .1 | Source Unit: Variable Refrigerant flow technology, inverter driven, variable speed compressor, pre-coated galvanized steel sheets, R410A refrigerant, 10.5kW (36,000 btuh) cooling capacity, 11.7kW (40,000 btuh) heating capacity, 230V, 1 phase, 60Hz, 3.22kW power input. |
| | .1 | Standard of Acceptance: Mitsubishi PUMY-P36NHMU(-BS). |
| | .2 | Indoor Unit: Wall mounted, 7.0kW (24,000 btuh) cooling capacity, 7.9kW (27,000 btuh) heating capacity, 230V, 1 phase, 60Hz, 0.20kW. |
| | .1 | Standard of Acceptance: Mitsubishi PEFY-P24NKMU-E |
| | .3 | Controller: Mitsubishi PAR-U01MEDU-J. |
| | .4 | Condensate pump required. |
| <u>2.2 Piping</u> | .1 | CSA B51 rated, hard drawn copper tubing, ASTM B 88 type k or L, sized as per the plans. Sizing as per the manufacturers requirements. |

2.3 Insulation & Jacketing .1 Insulation: 12mm closed cell flexible elastomeric foam insulation, complete with adhesives, tape and insulated pipe supports, 0.036W/mK minimum, flame spread of 25 or less, smoke development rating of 50 or less.

2.4 Refrigerant .1 R-410A only.

PART 3 - EXECUTION

- 3.1 Piping
- .1 Install in accordance with the referenced codes, authorities having jurisdiction, and manufacturer's written installation instructions.
 - .2 Cut square, ream, and clean piping, tubing, and ends, clean recesses of fittings and assemble without binding.
 - .3 Assemble all piping using fittings manufactured to ANSI standards.
 - .4 Install close to building structure to minimize furring, conserve headroom and space. Group exposed piping, and run piping parallel to walls.
 - .5 Connect to fixtures and equipment in accordance with manufacturer's instructions unless otherwise indicated.
 - .6 Install intumescent devices at all locations where combustible piping penetrates a fire separation. Devices to be installed in strict accordance with manufacturers written installation instructions and conditions of ULC listing.
 - .7 Isolate all equipment, fixtures, and branches with ball valves.
 - .8 Test all systems to the requirements of the CSA codes. Provide testing reports witnessed by a third party.
- 3.2 Insulation
- .1 Apply insulation to pipe with all joints butted tightly. Seal circumferential joint with a minimum of 75mm wide butt strip. Staple lap of jacket in place on 75mm centres. Seal with vapour barrier adhesive or with a heavy brush coat of barrier coating for cold water piping. Insulate fittings and valves. Do not insulate unions, flanges except on flanged valves, mechanical couplings, and strainers. Terminate insulation neatly on bevel. Cover joints with jacket finishing tape. Provide recovering jackets on exposed insulation throughout. Runouts within walls do not require insulating.

END OF SECTION

PART 1 - GENERAL

- | | | |
|---|----|--|
| <u>1.1 Shop Drawings and Product Data</u> | .1 | Submit shop drawings and product data as per Section 23 05 10. |
| | .2 | Shop drawings are required for:
.1 |
| <u>1.2 Operating and Maintenance Data</u> | .1 | Include operating and maintenance data in maintenance manuals specified in Section 23 05 10. |
| | .2 | Operating and Maintenance Data is required for:
.1 |
| <u>1.3 Reference Standards</u> | .1 | National Building Code of Canada, 2010 |
| | .2 | ASHRAE Ventilation Guidelines; Fundamental, Systems, and Applications Volumes. |
| | .3 | SMACNA Construction and Installation Standards. |
| <u>1.4 Related Work</u> | .1 | Section 23 05 10 |
| | .2 | Section 25 05 10 |

PART 2 - PRODUCTS

- | | | |
|---------------------|----|---|
| <u>2.1 Ductwork</u> | .1 | Class IV ductwork, maximum pressure 0.5 in. wc, maximum velocity 33 ft/s, transverse and connections made airtight with sealing compound, longitudinal seams unsealed. Ductwork lock formed, zinc coated galvanized steel, thickness to SMACNA recommendations. Use strap hangers, same material as duct but one thickness heavier, for all ductwork. |
| | .2 | Spiral: galvanized steel, thickness to SMACNA recommendations, medium pressure sealing with transverse joints and connections made airtight with sealant. |
| | .3 | Fabrication and joints: to ASHRAE and SMACNA. |
| | .4 | Sealant: chemical and oil resistant, polymer type flame resistant duct sealant. Temperature range of minus 65C to plus 90C.
.1 Standard of Acceptance: Duro-Dyne S-2, United McGill. |

- .5 Fittings:
 - .1 Radiused elbows: standard radius.
 - .2 Sub branch duct with 45 degree entry and balancing damper on branch.
 - .3 Transitions:
 - .1 Diverging: 20 degree maximum included angle.
 - .2 Converging: 30 degree maximum included angle.

2.2 Exhaust Fans

- .1 EF-1: DC motor, 150mm duct adapter, LEED and Energy Star compliant, flush mounted grille, backdraft damper, rust-proof paint, 38 L/s at 60 Pa. Unit to run continuously.
 - .1 Standard of Acceptance: Panasonic FV-08VKM3

PART 3 - EXECUTION

3.1 General

- .1 Install equipment in accordance with manufacturer's written installation instructions. Maintain adequate clearances for servicing and maintenance.

3.2 Ductwork

- .1 Install ducts in accordance with ASHRAE and SMACNA or as indicated. Do not break continuity of insulation vapour barrier with hangers or rods. Space hangers every 10 feet for duct sizes 60 in. and under, every 8 feet for duct sizes over 60 in. Seal all joints with duct sealer.
- .2 Seal exterior wall penetration.
- .3 Provide supplemental steel as required to complete the installation and to comply with seismic restraint requirements.
- .4 Do not break continuity of insulation vapour barrier with hangers or rods. Space hangers every 3 metres for duct sizes 1500 mm and under, every 2.5 metres for duct sizes over 1500 mm. Seal all joints with duct sealer.
- .5 Coordinate with General Contractor framing for duct penetrations.
- .6 Ensure solid blocking is installed around duct penetrations.

3.3 Flexible Ductwork

- .1 Install maximum 1525 mm with at least one elbow at all diffuser connections in T-bar. Clamp core to ductwork, foil tape insulation and vapour barrier over clamp.

<u>3.4 Balancing Dampers</u>	.1	Install as far as practical from grille. Ensure damper operates clear of insulation in insulated ductwork.
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END OF SECTION

PART 1 - GENERAL

- | | | |
|---|----|--|
| <u>1.1 Shop Drawings</u> | .1 | No shop drawings required. |
| <u>1.2 Operating and Maintenance Data</u> | .1 | No O&M data required. |
| <u>1.3 Scope of Work</u> | .1 | The controls systems for this project shall consist of relocating thermostats and wiring associated with the new heat pump system. |
| | 2 | This division is responsible for all shop drawings, supply of all equipment including transformers, and installation of all controls. Unless noted otherwise, FT-4, 600 volt rated wiring is to be used. Work shall be completed in accordance with Division 26 specifications. Division 26 is only responsible for line voltage connection to control panels noted on the drawings. |
| <u>1.4 Responsibility</u> | .1 | The contractor has the ultimate responsibility for insuring that the control system operates according to the design intent, complete with fail safes, and to insure that the system operates properly during the Warranty period. |
| | .2 | Controls contractor shall be available to assist TAB contractor. Coordinate on site time. |
| <u>1.5 Related Work</u> | .1 | Section 23 05 10 - Mechanical General |
| | .2 | Section 22 42 10 - Plumbing |
| | .3 | Section 23 23 00 - Refrigeration |
| | .4 | Section 23 33 10 - Ventilation |

PART 2 - PRODUCTS

No Products Required

PART 3 - EXECUTION

3.1 General Installation

- .1 Control system is to be fed from a single dedicated circuit.
- .2 Wiring is to be run parallel and perpendicular to building lines.
- .3 Wiring is to run bundled in telephone rings where concealed but accessible such as above t-bar ceilings; otherwise, in conduit. Exposed non-concealed areas such as Mechanical Room to be run in conduit.
- .4 Low voltage wiring is to run separate from line voltage wiring.
- .5 Use water-tight flexible conduit and fittings for final connections to all equipment.
- .6 Ensure wiring connections are installed to accommodate seismic restraint and vibration isolation systems, and to facilitate maintenance (such as wire loops to facilitate removal of blower assemblies).
- .7 Install, test, adjust, and set up controls in strict accordance with manufacturer's written installation and operating instructions.
- .8 Locate thermostats, remote sensors and midpoint of control panels at 1200mm above floor level.

3.2 Start-Up and Adjustment

- .1 Upon completion of installation, test, adjust and regulate controls or safety equipment provided under this Section. Coordinate and work with TAB agency for completion of TAB, and start-up and adjustment.
- .2 Adjust and place in operating condition.

END OF SECTION

1.1 GENERAL

- .1 This section includes general clauses applicable to the supply and installation of all electrical systems. It is intended to supplement the requirements of Division 01.
- .2 The Contractor shall provide all labour, materials, tools and equipment required for the work, except such materials and/or equipment that is specified as supplied by Owner.
- .3 It is the intent of the Drawings and Specifications to provide a complete and workable installation. Any work, fitting and/or necessary material not specifically mentioned or shown on the drawings, but obviously necessary to complete the installation, shall be furnished by the Contractor as if specifically mentioned herein and detailed.
- .4 Contractor is to make all allowances for work to be completed as specified in the general and supplemental conditions.

1.2 SITE VISIT

- .1 The bidding Contractors are encouraged to visit the site prior to tender closing to examine closely any local and existing conditions which may affect the performance of the work.
- .2 Arrangements for site visits are to be made with the Project Manager.
- .3 The bidding Contractors are expected to examine the existing site in detail to determine the specific work required to complete the contract.

1.3 SCOPE OF WORK

- .1 Installation of electrical systems for CSPS and CAN NOR space renovations on the 2nd and the 4th floors of the Elijah Smith Building; including power systems (including power for security system); lighting systems (including controls); telephone and data Wiring, Fire alarm and exit signage systems.
- .2 Work also includes the relocation and/or removal of various electrical equipment that is currently located on walls, ceilings, or areas that will be demolished, removed, or altered during the renovations.

1.4 DRAWINGS AND SPECIFICATIONS

- .1 The drawings and specifications are complementary each to the other and what is called for by one shall be binding as if called for by both.
- .2 Should any discrepancy appear between the drawings and specifications or within the drawings or the specifications themselves, which leaves the Contractor in doubt as to the true intent and meaning of the drawings and specifications, a ruling shall be obtained from the Consultant before submitting his tender. If this is not done, it will be assumed that the most expensive alternative has been allowed for and shall be provided for by the Contractor.
- .3 Electrical drawings indicate general location and Specifications route to be followed by 'system wiring' which includes; conduits, cables, cable trays and wiring, and do not show all architectural, structural, mechanical and landscape details. In some cases, system wiring is

not shown on drawings or is shown diagrammatically in schematic or riser diagrams. The Contractor shall provide system wiring to form a complete operating job. System wiring shall be physically installed to conserve headroom, furring spaces, and to coordinate with all trades and equipment provided.

- .4 Follow architectural, structural and mechanical drawings for details of work and install electrical systems to coordinate with architectural, structural and mechanical work and details. Refer to architectural and structural drawings for accurate building dimensions.
- .5 Examine structural, architectural and mechanical drawings and work of all other trades to ensure that work can be satisfactorily carried out without changes to building as shown on the drawings. Conflicts or additional work beyond the work covered by drawings and specifications shall to be brought to attention of the Consultant by the Contractor.

1.5 INSTALLATION

- .1 The Contractor shall be responsible for prompt installation of his work in advance of concrete pouring, application of architectural finish or similar work.
- .2 Where any equipment supplied by the Contractor must be built-in with the work of other trades, the Contractor shall be responsible for supply of the equipment to be built-in and/or shop drawings with exact dimensions to allow necessary openings to be left so as not to hold up the work.
- .3 The Contractor shall be responsible for all damages caused to the Owner and the other trades/contractors by improper location or carrying out of his work.
- .4 Division 26 is responsible for all work specified as Division 26 in specification Sections 23 09 33 "Electric and Electronic Control System for HVAC".
- .5 Where interlocks are required for mechanical systems, Division 26 shall install Division 23 supplied relays and cabinets, and provide all line voltage wiring and terminations. Division 26 to coordinate with Division 23.

1.6 RESPONSIBILITY OF CONTRACTOR

- .1 Promptly advise the Consultant of any specified equipment, material or installation of same which appears inadequate or unsuitable, in violation of laws, ordinances, rules or regulations of authorities having jurisdiction, or of any necessary items of work omitted from the Contract Documents.
- .2 No consideration will be granted for failure to visit the site or for any resulting misunderstanding of work to be done. No additional charges will be considered for items which were apparent during a site visit.
- .3 During the course of construction, existing conditions which are found to deviate from those indicated on the drawing are to be brought to

the attention of the Consultant.

1.7 WORK SCHEDULE

- .1 Follow specific requirements outlined in Division 01 regarding work schedule, job completion, and the timing of work.

1.8 COORDINATION
WITH TRADES

- .1 In conjunction with the General Contractor and all trades, prepare electrical coordination drawings to determine and coordinate efficient use of available space, proper sequencing of work, and protection of installed work, in order to resolve installations conflicts.
- .2 Electrical coordination drawings are to be available on-site for use by; the General Contractor and all trades, and shall be available for Consultant's review during all site inspections.
- .3 Maintain electrical coordination drawings throughout the construction period. Record changes due to modifications and adjustments.
- .4 Coordination plans shall be made available to the Consultant at the Consultant's request; copy of drawings to be delivered to the Consultant's office within 3 working days of the Consultant's written request to the Contractor.
- .5 Consultant's review of coordination drawings is for general implementation design only and does not relieve the Contractor from complying with all requirements of drawings and specifications including coordination with the General Contractor and with all trades.

1.9 VOLTAGE RATINGS

- .1 Operating voltages: To CAN3-C235, latest edition.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.10 CODES AND
STANDARDS

- .1 Do complete installation in accordance with CSA C22.1 - 2015 except where specified otherwise.
- .2 Comply with all CSA electrical bulletins as well as all local rulings in force at the time of tender.
- .3 Where reference is made to published standards the latest editions and revisions of such standards shall apply.
- .4 Notify Consultant of changes required by the Electrical Inspection Department prior to making changes.

1.11 PERMITS AND FEES

- .1 Submit to; the Electrical Inspection Department, the Supply Authorities and the Building Inspection Authorities, the necessary number of drawings and specifications, for examination and approval

prior to commencement of work.

- .2 Pay all fees and coordinate inspections required by the Authorities Having Jurisdiction (AHJ) for work provided by this division.
- .3 Furnish certificates of acceptance from each AHJ inspection department upon completion of work.
- .4 Notify the Consultant of changes required by the AHJ Department(s) prior to making changes. Changes required by the AHJ shall be implemented by the Contractor only after written instruction by the Consultant.

1.12 CARE, OPERATION
AND START UP

- .1 Instruct operating personnel in the operation, care and maintenance of equipment as specified in further sections.
- .2 Provide specific training requirements as specified in further sections.

1.13 MATERIALS AND
EQUIPMENT

- .1 Equipment and materials to be new and carry acceptable agency approval markings.
- .2 Factory assembled control panels and component assemblies.
- .3 Where equipment or materials are specified by technical description only, they are to be of the best commercial quality obtainable for the purpose.
- .4 All work to be executed in a neat and workmanlike manner by qualified tradesmen. Division 26 to keep a competent foreman and all necessary assistants, to the approval of the Consultant and to the approval of the AHJ(s), on the job during the work.
- .5 All electrical equipment to be CSA or Canadian equivalent Canadian standards approved. Electrical equipment that is shown on the drawings or called for in the specifications that is not CSA or equivalent approved is to be treated by the requirements of Division 26 requirements in one of the following ways:
 - .1 make allowance in Contract Price to have the equipment CSA or equivalent approved, or
 - .2 make allowance in Contract Price for the most expensive CSA or equivalent approved equivalent.
- .6 Unless otherwise specifically called for in the specifications, uniformity of manufacturer to be maintained throughout the building for any particular item or type of equipment.
- .7 The Contractor shall be completely responsible for ascertaining that every item included in Contract complies in all respects with specifications and drawings. Any item of equipment found by Consultant not to comply with specifications and drawings to be replaced at no additional cost with an item or unit of the Consultant's choice.

1.14 RECORD
(AS-BUILT) DRAWINGS

- .1 Reference and follow directions of section 01 78 00; "Closeout Submittals".
- .2 Neatly record, as the job progresses, day by day, all work as installed. Make these drawings available to the Consultant for inspection and review from time to time as the Consultant sees fit. As-built drawings must be available on-site during all Consultant's inspections.
- .3 Record all changes to contracted work as issued by addendum, site instruction, and change order.
- .4 Record all system's installations on record drawings. Include:
 - .1 panel and circuit numbers,
 - .2 Feeder wiring details including; location, conductor gauge, cable assembly and conductor termination details. Required for all panel feeders, MCC units, CDP(s) and service entrances.
 - .3 conduit and cable tray details including; location, trade size.
 - .4 boxes, cabinets and consolidation points including; physical dimensions, NEMA type and seismic restraint,
 - .5 equipment; location, name plate data, overload protection location and trip settings, seismic restraint,
 - .6 all other details required to document the provided systems for use by the owner
- .5 Record the location of all electrical equipment; Equipment designation to correspond to field label of equipment. Show connected circuit and panel identification.
- .6 Record wiring logic diagrams and include written commentary for logic operation.
- .7 Deliver marked up plans to the Consultant

1.15 SHOP DRAWINGS
AND OPERATING
INSTRUCTIONS

- .1 Provide five copies of shop drawings for all equipment and required details including the following:
 - .1 Electrical Permit
 - .2 Maintenance Manual; tabs and binder art work wording and details
 - .3 Contractor Test Forms
 - .4 Demonstration and Instruction Agenda
 - .5 Cabinets and Pull Boxes
 - .6 Seismic Restraint and Housekeeping Pads
 - .7 Service Entrance Equipment
 - .8 Distribution Equipment
 - .9 Disconnect Switches
 - .10 Lighting System and controls
 - .11 Exit and Emergency Lighting including Mounting Details
 - .12 Fire Retardant Compound
 - .13 Labels; lamicoïd label materials, lettering description and final label wording
 - .14 Equipment and materials as required in further sections of the

specifications.

- .2 The Contractor shall submit shop drawings and all supporting materials sufficiently in advance of material ordering/delivery requirements to allow the Consultant time for review.
- .3 All shop drawings to be delivered in 8½ x 11" format only.
- .4 Shop drawings to be delivered to the Consultant's office unless otherwise approved by the Consultant.
- .5 Approval of shop drawings is for general design only and does not relieve the Contractor and/or the equipment supplier/manufacturer from complying with all requirements of the contract documents. The Contractor shall be responsible for conforming to and coordinating all dimensions. The Contractor shall take note that the Consultant's review of shop drawing submission(s) after the Consultant's second review as required for the Contractor to provide, in the opinion of the Consultant, materials to meet the requirements of the Contract Documents shall be at expense of the Contractor.
- .6 Reference and follow Section 01 33 00 "Submittal Procedures".
- .7 Prior to submission, all shop drawings shall be stamped, dated and signed by the Division 26 Contractor and the General Contractor.
- .8 The Contractor is to coordinate all shop drawing submission(s) with requirements of the contract documents. Individual equipment that forms an integral portion of a specific system will not be reviewed until all related shop drawings and product data is available in shop drawing submission, unless otherwise approved by the Consultant.
- .9 Division 26 to review shop drawings and assume responsibility for:
 - .1 Completeness - including all details specified.
 - .2 Dimensions and field measurements.
 - .3 Catalogue numbers and similar data.
 - .4 Conformance with contract documents.
 - .5 Colours.
 - .6 Site conditions.
 - .7 Interference with mechanical equipment including motor sizes and loads, equipment locations and connections points.
- .10 Shop drawing submissions to include:
 - .1 Name of Contractor, Sub-contractor, Supplier and Manufacturer.
 - .2 Date and revision dates.
 - .3 Project name.
 - .4 All pertinent data.
 - .5 Dimensions. All dimensions and data to be in metric units.
 - .6 Weights and center of mass information, where required for seismic purposes.
 - .7 Colour.
 - .8 Specification section number.

- .9 Additional equipment information as necessary to describe equipment use (example: weatherproof disconnect switch for motor #1).
- .10 Contractor's and Division 26's; stamp and signature.
- .11 A clear space of 100 mm x 75 mm on each sheet for placement of the Consultant's review stamp.
- .12 Model and type numbers.
- .13 Corresponding lamicoid label wording where and Operating required. Instructions
- .11 Shop drawings will not be reviewed if they:
 - .1 Are not clearly legible.
 - .2 Do not contain all information required above.
 - .3 Describe other products or models not applicable to this project.
- .12 Luminaire shop drawings to include:
 - .1 Replacement ballast shop drawings.
 - .2 Replacement lamp data.
- .13 Include with shop drawing submittal, detailed pre-startup check lists, startup/post-startup procedures and check lists for each piece of equipment and for each system.
- .14 Submit shop drawings on all wiring devices, relays and motor controls. Include manufacturer's and field; wiring and termination drawings where applicable.
- .15 Provide equipment operation instructions as specified in further sections and where requested by the Consultant.
- .16 Do not order material or equipment until the Consultant has reviewed the shop drawing(s).
- .17 Maintain on-site, one complete indexed copy of all reviewed shop drawings.

1.16 LOCATION OF
OUTLETS

- .1 Do not allow outlets back-to-back in wall; Allow minimum six inches (150 mm) horizontal clearance between boxes.
- .2 Where outlets are located on counter tops and adjacent to sinks, confirm exact location of the sink with the plumbing trade prior to rough-in. If a conflict exists with the outlet inform the engineer as soon as possible to obtain a new location for the outlet(s). Switches and outlets adjacent to each other to match in elevation.
- .3 Change location of outlets at no extra cost or credit, providing distance does not exceed ten feet (3050 mm) and information is given before installation.
- .4 Locate light switches on latch side of doors, ensure switches are inside room. Confirm prior to rough-in. If insufficient room is left by building framing, notify the Consultant for further instruction.

- .5 Note, drawings indicate design intentions only. Exact locations are the responsibility of the contractor. Provide coordination with all sub-trades for exact connection locations prior to rough-in.

1.17 MAINTENANCE MATERIALS

- .1 Provide maintenance materials as recommended by equipment suppliers and as specified.
- .2 Provide materials as specified in Section 01 78 00 "Closeout Submittals", Section 26 05 31 "Electrical Maintenance Manual" and as specified in each following section.

1.18 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centre line of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not indicated verify before proceeding with installations.
- .3 Confirm the height of devices in handicapped facilities before installation.
- .4 Install electrical equipment at the following centre heights unless indicated otherwise.
 - .1 Local Light Switches:
 - .1 General: 1050 mm unless detailed otherwise.
 - .2 Above top of counters or splash back: 175mm to match outlets.
 - .2 Wall receptacles:
 - .1 General: 300 mm unless detailed otherwise.
 - .2 Above top of continuous baseboard: 200 mm
 - .3 Above top of counters or splash back: 175 mm
 - .4 In Mechanical Rooms: 1050mm or as indicated on drawings.
 - .3 Panelboards: 1800mm to top or as required by code
 - .4 Telephone outlets: 300mm
 - .5 Wall-mounted telephone outlets: 1500mm
 - .6 Telephone outlets above backsplash: 175mm.
 - .7 Wall-mounted emergency lighting head:
 - .1 general: 2700 mm when ceiling height is 3000 mm or greater, and 300 mm below ceiling height in locations where ceiling is less than 3000 mm.
 - .8 Fire alarm system equipment and devices: as specified in Section 28 31 01 "Fire Alarm System".

1.19 PROTECTION

- .1 Protect exposed live equipment during construction for personnel safety.

- .2 Shield and mark live parts eg. "Live 120 Volts".

1.20 PENETRATIONS

- .1 Use pre-manufactured poly pans or approved alternate for any outlet or box located in or through vapour barrier.
- .2 All penetrations through vapour barrier required for any component installed by Division 26 to be performed in accordance with specification section 07 27 10.
- .3 Provide fire rating protection as required at all locations where electrical equipment penetrates fire separations.
- .4 Where cables or conduits pass through floors and fire rated walls, pack space between wiring and sleeve full and seal with caulking compound conforming to ULC-S115, latest revision.
- .5 Use HILTI FS-ONE Intumescent Firestop Sealant or approved equal. Provide shop drawings for fire sealant.

1.21 CLEANING

- .1 Do final cleaning in accordance with section 01 74 11 "Cleaning".
- .2 At time for final cleaning, clean lighting lenses, reflectors and other surfaces that have been exposed to construction dust and dirt.

1.22 MECHANICAL
WIRING

- .1 Provide all starters and disconnects unless otherwise specified. Include provision of all starters and disconnects for Division 23 specified equipment unless otherwise detailed or shown that provision is by another Division.
- .2 Division 26 is to provide all line voltage; wiring, connections, and conduit, work for this project unless otherwise detailed or shown that provision is by another Division. Coordinate with the General Contractor and all Divisions for requirements.
- .3 Supply and install all line voltage; wiring, connections, over-current devices, disconnect switches and conduit work for all Division 23 control transformers.
- .4 Division 26 to provide all line voltage; wiring, connections, over-current devices, disconnect switches, starters, over-loads, and conduit work, for all Division 23 supplied and/or installed equipment, unless specified otherwise. Refer to Division 23 specifications and drawings for Division 23 wiring requirements. Note that the Contractor shall be responsible to coordinate with Division 23 and all Divisions prior to rough-in for exact equipment electrical requirements.
- .5 Wiring and connections below 50 V and which are related to the control systems specified in Division 23 and other Divisions shall remain the responsibility of that specific Division unless noted otherwise as to be provided by Division 26. Provide all line voltage control system interlocks for Division 23 where specified and/or shown on the drawings.

- .6 Final connections to mechanical equipment is to be made with watertight flexible conduit with watertight connectors, except in hazardous locations where connections shall be made with teck cable and cable glands to suit the environment.
- .7 All extra low voltage wiring and connections below 50 volts related to the security system shall be the responsibility of Division 26.
- .8 The contractor is required to review Division 23 drawings and specifications prior to submitting a tender. No consideration shall be granted for additional costs for items identified in Division 23 as the responsibility of Division 26. The Division 26 Contractor shall coordinate line voltage provision with the General Contractor prior to submitting a tender.

1.23 TESTS

- .1 Reference Section 26 05 04 "Contractor Testing".

1.24 DEMONSTRATION
AND INSTRUCTION

- .1 Reference Section 27 95 01 "Demonstration and Training".

1.25 IDENTIFICATION

- .1 Reference Section 26 05 25 "Identification".

1.26 COST BREAKDOWN

- .1 Within 14 days after the award of the contract, Division 26 is to submit a breakdown of the electrical contract price. The breakdown is to be detailed to the requirements of the engineer and is to include but not be limited to the following categories:
 - .1 Mobilization, Coordination with Utilities and Permits
 - .2 Distribution Equipment: Supply and Install
 - .3 Distribution Cabling and Conduits: Supply and Install
 - .4 Line Voltage Controls Equipment and Wiring: Supply and Install
 - .5 Rough-in Wiring; Lighting and General Power: Supply and Install
 - .6 Interior Lighting Fixtures and Lamps: Supply and Install.
 - .7 Lighting Control System: Supply and Install.
 - .8 Emergency and Exit Lighting Equipment: Supply, Rough-in and Install
 - .9 Communication and Data system: Supply and Install
 - .10 Operation and Maintenance Manual
 - .11 Contractor Testing
 - .12 As-built Drawings
 - .13 Contractor demonstration and instruction
 - .14 Demobilization

<u>1.27 CONTEMPLATED CHANGE ORDERS</u>	.1	All pricing of Contemplated Change Orders (CCO) to be accompanied by a complete itemized breakdown of labor and materials for each item of work.
<u>1.28 ACCESSIBILITY</u>	.1	Install so as to be readily accessible for adjustment, operation and maintenance. Provide access panels where required in building surfaces.
	.2	Locate panels in service areas where possible. Do not locate in panelled or special finish walls without prior approval of the Consultant and the Architect.
	.3	Access panels in ULC fire separations and fire rated walls shall have a compatible fire rating and ULC label. Acquire approval in writing from the local Fire Authority and Building Official where required.
	.4	Access panels shall be painted with a primer coat, if applicable and then with a finish coat, colour and type to the Consultant's and Architect's approval.
<u>1.29 INSPECTIONS GENERAL</u>	.1	The Division 26 Contractor, in coordination with the General Contractor, shall request the Consultant to perform site installation inspections as required by; the General Contract, as established at the pre-construction site meeting and as required to satisfy the Consultant that the Division 26 work, including equipment, materials and installation is provided as specified, as shown and as required.
	.2	In the absence of a firm inspection schedule the contractor is to notify the Consultant in writing prior to all; boarding and wall covering, of the electrical rough-in.
	.3	Notification of a required inspection is to be at least 5 days hours prior to actual inspection time.
	.4	The Electrical contractor is to ensure that all components of the installation are accessible or furnish accessibility as required by the Consultant.
	.5	Should re-inspection be necessary as a result of inferior or incomplete work, additional inspections will be charged back to the contractor. Scheduling of the required inspections/meetings is a responsibility of the Contractor concerned.
<u>1.30 SUBSTANTIAL COMPLETION INSPECTION</u>	.1	Refer to general specifications.
	.2	Prior to a substantial completion review being done, Division 26 shall submit all of the following to the Consultant: .1 A complete list of outstanding deficiencies pertaining to Division 26; as assessed on-site by the Division 26 Contractor in coordination with the General Contractor. The list is to be detailed, accurate and shall list room by room, all

work not yet complete.

.2 A complete list of all materials pertaining to Division 26, not on-site and required to complete the project; as assessed by the Division 26 Contractor in coordination with the General Contractor.

.3 Fire Alarm Verification Report.

.4 Contractor Test Reports.

.5 Record Drawings; complete to date of submission.

.6 O&M Manual draft; complete to date of submission.

.7 Transmittal letters indicating all spare parts, tools, etc. turned over to the Owner as specified.

.3 The following requirements in addition to the submission requirements above shall be demonstrated as operational and complete prior to granting of Substantial Completion:

.1 Emergency and Exit Lighting System

.2 Fire Alarm System

.3 Seismic Restraint Systems

.4 Other Items Effecting Life Safety and Items affecting Fire Safety.

1.31 FINAL ACCEPTANCE
INSPECTION

.1 Refer to requirements of the General Contract.

.2 Prior to the contractor requesting final acceptance, the Division 26 in coordination with the General Contractor, shall submit to the Consultant the following:

.1 A written report indicating action completed to correct all Substantial Inspection deficiencies.

.2 Operation and Maintenance manuals.

.3 As-built Drawings.

.4 Letters of Warranty and Guaranty.

.5 Demonstration and Training documentation.

END

PART 1 - GENERAL

1.1 GENERAL
INSTRUCTIONS

- .1 This section of the specification forms a part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.
- .2 Where specified and as required, coordinate with other Division contractors to test and record, equipment and systems operation.

1.2 RELATED WORK

- .1 "Common Work Results Electrical" 26 05 01
- .2 "Maintenance Manuals" Section 26 05 08
- .3 "Demonstration and Instruction" 26 79 00

PART 2 - PRODUCTS

2.1 SCOPE

- .1 Test and check all portions of the electrical systems for correct operation.
- .2 All test results shall be tabulated, signed and inserted into the Maintenance Manuals in the correlating system section's sub-section heading 'Test Results'.
- .3 Specific tests and procedures outlined in this section and in the referenced sections are in addition to normal visual and mechanical inspections prior to placing equipment in service.
- .4 Where required and where directed by the Consultant obtain copies of factory tests for comparative results.
- .5 Where directed by the Consultant demonstrate field tests for equipment and system operation.

PART 3 - EXECUTION

3.1 TESTING AGENCY
AND/OR PERSONNEL

- .1 All testing and commissioning will be performed by the contractor's forces unless indicated otherwise.
- .2 This Division is responsible for coordinating with the Consultant for Consultant's witness of the work detailed in this section and in the referenced sections.
- .3 Provide the Consultant with one journeyman; electrician or where a specialized sub-trade is required provide one specialized tradesman, as needed to gain access to equipment for testing, demonstration, removal and replacement of covers, wires and cables, etc.
- .4 All deficient equipment/devices shall be replaced and retested to the approval of the Consultant.
- .5 All covers, access doors opened for inspection to be replaced by the Contractor.

- .6 The costs for testing, test equipment and test forms and checklists will be the responsibility of the Contractor.

3.2 TESTING AND INSPECTION REPORTS

- .1 Inspection and test results to be recorded on a suitable form which shall be furnished by the Contractor.
- .2 The test and inspection report forms shall be submitted to the Consultant for review at the shop drawing phase and at least one (1) week prior to testing.
- .3 Each completed form is to be signed and dated by the test technician. Space to be provided for noting approved items and their disposition.
- .4 The Contractor shall submit to the Consultant; testing and inspection reports along with supporting as-built information for each system, each piece of equipment, and where directed by the Consultant.
- .5 The Contractor shall furnish copy of all test results on approved test sheets to the Consultant a minimum of 7 working days prior to substantial completion.
- .6 Upon completion of the project, the Contractor shall assemble a complete set of test and inspection results and report and insert in the operation and maintenance manuals.

3.3 TEST APPARATUS EQUIPMENT AND LABOUR

- .1 The Contractor to be responsible for furnishing all apparatus and labour required for the test operations.
- .2 Division 26 to designate a senior experienced individual fully familiar with the project to demonstrate, test and report the electrical systems' operations.

PART 4 - SYSTEMS

4.1 ELECTRICAL DISTRIBUTION SYSTEM

- .1 Before energizing any portion of the new electrical system, perform megger ohmmeter tests on include all distribution feeders, panelboard feeders and motor feeders.
- .2 Test readings to conform to the Canadian Electrical Code. Test results to be logged, tabulated and incorporated into operating and maintenance manuals.

4.2 MECHANICAL EQUIPMENT

- .1 In cooperation with the mechanical contractor, take clip-on ammeter readings and motor terminal voltage readings on all phases of all mechanical equipment motors with motors operating under normal full load conditions.
- .2 Test readings shall be submitted complete with heater overload sizes, motor electrical characteristics including frame type, voltage and phase, and name plate data. Insert list in each Operation and Maintenance Manual.
- .3 Confirm motor rotation direction with Division 23 (or other specific Division as required) and record motor rotational direction.

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|---|----|--|
| | .4 | Include in testing and report, declaration signature of mechanical contractor foreman witness of correct operation and operating parameters for each unit of mechanical equipment. |
| <u>4.3 DEVICES</u> | .1 | Test all receptacles for proper polarity, circuitry and grounding. |
| | .2 | Provide contractors test results in Operation and Maintenance manuals. Test result form to be contractor declaration that all receptacles have been tested and are operational. |
| <u>4.4 LIGHTING AND LIGHTING CONTROL</u> | .1 | Test all lighting circuits, lighting control and lighting fixtures as indicated following, as specified in specific equipment sections, and as recommended by the equipment manufacturer(s). Include all; manual switches, daylight controls, motion sensors and all other automatic controls and accessories. |
| | .2 | Provide contractors test results in operation and maintenance manuals. Test results to include lighting circuit ampacities under full load conditions, and contractor declaration that each lighting fixture and control apparatus has been tested and is operational. |
| <u>4.5 EXIT AND EMERGENCY LIGHTING AND UNIT EQUIPMENT</u> | .1 | Test all emergency; lighting circuits, controls and unit battery packs as following, as specified in specific equipment sections and as recommended by the equipment manufacturer(s). |
| | .2 | Test and record each remote head voltage under full load operating conditions. |
| | .3 | Test unit equipment operation including full load voltage and as recommended by the manufacturer for equipment operation for code required rated output. Note that:

.1 general emergency lighting requirements are 30 minutes to 91% of full load voltage

.2 generator room emergency lighting requirements are 120 minutes to 91% of full load voltage. |
| | .4 | Provide contractors test results into operation and maintenance manuals. Test results to include lighting circuit capacities, and contractor declaration that each lighting fixture and control apparatus has been tested and is operational. |
| <u>4.6 ADDITIONAL TESTS AS REQUIRED BY THE ENGINEER</u> | .1 | Make additional system tests as directed by the Consultant. Make allowance in bid price to provide an additional 8 journeyman man hours to test and document electrical systems as directed by the Consultant. Include allowance in bid price to provide Contractor test results in O+M manual. |
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PART 1 - GENERAL

1.1 GENERAL

- .1 This section covers items common to all sections of Division 26 and is to be supplemented with the requirements of the other sections.
- .2 Provide operation and maintenance data in accordance with Section 01 77 00 "Closeout Procedures".

1.2 SCOPE OF WORK

- .1 Provide four (4) complete sets of electrical operation and maintenance manuals to be turned over to the Owner. One additional copy for the Engineer. Total 5.
- .2 Documentation Agent or Contractor to submit complete system description, schematics and draft manuals by the substantial completion date. Draft manual to be submitted in temporary binder. All O&M manual material to be assembled and submitted in draft form to the Engineer's office for review at the substantial completion date.

PART 2 - PRODUCTS

2.1 DOCUMENTATION
AGENT

- .1 Electrical operation and maintenance manuals shall be prepared by a documentation agent specializing in this type of work. Agent shall have previous experience in assembling O&M manuals as described below.

2.2 BINDERS

- .1 Binders: D ring binder, white vinyl cover c/w non-glare, smudge resistant clear vinyl pockets on front, back and spine, for loose leaf 8 1/2 x 11" paper. Binders to be oversized by 25% capacity based on final assembly. Clear vinyl cover and spine to accommodate full size title sheets. Acco 13660 series or approved equal.

2.3 BINDER COVER AND
SPINE TITLES

- .1 An Organized compilation of operation and maintenance; including detailed technical information, documents and records describing operation and maintenance of individual products or systems as specified in Section 01 47 11 and other specification sections.
- .2 Assemble, coordinate, bind and index required data into Operation and Maintenance Manual.
- .3 Submit complete operation and maintenance manual to Engineer at time of application for Substantial Completion.
- .4 Organize data into same numerical order as the contract specifications.
- .5 Material: label each section with tabs protected with celluloid covers fastened to hard paper dividing sheets.

- .6 Drawings, diagrams and manufacturers literature must be legible.
- .7 Printed lists and notes.
- .8 Submit cover wording to Engineer for approval prior to ordering binders.
 - .1 Cover sheet containing:
 - .1 Data submitted.
 - .2 Project title, location and project number.
 - .3 Names and addresses of Contractor, and all Sub-contractors
- .9 Table of Contents of all binders.
- .10 Warranties, guarantees.
- .11 Copies of approvals, and certificates.
- .12 Provide data as specified in individual specification sections of Division 26.
- .13 List of equipment including repair services depot location.
- .14 Nameplate information including equipment number, make, size, capacity, model number and serial number.
- .15 Parts lists.
- .16 Installation details.
- .17 Detailed Operating Instructions including complete start-up and shut-down sequencing. Include drawings and location description as required to clearly describe functions.
- .18 Detailed Maintenance Instructions for equipment, including service schedules, maintenance routines and service locations.
- .19 Including all shop drawings.

PART 1 - GENERAL

1.1 WIRE DE-RATING

- .1 16 A minimum wire ampacity capacity after applicable de-rating factors.

1.2 AUXILIARY SYSTEMS

- .1 Refer to specific specifications sections for wire and cable requirements for auxiliary systems.
- .2 Follow equipment manufacturer's wiring and cabling recommendations.

1.3 EXISTING WIRING

- .1 Re-use of existing wiring only to the approval of the engineer, and only where new devices are being installed in existing boxes.

PART 2 - PRODUCTS

1.1 BUILDING WIRES

- .1 Stranded for #10 AWG and larger for power wiring. Stranded for all control wiring.
- .2 Minimum size:
 - .1 #12 AWG for power and lighting,
 - .2 #14 AWG stranded for control,
 - .3 #10 AWG for emergency lighting.
- .3 Copper conductors only: size as indicated and as required for installation de-rating, with 600 V minimum insulation, 1000 V insulation where shown on the drawings, of chemically cross-linked thermosetting polyethylene material rated R90, RW90 or RWU90.

1.2 ARMoured CABLES

- .1 Conductors: insulated, copper, minimum size to be #12 AWG
- .2 Type AC90.
- .3 Armour: interlocking type fabricated from aluminum strip.
- .4 Armoured cables shall be permitted where allowed by code for lighting 'drop' connections to single lighting fixtures only, where the AC cable drop connection is:
 - .1 completely concealed behind architectural finish,
 - .2 less than 2000 mm in total length,
 - .3 a dedicated drop cable from conduit box to a single fixture (fixture to fixture wiring by AC cabling is not permitted).

1.3 CONTROL CABLES

- .1 Type LVT: 2 soft annealed copper conductors, sizes as indicated or where size has not been indicated provide wire conductor size as required by code and as required by the equipment manufacturer, LVT cables shall have thermoplastic insulation, outer covering of cotton braid thermoplastic jacket, and armour of closely wound aluminum wire.

- .2 Low energy 300 V control cable:
 - .1 Conductors: solid, multiconductor, insulated, copper, minimum size #18 AWG.
 - .2 Insulation: 105 C flame retardant PVC.
 - .3 Outer Jacket: 105 C flame retardant PVC.
 - .4 Optional Armour: interlocked aluminum or galvanized steel with or without overall jacket.

PART 3 - EXECUTION

3.1 BUILDING WIRING

- .1 Install building wires as follows:
 - .1 In conduit systems in accordance with Section 26 05 34.
 - .2 In surface and lighting fixture raceways in accordance with Section 26 05 36.
 - .3 To the approval of the Engineer.
- .2 AC cabling where specified in this section, the drawings, and only where permitted by code.

3.2 INSTALLATION OF FEEDERS

- .1 Panel and motor feeders larger than #10 AWG to be continuous and without splice from the breaker or starter to the panel or disconnect.

3.3 TESTING

- .1 Provide contractor testing as specified in section 26 05 04 "Contractor Testing".
- .2 Insert test result data in O+M manuals.

3.4 AS-BUILT INFORMATION

- .1 All wiring information shall be provided on the as-built drawings.
- .2 Provide:
 - .1 Conductor gauge and type,
 - .2 Cable gauge and type,
 - .3 Splice locations,
 - .4 Terminal strip locations,
 - .5 Wire labels and designators,
 - .6 Additional installation detail(s) as required to document the installation.

PART 1 - GENERAL

1.1 RELATED WORK

- .1 "Common Work Results Electrical" - 26 05 01.
- .2 General Requirements: Division 1
- .3 Finishes: Division 9

PART 2 - PRODUCTS

2.1 IDENTIFICATION
GENERAL

- .1 Refer to equipment sections for specific requirements.
- .2 Clearly identify all new added/relocated equipment by permanent nameplates described below.
- .3 Panels: identify the panels as shown on drawings, and as per schedules, and the main voltage using lamicaid nameplates.
- .4 Disconnects, starters, and contactors: indicate equipment being controlled and voltage. Use tag numbers of process equipment. Use lamicaid nameplates.
- .5 Terminal cabinets and pull boxes: indicate the system and the voltages using lamicaid nameplates.
- .6 Remote On/Off switches: indicate areas being served or equipment controlled.
- .7 Cable tray: identify to voltage being carried in tray (or portion thereof) using lamicaid nameplates.
- .8 Light switches: identify area being controlled using manufacturer standard product.
- .9 For process equipment and motors use 304 Stainless steel or aluminium tags with 6 mm high indented letters. Stainless steel required for submerged conditions.

2.2 LAMICOID
NAMEPLATES

- .1 Label all equipment using lamicaid nameplates as follows:
 - .1 Nameplates of lamicaid plastic, white background with 10 mm black letters beveled edges and two mounting screw holes, mounted in conspicuous locations on the surface of the equipment, except in finished areas locate nameplates in flush panels mounted on panel front inside enclosure.
 - .2 Lamicaid labels to be fastened with metal screws; glue on labels will not accepted.
 - .3 Lamicaid labels to include equipment description and circuit number. Equipment description shall correspond to Contractor's as-built drawings.
 - .4 Lamicaid nameplate for all; panelboards, starters, disconnect switches, terminal cabinets and communication terminal cabinets. Labels to indicate system and/or voltage characteristics and

equipment name (example: Panel A, 120/208 V, 3 PH).

.5 Provide a complete list of nameplates for review and approval by the Engineer, prior to placement of fabrication order. (Shop Drawing Review).

.6 Wording on nameplates to be approved prior to manufacture.

.7 Labels subject to the Engineer's approval. Allow for 20% rejection in the bid price.

2.3 PANEL SCHEDULES

.1 Provide type written panel directories to be included with panels installed.

.2 Labels to include:

.1 The size of overcurrent

.2 The area served (ie: "Rooms 122, 123 outlets")

.3 Unambiguous labelling will be rejected. (ie: "plugs")

2.4 COLOUR CODING

.1 Exposed conduits in mechanical and electrical rooms and exposed conduits above removable ceilings and where they enter or leave a box to be colour coded. Option is to paint all conduit fittings.

.2 All junction boxes, pull boxes, panels and their covers shall be painted according to the colour coding schedule.

.3 Colour coding of this equipment is to provide an easy and consistent means of identification of all electrical systems.

.4 Colour Code Schedule:

.1 120/208 V - Power, Lighting Grey

.2 120/208 V - Emergency (UPS) Grey with 50 mm black letters

.3 347/600 V - Power, Lighting Sand

.4 Telephone System Black

.5 Data Communication - DDC Yellow

.6 Fire Alarm, Security Red

.5 All conduit entering or leaving these enclosures shall be identified by tape markers.

2.5 COLOUR CODING OF CONDUCTORS

.1 All conductors to be colour coded throughout the building with same colour applying to the same phase throughout. Colour coding to be by insulation colour or permanently applied colour banding at termination ends. Colour coding to be as follows:

.1 Equipment Bonding: Green

.2 Neutral Conductor: White

.3 120/208 Phase Wires: Red/Black/Blue

.4 347/600 Phase Wires: Orange/Brown/Yellow

.2 Each system to follow its own colour coding. If system of same colour coding terminates in same piece of equipment, each system to be identified to which system it belongs.

PART 3 - EXECUTION

3.1 CONDUIT
IDENTIFICATION

- .1 All cable and conduit for electrical systems to be identified within 200 mm of exiting panel locations, pull box locations, within 200 mm of where they enter or leave a room or non-accessible ceiling space, and 4 m on centre within an area.

3.2 JUNCTION BOX

- .1 All pull and junction boxes to be labeled as to use.
- .2 Where boxes are exposed thermal tape labels are acceptable.
- .3 Where boxes are concealed in t-bar ceiling marker pen is acceptable.

3.3 IDENTIFICATION
OF CONDUCTORS

- .1 At all distribution centres, pull boxes, wireways, etc., feeder conductors of each feeder group to be neatly laced or clipped into a feeder group with each conductor identified as to load fed.

PART 1 - GENERAL

1.1 REFERENCE
STANDARDS

- .1 Complete grounding work to CSA C22.1 2015.

1.2 SCOPE OF WORK

- .1 Refer to drawings for extent of grounding in addition to code requirements.
- .2 Provide an electrical system ground with an earth ground maximum resistance as specified in this section; Tests.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Grounding equipment to CSA C22.2 No. 41 (R2015); Grounding and Bonding Equipment.

2.2 EQUIPMENT

- .1 Main Building Grounding system – Existing.

2.3 MANUFACTURERS

- .1 New equipment to match existing equipment.

PART 3 - EXECUTION

3.1 INSTALLATION
GENERAL

- .1 Install complete permanent, continuous, system and circuit, equipment, grounding systems, including electrodes, conductors, connectors, accessories, as indicated, to conform to requirements of Owner, and local authority having jurisdiction over installation.
- .2 Install connectors to manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Make buried connections, and connections for lightning protection using copper welding by thermit process.
- .5 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .6 Soldered joints not permitted.
- .7 Comply with requirement of CSA C22.2 No. 0.4 and Canadian Electrical Code.

3.2 CIRCUIT GROUND
CONDUCTORS

- .1 Install grounding bushings, grounding studs and grounding jumpers at all distribution centres, pull boxes, motor control centres, panelboards where separate grounding conductors are indicated or required by code.
- .2 Install grounding connection to typical equipment included in, but not necessarily limited to the following list:
- .1 service equipment,

- .2 duct systems,
- .3 motor frames,
- .4 distribution panels,

- .3 Bonding Jumpers: green insulation, sized by Electrical Code Table 16, sized for over current device protecting the circuit. Connect to grounding bushings on conduit, to lugs on boxes, tubs and other enclosures. Connection to neutral made only at service entrance and at secondary of distribution transformer.
- .4 Install bonding wire as required by Code in all flexible conduit connected at each end to a grounding bushing, solderless lug, clamp, cup washer and screw.
- .5 Integral bond conductor to be installed in all conduits with the exclusion of the utility to main service switch conduit(s).

3.3 TELEPHONE AND
DATA SYSTEM GROUNDING

- .1 Install the following ground wires:
 - .1 1 - #14 AWG to all device conduits.

3.4 ELECTRICAL SYSTEM
GROUNDING

- .1 Provide grounding conductor(s) in main service disconnect switch to solidly ground the system. Grounding conductors minimum as shown.

3.5 CABLE TRAY
BONDING

- .1 where shown on the drawings, Install cable tray bonding conductor at intervals of not greater than 15 m by a green insulation copper bonding conductor sized to meet the requirements of the Electrical Code Table 16 but in no case shall be smaller than #6 AWG.

3.6 AS-BUILT
INFORMATION

- .1 All grounding system information shall be provided on the as-built drawings.
- .2 Provide:
 - .1 grounding and bonding locations,
 - .2 grounding and bonding conductor gauge and type
 - .3 additional installation detail(s) as required to document the installation.

PART 4 - TESTS

4.1 TESTS

- .1 Building system ground: measure system ground resistance with earth ground meggar tester; install additional ground rods and conductors as required for ground resistance less than 25 ohms.
- .2 Provide field test results in O+M manual.

END

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PART 1 - GENERAL

1.1 RELATED WORK .1 Seismic Restraint: Section 26 05 48.

PART 2 - PRODUCTS

2.1 SUPPORT CHANNELS .1 U shape, size 41 mm x 41 mm, 2.5 mm thick or 25 mm x 25 mm x 2.5 mm, surface/suspended, set in poured concrete walls and ceilings as indicated and as required.

PART 3 - EXECUTION

3.1 INSTALLATIONS .1 All equipment and conduits larger than 19 mm in any dimension shall be securely attached to building structure by means of channel support. Single conduits 19 mm or smaller may be attached directly to the building structure.

.2 Other than lay-in fixtures, equipment shall not be fastened to T-bar ceilings. Allow for seismic restraint all light fixtures in the space (existing and relocated) in the bid price.

.3 Secure equipment to poured concrete with expandable inserts.

.4 Support equipment, conduit or cables using clips, spring-loaded bolts, cable clamps designed as accessories to basic channel members.

.5 Fasten exposed conduit or cables to building construction or support system using straps.

.1 One-hole malleable iron or steel straps to secure surface conduits and cables 50 mm and smaller.

.2 Two-hole steel straps for conduits and cable larger than 50 mm.

.3 Beam clamps to secure conduit to exposed steel work.

.6 Suspended support systems.

.1 Support individual cable or conduit runs with 10 mm dia threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 10 mm dia threaded rod hangers where direct fastening to building construction is impractical; channel support to be sized for minimum of 25% future support capacity.

.7 For surface-mounting of two or more conduits, use channels; channel support to be sized for minimum of 25% future support capacity.

.8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

- .10 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .11 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.
- .12 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

PART 1 - GENERAL

1.1 SHOP DRAWINGS
AND PRODUCT DATA

- .1 Submit shop drawings and product data for cabinets in accordance with Section 26 05 01.
- .2 Flush mount boxes and cabinets shall be provided with covers that finish the box or cabinet in a cosmetically complete transition to architectural surroundings; openings left by poor fit to architectural surroundings will not be accepted.
- .3 Where boxes and where cabinets are installed in fire separations and fire rated walls provide fire protection rated materials, equipment and installation as required.

PART 2 - PRODUCTS

2.1 JUNCTION AND
PULL BOXES

- .1 Welded steel construction with screw-on flat covers for surface mounting as applicable in; attic spaces, crawlspace, electrical rooms and mechanical rooms.
- .2 Covers with a 25 mm minimum extension around all edges for flush-mounted pull boxes and flush mount junction boxes.

2.2 CABINETS

- .1 Sheet steel cabinet with hinged door, latch, lock mechanism and back-pan.
- .2 Covers with a 25 mm minimum extension around all edges for flush-mounted cabinets.

PART 3 - EXECUTION

3.1 JUNCTION, PULL
BOXES AND CABINETS
INSTALLATION

- .1 Install pull boxes in inconspicuous, but accessible spaces.
- .2 Mount cabinets with top not higher than 2000 mm above finished floor.
- .3 Provide pull boxes at 30m intervals along conduit runs, or when cumulative conduit bends reach 360 degrees.
- .4 Do not install junction boxes or pull boxes in architectural detailed wall, ceiling or floor finishes unless specifically shown on the drawings or without the written approval of the Architect.
- .5 Where specified and as where shown; prime and paint boxes and covers.

3.2 IDENTIFICATION

- .1 Provide identification lamicoid labels that indicate system name, voltage and phase in accordance with Section 26 05 01.

END

PART 1 - GENERAL

- | | | |
|---------------------------|----|---|
| <u>1.1 DESCRIPTION</u> | .1 | Provide outlet boxes as required to enclose devices, permit pulling conductors and for wire splices. |
| <u>1.2 EXISTING BOXES</u> | .1 | Re-use of existing outlet boxes to the approval of the engineer and where device location does not change. Existing boxes not permitted to be moved to new locations. |
| <u>1.3 REFERENCE</u> | .1 | Reference Section 26 05 25 "Identification". |

PART 2 - PRODUCTS

- | | | |
|---|----|--|
| <u>2.1 OUTLET AND CONDUIT BOXES - GENERAL</u> | .1 | Size boxes in accordance with CSA C22.1, Section 12. |
| | .2 | 102 mm square or larger outlet boxes as required for special devices. |
| | .3 | Gang boxes where wiring devices are grouped. Do not use sectional boxes. |
| | .4 | Blank cover plates for boxes without wiring devices; covers to match surrounding device covers; to the approval of the Engineer. |
| | .5 | Install barriers where outlets for more than one system are grouped. |
| | .6 | Install properly sized boxes at the rough in stage. Box extensions will not be permitted. |
| <u>2.2 SHEET STEEL OUTLET BOXES</u> | .1 | 102 mm square flush outlet boxes for flush device installations in walls c/w extension and plaster rings as required. |
| | .2 | 102 mm square or octagonal outlet boxes for lighting fixture outlets. |
| <u>2.3 SURFACE CONDUIT BOXES - WP</u> | .1 | Cast FS or FD aluminum boxes with factory- threaded hubs and mounting feet for surface wiring of switches and receptacle in outdoor locations. |
| <u>2.4 FITTINGS GENERAL</u> | .1 | EMT couplings and connectors to carry agency Approval acceptable for Yukon. |
| | .2 | Knock-out fillers to prevent entry of foreign materials. |
| | .3 | Conduit outlet bodies for conduit up to 32mm and pull boxes for larger conduits. |

PART 3 - EXECUTION

- | | | |
|-------------------------|----|---|
| <u>3.1 INSTALLATION</u> | .1 | Support boxes independently of connecting conduits. |
|-------------------------|----|---|

3.2 AS-BUILT
INFORMATION

- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of construction material.
- .3 For flush installations, mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6mm of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers not allowed.
- .1 All outlet boxes and conduit boxes information shall be provided on the as-built drawings.
- .2 For pull boxes provide:
 - .1 box location,
 - .2 box type,
 - .3 additional installation detail(s) as required to document the installation.

END

PART 1 - GENERAL

1.1 LOCATION OF
CONDUITS

- .1 Drawings do not indicate all conduit runs. Those indicated are diagrammatic only.
- .2 Note that where required so by drawings conduit is to be routed in a specific manner.
- .3 Exact conduit installation location to be determined on-site, to the approval of the engineer.

1.2 REFERENCE

- .1 Reference Section 26 05 25 "Identification".

PART 2 - PRODUCTS

2.1 CONDUITS

- .1 Rigid metal conduit: to CSA C22.2 No. 45.
- .2 Electrical metallic tubing (EMT) conduit: to CSA C22.2 No. 83.
- .3 Liquid tight flexible metal conduit: to CSA C22.2 No. 56.

2.2 CONDUIT
FASTENINGS

- .1 One hole straps for conduits 35 mm or smaller.
- .2 Two hole straps for conduits larger than 35 mm.
- .3 Channel type supports for two or more conduits run in parallel and in close proximity.

2.3 CONDUIT FITTINGS

- .1 Manufactured and approved for use with conduit specified.
- .2 Factory bends required for conduits greater than 27mm diameter.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Liquid tight flexible metal conduit permitted if concealed or in service rooms, and the distance is less than 2000mm, and only where used for individual connection of specific equipment. Connecting fixture to fixture with liquid tight flexible metal conduit is not permitted.
- .3 Conceal all conduits except as otherwise noted.
- .4 Surface mount conduit shall be acceptable in mechanical rooms, electrical rooms, LAN room, radio equipment room, apparatus bay, truck fill kiosk, and above T-bar ceilings. Surface conduit in other areas requires the engineers approval.
- .5 Run all conduits parallel or perpendicular to building lines.
- .6 Group conduits where possible and fasten to common channel support.

- .7 Do not pass conduits through structural members without written approval from a Structural Engineer.
- .8 Where conduits pass through nonstructural concrete, core the concrete with a diamond cutting tool or to approval of the Engineer.
- .9 Do not locate conduits to less than 75 mm parallel to steam or hot water lines. Maintain a minimum 75mm clearance where conduit is run parallel to steam or hot water lines. Maintain a minimum of 25 mm clearance at crossovers.
- .10 Size conduits to suit application and to code. Conduit sizes on drawings are minimum only based on design standards. The Contractor shall confirm all equipment requirements with shop drawings prior to rough-in of conduits.
- .11 Provide 2 mm stranded nylon pull cord in empty conduits to facilitate future wire pull.

3.2 AS-BUILT INFORMATION

- .1 All conduit information shall be provided on the as-built drawings.
- .2 Provide:
 - .1 conduit trade size,
 - .2 conduit location,
 - .3 box and cabinet size (dimensions) and NEMA rating,
 - .4 conduit support details; where required by other sections provide Seismic shop drawings to supplement conduit support information,
 - .5 spare conduit and pull box locations,
 - .6 additional installation detail(s) as required to document the installation.
 - .7 Circuit and conduit designation.

END

PART 1 - GENERAL

- 1.1 RELATED WORK .1 "Fastenings and Supports For Electrical Systems": Section 26 05 29.
- 1.2 WORK INCLUDED .1 Electrical equipment to operate without objectionable noise or vibration. If, in the Engineer's opinion, equipment is operating with excessive noise or vibration, equipment and isolation system shall be improved at no additional cost.
- 1.3 SEISMIC RESTRAINT .1 Provide seismic restraint and anchorage for all intercepted and new electrical equipment and services in accordance with the current edition of the National Building Code of Canada, 2010 edition, Subsection 4.1.9. and table 4.1.9.E. as well as per BC Electrical Contractors Association Seismic Restraint Manual, 1st Edition.
- .2 All support equipment shall be tested in an independent testing agency or shall be certified by a registered Professional Engineer to demonstrate that the equipment meets the requirements of all Codes and Bylaws.
- .3 All seismic bracing to be certified by a professional engineer licenced to practice in the Yukon.
- .4 Allow for seismic restrain all lighting fixtures in the renovated place in the bid price.
- 1.4 SHOP DRAWINGS .1 Submit shop drawings in accordance with Section 26 05 01.

PART 2 - PRODUCTS

- 2.1 CONDUIT .1 Liquid-tight flexible metal conduit, size as indicated.
- 2.2 STRUCTURAL BASES .1 Structural steel rail base, sized for application, complete with isolation elements attached to base brackets, pre-drilled holes to receive equipment anchor bolts.
- 2.3 SEISMIC CONTROL MEASURES .1 General:
- .1 Seismic control systems to work in all directions.
- .2 Fasteners and attachment points to resist same maximum load as seismic restraint.
- .3 Drilled or power driven anchors and fasteners not permitted.
- .4 No equipment, equipment supports or mounts to fail before failure of structure.
- .5 Supports made of cast iron or threaded pipe not permitted.
- .6 Seismic control measures not to interfere with integrity of fire stopping.
- .2 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.

.3 Vibration Isolation Equipment:

.1 Seismic control measures not to jeopardize noise and vibration isolation systems. Provide 6 to 9mm 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.

.4 Conduit:

- .1 Hangers longer than 300mm; brace at each hanger.
- .2 To be compatible with requirements of anchoring of piping systems.

.5 Bracing Methods:

- .1 To approval of Engineer.
- .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.

2.4 T-BAR FIXTURES

- .1 As per BC Electrical Contractors Association Seismic Restraint Manual, 1st Edition: Fluorescent Light fixture - Figure 4.26.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install vibration isolation in accordance with manufacturer's instructions and adjust mountings to level equipment.
- .2 Ensure electrical connections to isolated equipment do not reduce system flexibility, and that conduit does not transmit vibrations

through walls and floors.

- .3 If inadequate isolation is provided, improve isolation to the satisfaction of the Engineer at no additional cost.
- .4 Seismic control measures to meet NBC-2010 and the requirements of the Authorities having Jurisdiction.
- .5 Drilled or power driven anchors not permitted for use with seismic control measures.
- .6 Division 26 to reference and comply with all requirements listed in specification section 23 05 49 "Seismic Restraint Systems".

3.2 ISOLATION
SCHEDULE

- .1 Motor driven equipment: liquid-tight flexible metal conduit.

END

PART 1 - GENERAL

- | | | |
|----------------------------------|----|--|
| <u>1.1 DESCRIPTION OF SYSTEM</u> | .1 | Low voltage control system designed to provide remote switching of lighting loads by use of low voltage momentary contact switches controlled by; manual switches. |
| <u>1.2 SCOPE</u> | .1 | Re-use existing low voltage lighting control system for the Fit-Up space where asked for and as shown on the plans and specified herein. |
| | .2 | Manual lighting control and line voltage controls as indicated on the drawings. |
| <u>1.3 SHOP DRAWINGS</u> | .1 | Submit shop drawings in accordance with Section 26 05 01. |
| | .2 | Shop drawing submittal to include an operational description of the system describing, in complete detail, the interaction of the components and the sequence of events. |
| <u>1.4 MAINTENANCE MATERIALS</u> | .1 | Provide spare relays in panels where requested and shown on the plans and indicated in schedules and as recommended by the manufacturer. |

PART 2 - PRODUCTS

- | | | |
|------------------------------------|----|--|
| <u>2.1 MANUFACTURER</u> | .1 | All new components are to be supplied by same manufacturer. And to match existing. |
| <u>2.2 INSTRUCTION MANUALS</u> | .1 | Supply manuals on system components to permit ease of installation, system operation and maintenance including, but not limited to the following:

.1 Lighting control system step by step operating instructions.
.2 update Relay panel schedules indicating circuits connected, inputs assigned, area controlled, panel location and panel equipment details. |
| <u>2.3 LIGHTING CONTROL RELAYS</u> | .1 | Two coil solenoid type: with one coil to close relay contacts and one coil to open relay contacts. |
| | .2 | All types of lamp loads up to 20 Amperes. Load contacts shall be able to sustain 1500 amp fault currents for up to 20 milliseconds. |
| | .3 | The relay shall be contained in a molded case containing both low and high voltage terminals and shall have a built-in operating lever marked ON/OFF for manual switching at the relay panel. |
| | .4 | Switching the relay shall be accomplished with ONE signal wire and a common return. The signal wire shall be able to signal ON and OFF and shall also carry status current that indicates if the relay is ON or OFF. |
| | .5 | UL Listing 20A : 120 & 277 VAC; CSA 20A : 120, 277 & 347 VAC. |

2.4 LIGHTING CONTROL
ON/OFF SWITCHES

- .1 Existing single pole, double throw, momentary contact, standard duty. Suitable for addition of labels. Refer to drawings for location.

2.5 SWITCH PLATES

- .1 Switch plates shall be stainless steel.

2.6 LIGHTING CONTROL
PANEL

- .1 New lighting control panel to control corridor and common space lighting.
- .2 Control panel manufacturer to match that of other low voltage lighting controls.
- .3 Standard of acceptance: Wattstopper LILM8

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Locate and install equipment in accordance with manufacturer's recommendations and as indicated.
- .2 Provide wire type as recommended by the manufacturer.

3.2 SEQUENCE OF
OPERATION; GENERAL

- .1 The lighting fixtures are turned on in the morning using the wall switches.
- .2 Where occupancy sensors are installed: If movement is not detected within a half hour period, lights in that area will turn off. ONLY motion sensors installed in bathrooms, janitor closets and storage rooms will turn on lights when movement is detected. Meeting room and office occupancy sensors only capable of turning lights OFF.
- .3 At night, office and common space lights are turned off using wall switches. If office lights are not manually turned off, they will turn off automatically if movement is not detected for a half hour period.
- .4 Any common space lights remaining on are turned off by lighting control panel at a preset hour.

3.3 TESTS

- .1 Perform test in accordance with Section 26 05 00.
- .2 Actuate control units in presence of the Engineer to demonstrate lighting circuits and car plugs are controlled as specified.

3.4 AS-BUILT
INFORMATION

- .1 All low voltage lighting control system information shall be provided on the as-built drawings.
- .2 Provide:
 - .1 Equipment locations,
 - .2 Equipment identification for reference to shop drawings,
 - .3 Cabling and wiring information including wire labels and designators,
 - .4 Additional installation detail(s) as required to document the installation

PART 1 - GENERAL

- | | | |
|--------------------------|----|--|
| <u>1.1 SHOP DRAWINGS</u> | .1 | Submit shop drawings in accordance with Section 26 05 01 "Common Work". |
| | .2 | Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension. |
| <u>1.2 O&M DATA</u> | .1 | Submit 5 copies of appropriate O&M data including data sheets for all equipment as well as manufacturers recommended maintenance procedures. All data to be 8½ x 11" format. |
| | .2 | Include cabinet tub framing depths. |

PART 2 - PRODUCTS

- | | | |
|------------------------|-----|--|
| <u>2.1 PANELBOARDS</u> | .1 | Panelboards: to CSA C22.2 No. 29. |
| | .2 | Panelboards: mains, number of circuits, and number and size of branch circuit breakers, as indicated. |
| | .3 | Tin plated aluminum bus or silver plated copper bus with full size 100% rated neutrals. |
| | .4 | Mains to match existing. |
| | .5 | Finish trim for all panelboards with hinged door assembly as standard. Provide door lock for all flush mount panelboards. |
| | .6 | Provide equipment identification in accordance with Section 26 05 25 "Identification". |
| | .7 | Complete circuit directory with typewritten legend showing location and load of each circuit for all new panelboards. |
| | .8 | Sized for full width breakers. |
| | .9 | All surface mounted panels to be provided with drip-shield. |
| | .10 | All panelboards to have isolated neutral bus. |
| | .11 | All panelboards to be seismically rated for minimum of Zone 3 area. |
| | .12 | Provide: sub-feed lugs, and interconnect wiring as required. Note that sub-feed wiring neutrals to be installed through common raceway as hot conductor sub-feed connections. |
| | .13 | Integral transient surge suppression unit where specified or shown on the drawings. |
| <u>2.2 BACKBOARDS</u> | .1 | All surface mounted panelboards to be mounted on 19 mm G1S painted plywood backboards. Paint to be fire retardant grey colour. Back boards to be provided by general contractor; refer to section 06 01 11 "Rough Carpentry - Short Form" for further details. |

2.3 EQUIPMENT

- .1 Provide equipment identification in accordance with Section 26 05 25 "Identification".
- .2 Complete circuit directory with typewritten legend showing location of each circuit.
- .3 Panelboards: current capacity, minimum circuits, mounting method, integral transient surge suppression systems, and main breakers as indicated on the drawings and as specified.

2.4 BREAKERS GENERAL

- .1 GFEPD breakers for 30 mA equipment protection.
- .2 GFCI breakers for 5 mA personnel protection.
- .3 Manufacturer's tie-locks for critical and code required systems: Existing.

2.5 MANUFACTURERS

- .1 Acceptable manufactureres: New equipment to match existing equipment manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.
- .2 Install surface-mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard.
- .3 Install flush-mount panelboard in wall framing. Report to the general contractor and to the Architect during rough-in where wall framing depth does not allow flush mount of electrical tub trim. General contractor to provide architectural trim around panel tub, increased depth of framed wall or other increased framing depth work to the approval of the architect. Contractor to request written instructions from the Architect prior to implementation of trim or wall depth increase work.
- .4 Coordinate with the General Contractor for the provision of continuous fire rated wall, ceiling and floor assemblies where panelboards are flush mount in fire separations and fire rated partitions.
- .5 Mount panelboards to height specified in Section 26 05 01 "Common Work", 26 24 17 "Panelboards" or as indicated.
- .6 Connect loads to circuits.
- .7 Connect neutral conductors to common neutral bus with respective neutral identified.
- .8 All panelboard feeders to be continuous without splice.
- .9 All panelboards to have minimum three 19 mm spare conduits to the ceiling space and three spare 19 mm conduits to the floor space

below the panelboard location (where applicable space is preset).
Spare conduits to be run to a free and clear location to the approval
of the engineer.

3.2 TESTING

- .1 Provide contractor testing as specified in Section 26 05 04
"Contractor Testing".
- .2 Insert test result data in O+M manuals.

3.3 AS-BUILT
INFORMATION

- .1 All panelboard information shall be provided on the as-built drawings.
- .2 Provide:
 - .1 equipment locations,
 - .2 equipment identification for reference to shop drawings,
 - .3 seismic restraint system,
 - .4 panel schedules,
 - .5 additional installation detail(s) as required to document the
installation.

END

PART 1 - GENERAL

- 1.1 SHOP DRAWINGS .1 Submit shop drawings for all wiring devices.

PART 2 - PRODUCTS

- 2.1 SWITCHES .1 All switches to be low voltage type as specified in section 26 09 24.

- .2 Switches of one manufacturer throughout project, unless otherwise specified.

- 2.2 RECEPTACLES .1 Duplex receptacles, spec grade, CSA type 5-15 R, 125 V, 15A U ground, suitable for back and side wiring. Hubbell 5252 series or approved equal.
- .2 Weatherproof receptacles and ground fault protection as required and where indicated.
- .3 Other receptacles with ampacity and voltage as indicated.
- .4 Receptacles of one manufacturer throughout project unless otherwise approved by the Consultant.
- .5 Install all receptacles in the vertical plane unless otherwise noted.
- .6 GFI type to be equal to Hubbell GF-5362 or Bryant GFR52FT-I.
- .7 Receptacles color to match existing.

- 2.3 COVER PLATES .1 Sheet steel utility box cover for wiring device installed in surface mounted utility box.
- .2 Stainless steel, vertically brushed, 1 mm thick, cover plate for receptacles, switches and devices mounted in flush boxes.
- .3 Weatherproof double lift spring loaded metal cover plate complete with gasket for duplex receptacles as indicated, "WP". c/w four mounting screws.
- .4 Metal Cast "FS" type cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes. Attachment with 4 mounting screws to box.
- .5 Provide cover plates for all wiring devices from one manufacturer throughout project.

PART 3 - EXECUTION

- 3.1 SWITCHES .1 Install switches in gang type outlet box when more than one switch is required in one location.
- .2 Install switches and receptacles in gang type outlet box when a switch(s) and receptacle(s) are shown at the same location and at the same plane.

- .3 Mount toggle switches at height specified in Section 26 05 01 or as indicated.

3.2 RECEPTACLES

- .1 Install receptacles vertically in gang type outlet box when more than one receptacle is required in one location.
- .2 Mount receptacles at height specified in Section 26 05 01 or as indicated.
- .3 Where split receptacle has one portion switched, mount vertically and switch upper portion. Provide labelling on cover plate to indicate switched receptacle.
- .4 Receptacles for LAN rooms, for computer workstations, and where shown on the drawings, are to have separate neutrals for each circuit.

3.3 COVER PLATES

- .1 Install suitable common cover plates where wiring devices are grouped.
- .2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.
- .3 Install exterior cover plates with thread lug compound on all screws; Silicone or Copper base.

3.4 TESTING

- .1 Provide contractor testing as specified in section 26 05 04 "Contractor Testing".
- .2 Insert test result data in O+M manuals.

END

PART 1 - GENERAL

- | | | |
|---|----|--|
| <u>1.1 RELATED WORK</u> | .1 | Common Work Results Electrical Section 26 05 01. |
| <u>1.2 SHOP DRAWINGS AND PRODUCT DATA</u> | .1 | re-use existing fixture, allow for 18 fixtures repair in the bid price. |
| <u>1.3 FIXTURE CATALOGUE REFERENCE</u> | .1 | Existing Fixtures, Submit shop drawings for repair kits where needed. |
| <u>1.4 SCOPE OF WORK</u> | .1 | Re-use existing lighting fixtures and accessories for all outlets as listed in the fixture schedule, as shown on drawings, and as required to provide a complete lighting system for the renovated areas and new addition. Allow for any additional equipment and repair needed for complete operational system. |
| | .2 | Ground all lighting equipment to the grounding system. |
| | .3 | Install seismic restraint on all fixtures in the renovated space. Installation detail as per BC Electrical Contractors Association Seismic Restraint Manual, 1st Edition. |
| | .4 | Provide lighting control as indicated on the drawings, in the fixture schedule and as described in the specifications. |

PART 2 - PRODUCTS

2.1 MOUNTING HARDWARE

- | | | |
|--|----|---|
| | .1 | Provide shop drawings for all seismic hardware. |
|--|----|---|

2.2 LAMPS

- | | | |
|--|----|--|
| | .1 | As per fixture schedule and to match fixtures. |
|--|----|--|

2.3 LUMINAIRES

- | | | |
|--|----|---|
| | .1 | Re-use existing fixtures as shown and as specified. |
|--|----|---|

2.4 BALLASTS

- | | | |
|--|----|--|
| | .1 | All new ballasts shall have power factor correction to 90% or more. |
| | .2 | Ballasts as per fixture schedule and as specified. |
| | .3 | Fluorescent ballasts shall be instant start electronic ballasts, equipped with thermal overload protection and 10% or less Total Harmonic Distortion (<10% THD). |
| | .4 | H.I.D. ballasts to be high power factor, epoxy encased "super quiet" ballast assemblies for all ballast-mounted interior fixtures. |

2.5 GUARANTEE

- | | | |
|--|----|--|
| | .1 | Replace new ballasts that fail or exceed their original noise level rating within 12 months of substantial completion. |
| | .2 | Replace any new lamps that fail within 3 months of substantial completion. |

2.6 LIGHTING CONTROL

- .1 As shown on the drawings and as specified.
- .2 Line voltage lighting control in all areas of fit up except where indicated on the drawings otherwise, refer to drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install T-Bar fixtures at locations shown.
- .2 Short section of AC90 where concealed behind architectural finishes is acceptable for single fixture drops. Using AC90 fixture to fixture is not acceptable.
- .3 All fixtures in straight rows, parallel to building lines and as shown on the drawings.
- .4 Make connections to lighting control as specified in section 26 09 24, as detailed in this section and as detailed on the drawings.

3.2 WIRING

- .1 Connect luminaries to lighting circuits as shown and as required.
- .2 Ensure that installed lighting circuit ampacities are suitable for wiring gauge and over-current protection. Where required for voltage drop increase conductor gauge and conduit sizing to suit.
- .3 Provide 2 wire circuits for all fluorescent and all HID lighting; sharing neutral conductors is not acceptable.
- .4 Provide manual lighting control locations as shown and as required.
- .5 Provide automatic lighting control and integration to other control systems as shown and as specified.

3.3 TESTING

- .1 Provide contractor testing as specified in section 26 05 04 - "Contractor Testing".
- .2 Insert test result data in O+M manuals.

3.4 AS-BUILT

- .1 All lighting system information shall be provided on the as-built drawings.
- .2 Provide:
 - .1 equipment locations,
 - .2 equipment identification for reference to shop drawings,
 - .3 seismic restraint system,
 - .4 cabling and wiring information including wire labels and designators,
 - .5 additional installation detail(s) as required to document the installation.

END

PART 1 - GENERAL

1.1 PRODUCT DATA .1 Submit product data in accordance with Section 26 05 01.

1.2 SHOP DRAWINGS
AND PRODUCT DATA .1 Submit shop drawings in accordance with Section 26 05 01.

1.3 REFERENCES .1 National Building Code of Canada 2010, section 3.4.5.

PART 2 - PRODUCTS

2.1 EXIT LIGHTS -
GENERAL .1 Exit lights as indicated in the fixture schedule and as specified herein.

.2 Housing: As per fixture schedule and as per specifications.

.3 Face and back plates: As per fixture schedule and as specified.

.4 Lamps: ultra bright LED light source.

.5 Exit signs to the green "running man" pictogram type.

.6 Exit signs that to be specified as self-powered (min. 2h operation upon AC failure).

2.2 EXIT LIGHT
LOCATIONS .1 At locations shown on the drawings.

2.3 WIRING EXIT
LIGHTS .1 Conduit: to Section 26 05 34 "Conduits, Conduit Fastenings and Conduit Fittings".
.2 Conductors: Section 26 05 21 "Wires and Cables 0-1000V", sized in accordance with manufacturer's recommendations.

PART 3 - EXECUTION

3.1 INSTALLATIONS .1 Wiring methods as per Section 26 05 21 "Wires and Cables 0-1000V". Where permitted, NMSC cabling to be orange in colour.
.2 Install exit lights as indicated, in accordance with NBC-2010, arrow directions to the approval of the Architect.

.3 Connect fixtures to exit light circuits, as indicated.

.4 Ensure that exit light circuit breakers are locked in "ON" position with a breaker manufacturer's tie-lock.

3.2 TESTING .1 Measure and record DC input voltage to each exit light while AC power is disconnected to associated battery pack and to exit light. Note tests to be performed with all remote heads and exit lights in connected circuit energized - full connected battery load.
.2 Provide contractor testing as specified in section 26 05 04 "Contractor Testing".

- .3 Insert test result data in O+M manuals.

3.3 AS-BUILT
INFORMATION

- .1 All exit lighting system information shall be provided on the as-built drawings.
- .2 Provide:
 - .1 equipment locations,
 - .2 equipment identification for reference to shop drawings,
 - .3 seismic restraint system,
 - .4 cabling and wiring information including wire labels and designators,
 - .5 additional installation detail(s) as required to document the installation.

PART 1 - GENERAL

1.1 GENERAL
INSTRUCTIONS

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

1.2 RELATED WORK

- .1 General Requirements: Section 26 05 01
.2 Maintenance Manuals: Section 26 05 08
.3 Contractor Testing: Section 26 05 04

PART 2 - PRODUCTS

2.1 SCOPE

- .1 Provide on-site demonstration of all electrical systems to the owner and the owner's representatives.
.2 Provide on-site operating instructions of all provided electrical systems to the owner and the owner's representatives.
.3 Division 26 to designate a senior experienced individual fully familiar with the project to coordinate and chair each demonstration and instruction session.
.4 Division 26 Contractor shall be responsible for keeping a 'Demonstration and Instructions of Electrical Systems' Record Log. Include Record Log copies of each session in each electrical operations and maintenance manual.
.5 Division 26 Contractor to make allowance in tender price to provide a minimum of 1 - 2 hour sessions for demonstration and training of Owner designated personnel.

PART 3 - EXECUTION

3.1 SITE TOURS

- .1 Provide a Contractor guided walk-through tour to allow Owner designated personnel to familiarize themselves with all provided electrical systems.
.2 Coordinate timing of demonstrations and instructions with the Owner to ensure that designated personnel have a minimum of five (5) working days notice prior to conducting each demonstration and instruction session. Follow all additional instructions in the general contract.
.3 Division 26 to keep a log of all site tour demonstration and instruction sessions conducted. Log shall include tour date, persons and firms represented and names, signatures and comments to those present. Copies of same shall be tabulated and included in electrical operations and maintenance manuals, with demonstration log sheets.
.4 The Contractor shall provide the on-site services of all sub-trade designates to demonstrate and instruct the Owner's personnel in the specialized systems. The sub-trade designates shall be senior personnel fully trained and competent in the installation and in the

operation of the system.

3.2 SYSTEMS INCLUDED
IN ELECTRICAL
DEMONSTRATION AND
INSTRUCTION

- .1 Unless otherwise indicated, provide sessions in Electrical to fully demonstrate and familiarize the client and the client's representatives with electrical systems, electrical operations and the general maintenance requirements for all provided electrical systems.
- .2 Operations and Maintenance Manuals shall be used on-site for all demonstration and instruction sessions.
- .3 Where demonstration and instructions sessions show that additional work or information is necessary to provide a complete and useable Maintenance Manual for user and maintenance staff, the Contractor shall provide the necessary changes and resubmit the O+M manuals for Engineer's review prior to the Contractor's manuals turn over to the Owner.
- .4 Systems Include:
 - .1 Maintenance Manuals
 - .2 Disconnect switches
 - .3 Panelboards
 - .5 Contactors
 - .6 Lighting fixtures and control
 - .7 Exit and emergency lighting
 - .9 Data and voice

END

PART 1 - GENERAL

- 1.1 SCOPE .1 To install voice/data conduits as detailed on the drawings and in this specification.
- 1.2 SYSTEM DESCRIPTION .1 Provide a complete telephone and computer data system as shown on the drawings and as specified here-in including:
- .1 Outlet Boxes.
 - .2 Conduits.
 - .3 Cover Plates.
 - .4 Pull Boxes.
 - .5 Painted Plywood Backboards.
 - .6 Cable trough in LAN rooms and communications closets as shown on the drawings.

PART 2 - PRODUCTS

- 2.1 MISCELLANEOUS MATERIAL .1 Refer to appropriate section in Division 26.
- 2.2 WALL OUTLETS .1 Provide flush 100 mm x 100 mm boxes with plaster rings.
- 2.3 CONDUITS .1 Conduits to Section 26 05 16. Minimum size - 19mm.
- .2 Conduits:
- .1 rigid steel and EMT for outlet jack to ceiling space (tbar space) and for ceiling space to LAN room.
 - .2 rigid PVC for all below slab installation.
- .3 Conduits shall have a carrying capacity to "conductor fill" as per CEC C22.1. or conductor fill as per the following table, which ever is the lesser number of wires:
- | Conduit Size (mm) | Number of Cables |
|-------------------|------------------|
| 13 | NOT PERMITTED |
| 19 | 7 |
| 25 | 12 |
| 32 | 21 |
| 37 | 29 |
| 50 | 48 |
- .4 If the cable is in a conduit, the maximum number of bends between draw-in points shall not contain more than two (2) 90° bends.
- .5 Conduit is to run to from the outlet jack to the ceiling space (T-BAR). Open cabling through metal D-rings shall be permitted in ceiling space.
- .6 Conduit is to run from the ceiling space into the LAN room. Conduit to

- .7 end at LAN room cable trough. Provide D-rings as required to facilitate transition from conduit to cable trough.
Bond all conduits to ground to the requirements of the local authorities.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install conduit raceway system from: each outlet jack location to the ceiling space D-ring runs, from each ceiling space to LAN room cable trough, from main telephone head end (in electrical room) to telephone cross-connect equipment in the LAN room, and through all rated fire separations.
- .2 Conduit bends shall have a bending radius of not less than ten times conduit diameter. LB and similar fittings are not allowed. All pull boxes to be straight through pulls, corner pulls not permitted.
- .3 Record all conduit runs and all junction box locations on the as built drawing.
- .4 Bond all telephone and data system conduits to code.

3.2 TESTS

- .1 Physically inspect all data and voice conduits to ensure bond continuity.

3.3 AS-BUILT INFORMATION

- .1 All conduit system including pull box and locations information shall be provided on the as-built drawings.
- .2 Provide:
- .1 conduit locations and trade dimensions,
 - .2 seismic restraint system,
 - .3 pull box locations and trade dimensions,
 - .4 additional installation detail(s) as required

PART 1 - GENERAL

- 1.1 SCOPE .1 To install Category 6 Unshielded Twisted Pair (UTP) cables as detailed in this specification and on the drawings. All tel/data cables, cross connection, patch panels and costumer D-mark to be installed and terminated by a SSC certified contractor. Div 26 contractor to carry the cost of the SCC contractor in the bid price.
- 1.2 GENERAL REQUIREMENTS .1 The workmanship and installation shall meet the minimum standards as set forth in these specifications, as well as the standards listed below:
- .1 'Government of Yukon Structured Wiring System Standard Specification and Implementation Criteria in YTG Buildings' dated February 23, 2000.
- .2 Canadian Electrical Code, Canadian Standards Association, EIA/TIA-568A-A, EIA/TIA-569-A, EIA/TIA-568-B.3, and BICSI-TDM.
- .2 Provide, overall, a data/voice system of Category 6 outlets as indicated on the drawings. Exact locations to be determined by the work station layout with the approval of the Engineer and the owner.
- 1.3 PRODUCT DATA .1 Submit product data in accordance with Specification Section 26 05 00.

PART 2 - PRODUCTS

- 2.1 DATA/VOICE CABLE .1 Four pair enhanced Category 6 FT-6 UTP cable to the approval of the owner and the Engineer.
- .2 Reference Specification Section 27 07 28.

PART 3 - EXECUTION

- 3.1 CABLE SYSTEM .1 Work stations and/or computer station outlets are indicated by the tel/data symbols on the drawings.
- .2 Single data, double data and tel/data outlets are indicated on the drawing by specific symbols or a note covering the entire room.
- .3 Install two - four pair 100 ohm unshielded twisted pair (UTP) cable to each outlet shown on the drawings. Cables terminate at the LAN communications backboard; 1 to data head end, 1 to telephone head end.
- .4 Leave 3 metres minimum coil of extra cable at the backboard/head end.
- .5 Leave 1 metre minimum extra cable in the wall behind the work station outlet.
- .6 Ensure that all runs are straight through, with no splices.

- .7 Pull runs grouped so that cables do not pull against each other.
- .8 Installation to be under the direction of the owner and the Engineer.
- .9 The maximum cable length for each run shall be limited to 90 metres.
- .10 Install cables in conduit system, cable trough system and in open D rings for short exposed lengths for transition between conduit system to cable trough and above T-Bar Space.
- .11 Install cables in conduit in finished walls and for vertical runs.

3.2 GROUNDING

- .1 Install all grounding conductors as required by the local authorities and to the approval of the Engineer.
- .2 Reference Specification Section 26 05 28.
- .3 Bond all metal conduits and metal conduit sleeves.

PART 1 - GENERAL

1.1 SCOPE

- .1 To install Level 6 (CAT6) RJ45 jacks as detailed on the drawings.
- .2 To install "RJ45" modular jack connectors, Modular Category 6 for all data cables on the backboard at the communications backboard.
- .3 To install "RJ45" modular jack connectors, for telephone cables on the backboard at the communications backboard.
- .4 To make all connections as required to make a complete operational voice/data cabling system. All cables to be terminated and labelled at each end.
- .5 A network installer must be **SSC certified** trades person or be directly supervised on site by one and shall supply and install a Level 6 data system complete with all apparatus, equipment, wiring, etc. necessary for reliable, high quality operation and excellent technical performance. The network installer shall be familiar with the installation and service of Enhanced Level 6 network and telephone equipment.
- .6 The network installer shall be responsible for verifying the completeness of the parts and component lists, correctness of type numbers, and the overall suitability of the equipment to meet the intent and purpose of the systems in this specification. Any additional equipment, apparatus or labour needed in order to meet the requirements of this specification even if not specifically mentioned, shall be supplied by the network installer without claim for additional payment. The contractor must obtain in writing, explicit approval from the Engineer for any changes or substitutions to this specification.
- .7 Div. 26 Contractor to carry the cost of the SSC contractor and all equipment required for a complete operational tel/data system in the bid price.

1.2 GENERAL REQUIREMENTS

- .1 The workmanship and installation shall conform with 'Government of Yukon Structured Wiring System Standard Specification and Implementation Criteria in YTG Buildings' dated February 23, 2000.
- .2 The workmanship and installation shall conform with the Canadian Electrical Code, Canadian Standards Association, EIA/TIA 568A-A, EIA/TIA 569-A, EIA/TIA-568-B.3, and BICSI-TDM.
- .3 Provide, overall, a data system of Level 6 outlets as indicated on the drawings. Exact locations to be determined by the work station layout with the approval of the Engineer and the owner.

PART 2 - PRODUCTS

2.1 DATA/TEL JACKS

- .1 Voice and data jacks shall be Category 6 "RJ-45" modular jacks. These RJ-45 jacks shall also accept standard RJ-11 6 pin jacks.

2.2 JACK COVERS

- .1 Covers to match colour of switch and receptacle device covers or as

approved by the engineer and architect.

2.3 DATA/TEL CABLE

- .1 Wiring to approval of the Engineer.
- .2 Four twisted pair, 24 gauge solid copper wire, Category 6, enclosed in FT6 rated covering.
- .3 Reference Specification Section 27 05 42.

2.4 MODULAR JACK CONNECTORS

- .1 All data head-end modular jack connector cross connect blocks to be "RJ45", Category 6 or equivalent for data.
- .2 All telephone head-end connections to be RJ-45 connectors suitable for cross-connection to owner supplied telephone switching equipment.

2.5 CONNECTORS

- .1 All data and telephone communication connectors including telecommunication outlets, patch panels, transition connectors and cross-connect blocks shall be certified to 1 Gbps and within the limits set in the TIA 568-B Standards.

2.6 AS-BUILT PLAN

- .1 Tel/Data System Plan: to approval of the Engineer, minimum size 11 X 17 inches. Professional drafting quality or CADD reproduction. One copy for each maintenance manual. Plan to show wire designators for all cables.
- .2 One copy for the communications closet backboard.

PART 3 EXECUTION

3.1 GENERAL

- .1 Allow for liaison and coordination with NWTel for the installation of a complete and operating data communication system.
- .2 Liaison with the owners representative to confirm the detailed requirements of the data communication systems, including connection requirements and exact locations.
- .3 Make allowance in bid price to provide SSC sub contractor to provide cross-connect wiring between owners provided telephone switching equipment and contractor provided 1A4 connectors. Allowance shall include 100% cross-connect wiring.

3.2 GROUNDING

- .1 All metal conduits to be bonded to ground.
- .2 Reference Specification Section 26 05 28 and CSA T527.

3.3 CABLE DISTRIBUTION SYSTEM

- .1 Data/Tel communication cables are to be distributed in a workmanlike manner and according to relevant codes

	.2	Install cable from the communications backboard to each remote outlet; 2 Cat 6 cables to each outlet; 1 for data and 1 telephone.
	.3	Data/voice cables and conduits shall not be installed at a distance: .1 Less than 300 mm from lighting ballasts .2 Less than 1 metre from electric motors, or at a separation distance from source of 480 V or less according to Table 4.8-5 of the CAN/CSA T530-M90 Standards.
	.4	All specified unused (spare) data cable shall be neatly coiled and tie-wrapped at the end of the cable run in the ceiling space.
3.4 CABLE INSTALLATION DETAILS	.1	Allow an extra 1 metre of cable on each run at the work station end and 3 extra metres at the equipment backboard end or equipment rack location.
	.2	All unused (spare) data cable shall be neatly labelled on both ends.
	.3	The cable shall be continuous without joints or splices from the wall cover plates to the patch panels in LAN room.
	.4	The maximum cable length for each run shall be limited to 90 metres.
3.5 OUTLET JACKS	.1	Install wall outlet cover plates complete with modular jacks for data cabling systems at each work station.
3.6 CABLE TERMINATIONS AND TERMINAL SYSTEMS	.1	Termination of all data cables at wall outlets shall be as specified in the EIA/TIA and 568B Standards. Pin configuration T568A on Category 6 RJ45 modular 8 jacks. At the data backboard or rack: terminate all data cables on IDC terminal strips for terminating multi-pair 100 ohm balanced twisted pair cables and supporting cross-connections using jumper wires or compatible plug-ended patch cords: Category 6 to TIA/EIA-568. Size the cross-connect blocks to accommodate all data home runs with minimum 10% spare capacity. Mount cross-connect blocks on plywood backboards.
	.2	Termination of voice cables shall be as above. Provide separate cross connect blocks so as to physically separate voice and data terminations.
	.3	Horizontal data cables shall be located on the top half of the backboard while the riser cables shall be located on the bottom half of the backboard.
	.4	Layout wall-mounted cross-connect systems from top to bottom and from left to right and terminate data cabling on the punch down rail so that only ½" (13mm) of each cable pair is exposed from the cable.
	.5	Use appropriate mounting frames and "D" rings for vertical and horizontal jumper channeling. Use modular connector strips for all data connections.

3.7 NUMBERING AND LABELLING

- .1 Each cable shall be clearly marked with a permanent identifier at each end of the cable. All horizontal cable terminations will be labeled at cross connects and at telecommunication outlets. Labeling shall be as follows: #1 - D001, #2 - D005 and so on for data.
- .2 Where used, all riser cables shall have permanent labels at each end of the cable. Label shall include floor number, closet number and zone.
- .3 Cross-connect ports shall be labelled to correspond to work station numbers and riser cable number, where applicable, at the termination strip at the communications backboard.
- .4 The wall outlets shall be clearly and permanently marked at cover plates with icon identification for both service types as well as with clear identification of cable/termination numbers.
- .5 All labeling to be legible, computer printed, not handwritten. Labeling to approval of engineer. Standard of acceptance: TIA/EIA-606-[A].
- .6 Include in the contract price the time and materials required to install on the voice/data backboard a plastic laminated plan showing all workstation locations and corresponding numbers. One additional copy for the O&M manual. All drafting to CADD standard to match the contract documents.

3.8 MAIN DISTRIBUTION TERMINAL

- .1 Use wall-mounted cross-connect hardware.
- .2 Layout for copper cross-connect system shall be from left to right and from top to bottom.
- .3 Use standard colour codes: (CSA Standard)
 - .1 Green - From central office or data network interface.
 - .2 White - Riser/backbone and between equipment rooms.
 - .3 Blue - Stations served directly from closets, i.e. horizontal wiring.
- .4 All work must be performed by SSC Certified contractor, carry the cost of the SSC contractor in the bid price.

3.9 TESTING

- .1 All communications cables shall be individually tested for parameters listed in the Government of Yukon standards ("Structured Wiring System Standard Specification and Implementation Criteria in YTG Buildings" dated February 23rd, 2000). All data cables shall be tested individually.
- .2 When patch cords are provided, the tests shall be performed to include the patch cords with both the modular interface components (plug and jack connectors) in a mated state.

- | | | |
|-----------------------------------|----|---|
| | .3 | Testing equipment shall be a minimum certified level III tester to: TIA/EIA-568-B.2. All cables shall be tested to the maximum data speed of 250 MHZ. |
| | .4 | Submit the test results to the Engineer in EXCEL or equivalent format approved by the Engineer, on a CD/DVD disk. |
| <u>3.10 AS-BUILT
DRAWINGS</u> | .1 | Record on one set of white print drawings of the data and telephone cable locations and all approved changes and other details. Show all cabling runs by labeled numbering system. Submit copy of the as-built drawings to the Engineer. |
| <u>3.11 WARRANTY</u> | .1 | All cabling and workmanship shall be guaranteed for one year from the final acceptance. A signed letter of guarantee shall be provided by the Division 26 Contractor. All manufacturer warranty certificates shall be contained in this subsection. |

END

PART 1 - GENERAL

<u>1.1 DESCRIPTION OF SYSTEM</u>	.1	Existing fire alarm system.
<u>1.2 SCOPE OF WORK</u>	.1	Relocation of fire alarm speakers and addition of new fire alarm system speakers complete with all wiring, terminations, testing and verification for complete operational system as shown on the drawings.
<u>1.3 REFERENCES</u>	.1	Factory Mutual Research Corporation for Property Conservation - Approval Guide.
	.2	CAN/ULC-S524-14 Installations of Fire Alarm Systems.
	.3	ULC-S525 Audible Signal Appliances, Fire Alarm.
	.4	ULC-S528 Manually Actuated Signalling Boxes, Fire Alarm.
	.5	CAN/ULC-S536 Inspection and Testing of Fire Alarm Systems.
	.6	CAN/ULC-S537 Verification of Fire Alarm Systems.
	.7	DFC No. 410(M) Fire Alarm Systems.
	.8	NBC National Building Code of Canada 2010.
	.9	All references to the latest edition of these standards.
<u>1.4 SHOP DRAWINGS</u>	.1	Submit shop drawings on accordance with Section 26 05 01.
<u>1.5 OPERATING AND MAINTENANCE INSTRUCTIONS</u>	.1	Provide operating and maintenance instructions in accordance with Section 26 05 08.
<u>1.6 AS-BUILT DRAWINGS</u>	.1	Show all wiring and connections on the as built drawings.
<u>1.7 WARRANTY / SERVICE</u>	.1	Contractor responsible for this division is to include is as part of the base tender price; a guarantee stating: .2 Full warranty on new equipment to be provided for the duration of 1 year from the date of final acceptance of work. .3 During this warranty period the contractor is to repair and replace all such defective work and other work to the new devices which fails or becomes defective during the term of the warranty, provided that such failure is not cause by improper usage or physical damage. .4 Should the system installer fail to comply with sub-item 1 above, work will be pre-formed by others at this contractors expense.

- .2 Warranty date will commence from the date of the final acceptance of this work.

PART 2 - PRODUCTS

2.1 MATERIALS GENERAL

- .1 New equipment to match existing.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Installation to CAN/ULC - S524-14.
- .2 Install system in conduit.
- .3 Install new devices to approval of Fire Marshall and applicable CSA and ULC standards and codes.

3.3 WIRING METHODS

- .1 New wiring only, all wiring must be inside EMT conduits.
- .2 Provide all wiring for fire alarm system c/w R-90 crosslink polyethylene insulation as allowed by codes.

3.4 DEVICE LOCATIONS

- .1 Location of outlets for fire alarm devices shall be approximately as shown on the drawings and as set out in CSA standard ULC S524.
- .2 Location of outlets shall be subject to change, without extra cost, provided information is given prior to installation. No extra amount will be paid, for extra labour and materials, for relocating outlets up to 3m from their original locations, nor will credits be anticipated where relocation up to 3m reduces materials and labour. Other cases will be considered on their individual merits.
- .3 All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

3.5 DEVICE NUMBERING

- .1 Provide device listing including device number, part number and device location on CD-ROM in excel format to engineer. Copy to be included in O&M manuals. Device number to correspond with device number on verification report. Description of device locations to be coordinated with Owner prior to programming of system.
- .2 Label all new and relocated devices to indicate device #, loop # and zone #.

3.10 TESTS AND COMMISSIONING CONTRACTOR

- .1 Test all new/relocated ancillary, annunciation zones.
- .3 Test each new/relocated signal device and each signal circuit.
- .4 Simulate grounds and breaks on new and renovated alarm and signaling devices and circuits to ensure proper operation of trouble signals.
- .5 Tests to be carried out by the contractor or the contractor's agent.

3.11 TESTS AND
COMMISSIONING
VERIFICATION AGENT

- .6 Contractor to submit to engineer, copy of Contractor provided Test and Commissioning report to engineer prior to verification. Report to include test documentation for all devices. Report to be in Word or Excel (or equivalent) format.
- .1 Verify all new zones, and annunciation which have been installed or modified in any fashion.
- .2 Test each new/relocated device to ensure manual stations, thermal and smoke detectors transmit alarm to control panel and actuate first stage alarm, general alarm and ancillary devices. Test to be carried out as per CAN/ULC-S524-06.
- .3 Test each new signal device and each signal circuit.
- .4 Check the Fire Alarm panel display to ensure zones are shown and actuated correctly. Ensure that each smoke detector is properly annunciated.
- .5 Simulate grounds and breaks on signaling devices and circuits to ensure proper operation of trouble signals.
- .6 Tests to be carried out by the contractor force and fire alarm technician, in the presence of a representative from the engineering office. The test shall be complete, submit the test report to the engineer for approval.
- .8 The contractor will be responsible for correcting deficiencies in the contractor's work that are reported by the verification agent.
- .9 Fire alarm verifier to certify zone plan drawing. Certification to be included on fire alarm verification report.
- .10 **Agent: A team consisting of a professional engineer designer, a licensed electrician installer and verification by a fire alarm company technician (scenario #1 by ULC).**
- .11 Contractor to carry the cost of all the parties for the verification in the bid price. Engineering witness is provided by the owner.

3.12 AS-BUILT
DRAWINGS

- .1 Record all wiring, pipe runs and junction box locations on the as built drawings. Include wire gauge, conduit size and junction box size.
- .2 Show all connections and splices on as built drawings.
- .3 As-built drawings to show room and corridor numbers (Specific area identification).
- .4 As-built drawings shall be submitted to engineer for approval, revise as-built to the satisfactory of the.

END