END OF TABLE OF CONTENTS

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Not Used.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises demolition of the existing lab/freezer building, including foundations and replacing it with a new larger storage building. This is an operational production hatchery that must remain in operation during the entire construction project. The project is located on the west side of the Big Qualicum River at the Big Qualicum Fish Hatchery, 215 Fisheries Road, Qualicum Beach, B.C.

1.3 CONTRACT METHOD

.1 Construct Work under single, stipulated price contract.

1.4 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 executed prior to start of, and during Work of this Contract, and which is specifically excluded from this Contract:

.1 Assessment and removal of any hazardous materials found on site.

.2 Geotechnical engineering.

.4 Work of this Project must include provisions for co-ordinating related work, identified in Contract Documents, for following principal items.

.1 Geotechnical engineering.

.2 Electrical services to the building.

1.5 CONTRACTOR USE OF PREMISES

.1 Limit use of premises for Work, storage and access, to allow:

.1 Owner Occupancy.

.2 Temporary storage of materials and equipment are permitted in the areas shown on the attached site plan.

.2 Repair or replace portions of existing structures and or roadwork which have been damaged during construction operations equal to or better than that which existed before new work started, as directed by Departmental Representative.

1.6 OWNER FURNISHED ITEMS

.1 Owner Responsibilities:

.1 Connections of storm and sanitary sewers to existing services.

.2 Contractor Responsibilities:

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

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

.3 Receive and unload products at site.

.4 Inspect deliveries, record shortages, and damaged or defective items.

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

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

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

.8 Provide installation inspections required by public authorities.

.9 Repair or replace items damaged by Contractor or subcontractor on site under his control.

1.7 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 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian and vehicular traffic.

.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 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

.7 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.8 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

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

1.8 DOCUMENTS REQUIRED

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

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

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

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

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

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

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

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

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

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

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

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

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia.

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

.4 Allow 7 days for Departmental Representative's review of each submission.

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

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

.7 Accompany submissions with transmittal letter, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:

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

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

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

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

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

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

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

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

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

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

.14 Submit electronic copy of manufacturer’s instructions for requirements requested in specification Sections and as requested by Departmental Representative.

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

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

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

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

.18 Delete information not applicable to project.

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

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

.21 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.

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

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

1.3 SAMPLES

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

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

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

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

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

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

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

1.4 CERTIFICATES AND TRANSCRIPTS

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

.2 Submit transcription of insurance immediately after award of Contract.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 INSPECTION

.1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

1.2 INDEPENDENT INSPECTION AGENCIES

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

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

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

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

1.3 ACCESS TO WORK

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

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

1.4 PROCEDURES

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.5 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by

Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

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

1.6 REPORTS

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

.2 Provide copy to subcontractor of work being inspected or tested.

1.7 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

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

1.8 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 WASTE MANAGEMENT GOALS

.1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss waste management plans and goals

.2 Accomplish maximum control of solid construction waste

.3 Protect environnement and prevent environnemental pollution damage.

1.2 RELATED REQUIREMENTS

.1 Not Used.

1.3 REFERENCES

.1 Not Used.

1.4 DEFINITIONS

.1 Class III: non-hazardous waste - construction renovation and demolition waste.

.2 Inert Fill: inert waste - exclusively asphalt and concrete.

.3 Waste Source Separation Program (WSSP): consists of series of ongoing activities To separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

.4 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

.5 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

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

.7 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors

.8 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling

.9 Separate Condition: refers to waste sorted into individual types.

.10 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.

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

1.5 DOCUMENTS

.1 Post and maintain in visible and accessible area at job site, one copy of following documents:

.1 Waste Source Separation Program.

1.6 SUBMITTALS

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

.2 Prepare and submit following prior to project start-up:

.1 One electronic copy of Waste Source Separation Program (WSSP).

.3 Submit prior to final payment the following:

.1 Provide receipts, scale tickets, waybills, waste disposal receipts that confirm quantities and types of materials reused, recycled or disposed of and destination.

1.7 WASTE SOURCE SEPARATION PROGRAM (WSSP)

.1 Prepare WSSP prior to project start-up.

.2 WSSP will detail methodology and planned on-site activities for separation of reusable and recyclable materials from waste intended for landfill.

.3 Provide list and drawings of locations that will be made available for sorting, collection, handling and storage of anticipated quantities of reusable and recyclable materials.

.4 Provide sufficient on-site facilities and containers for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

.5 Locate containers to facilitate deposit of materials without hindering daily operations.

.6 Provide training for sub-contractors in handling and separation of materials for reuse and/or recycling.

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

.8 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.

.1 Transport to approved and authorized recycling facility.

.9 Collect, handle, store on-site, and transport off-site, salvaged materials in combined condition.

.1 Ship materials to site operating under Certificate of Approval or premises of Departmental Representative

.2 Materials must be immediately separated into required categories for reuse or recycling.

1.8 USE OF SITE AND FACILITIES

.1 Execute Work with minimal interference and disturbance to normal use of premises.

1.9 DISPOSAL OF WASTES

.1 Do not bury or burn waste materials

.2 Do not dispose of waste volatile material, minera spirts, oil or paint thinner into waterways, storm, or sanitary sewers.

.3 Keep records of construction waste including:

.1 Number and size of bins.

.2 Waste type of each bin.

.3 Total tonnage generated.

.4 Tonnage reused or recycled.

.5 Reused or recycled waste destination.

.4 Remove material from demolition and deconstruction as work progresses.

.5 Prepare project summary to verify destination and quantities on a material-by-material basis.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 APPLICATION

.1 Do Work in compliance with WSSP.

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

3.2 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, waste, tools and equipment.

3.3 DIVERSION OF MATERIALS

.1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative, and consistent with applicable fire regulations.

.1 Mark containers or stockpile areas.

.2 Provide instruction on disposal practices.

.2 On-site sale of materials is not permitted.

3.4 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Government Chief Responsibility for the Environment:

British Columbia	Ministry of Environment Lands and Parks, 810 Blanshard Street, 4th Floor, Victoria BC V8V 1X4	604-387-1161	604-356-6464
	Waste Reduction Commission Soils and Hazardous Waste, 770 South Pacific Blvd, Suite 303, Vancouver BC V6B 5E7	604-660-9550	604-660-9596

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 10 00 – Concrete Forming and Accessories.

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

1.2 REFERENCES

.1 American Concrete Institute (ACI)

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

.2 ASTM International

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

.3 CSA International

.1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A23.3-14, Design of Concrete Structures.

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

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

.4 Reinforcing Steel Institute of Canada (RSIC)

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

1.3 QUALITY ASSURANCE

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

.1 Mill Test Report: upon request, provide Consultant with certified copy of mill test report of reinforcing steel, minimum 2 weeks prior to beginning reinforcing work.

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

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials off ground and in accordance with manufacturer's recommendations in clean area.

.2 Replace defective or damaged materials with new.

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

Part 2 Products

2.1 MATERIALS

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

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

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

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

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

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

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

2.2 FABRICATION

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

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

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

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

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 2 weeks prior to beginning reinforcing work.

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

Part 3 Execution

3.1 FIELD BENDING

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

.2 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

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

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

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

3.3 CLEANING

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

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

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 10 00 – Concrete Forming and Accessories.

.2 Section 03 20 00 – Concrete Reinforcing.

1.2 REFERENCES

.1 Abbreviations and Acronyms:

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

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

.2 Fly ash:

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

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

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

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

.2 Reference Standards:

.1 ASTM International

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

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

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

.2 CSA International

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

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

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit concrete mix designs for review by consultant minimum 2 weeks prior to starting concrete work.

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

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

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

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

.7 Provide two copies of WHMIS MSDS Material Safety Data Sheets.

1.4 QUALITY ASSURANCE

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

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

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

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

.1 Cold weather concrete.

.2 Curing.

.3 Finishes.

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

.5 Sustainability Standards Certification:

.1 Construction Waste Management: provide copy of plan.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

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

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

.2 Deviations to be submitted for review by Departmental Representative.

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

.2 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 11 - Cleaning.

Part 2 Products

2.1 DESIGN CRITERIA

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

2.2 PERFORMANCE CRITERIA

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

2.3 MATERIALS

.1 Portland Cement: to CSA A3001, Type GU HS.

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

.2 Blended hydraulic cement: Type GUb to CSA A3001.

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

.4 Water: to CSA A23.1.

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

.6 Admixtures:

.1 Air entraining admixture: to ASTM C260.

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

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

.1 Compressive strength: 50 MPa at 28 days.

2.4 MIXES

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

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

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

.1 Types 1 & 2 not used

.2 Type 3 –

.1 Durability and class of exposure: C2.

.2 Compressive strength at 28 day age: 32 MPa minimum.

.3 Intended application: Typical exterior and interior slab on grade.

.4 Aggregate size 20 mm maximum.
.5 Slump: 80 mm ± 20.

.3 Type 4 –
.1 Durability and class of exposure: N.
.2 Compressive strength at 28 age: 20 MPa minimum.
.3 Intended application: Masonry grout.
.4 Aggregate size 10 mm maximum.
.5 Slump: 200 mm ± 20.

.4 Type 5 –
.1 Durability and class of exposure: F-2.
.2 Compressive strength at 28 age: 25 MPa minimum.
.3 Intended application: Foundation walls.
.4 Aggregate size 20 mm maximum.
.5 Slump: 80 mm ± 20.

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

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

Part 3 Execution

3.1 PREPARATION

.1 Obtain Departmental Representative's written approval before placing concrete.
.1 Provide 48 hours minimum notice prior to placing of concrete.

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

.3 During concreting operations:
.1 Development of cold joints not allowed.
.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

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

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

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

.7 Protect previous Work from staining.

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

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

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

3.2 INSTALLATION/APPLICATION

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

.2 Sleeves and inserts:

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

.2 Sleeves and openings greater than 100 x 100 mm, must be reviewed by Departmental Representative.

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

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

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

.3 Anchor bolts:

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

.4 Finishing and curing:

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

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

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

.4 Provide steel-trowelled finish unless otherwise indicated.

3.3 SURFACE TOLERANCE

.1 Concrete tolerance to CSA A23.1 Straightedge Method FF = 20: FL = 15 Index Method to tolerance schedule as indicated.

3.4 FIELD QUALITY CONTROL

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

.1 Concrete pours.

.2 Slump.

.3 Air content.

.4 Compressive strength at 7 and 28 days.

.5 Air and concrete temperature.

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

.1 Ensure testing laboratory is certified to CSA A283.

.3 Owner will pay for costs of tests as specified in Section 01 45 00 – Quality Control.

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

3.5 CLEANING

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

.2 Waste Waste Management: separate waste materials for reuse and recycling.

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

.2 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site.

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

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

.5 Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 22 00 Concrete Unit Masonry.

.2 Section 04 05 19 Masonry Anchorage and Reinforcing.

1.2 REFERENCES

.1 CSA Group

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

.2 CAN/CSA-A179, Mortar and Grout for Unit Masonry.

.3 CAN/CSA-A371, Masonry Construction for Buildings.

.4 CAN/CSA-A3000, Cementitious Materials.

.2 International Masonry Industry All-Weather Council (IMIAC)

.1 Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for masonry mortar and grout and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Manufacturers' Instructions: submit manufacturer's installation instructions.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

1.5 SITE CONDITIONS

.1 Ambient Conditions: maintain materials and surrounding air temperature to:

.1 Minimum 5 degrees C prior to, during, and 48 hours after completion of masonry work.

.2 Maximum 32 degrees C prior to, during, and 48 hours after completion of masonry work.

.2 Weather Requirements: CAN/CSA-A371 International Masonry Industry All-Weather Council (IMIAC) - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

Part 2 Products

2.1 MATERIALS

.1 Use same brands of materials and source of aggregate for entire project.

.2 Cement:

.1 Portland Cement: to CAN/CSA-A3000, Type GU - General use hydraulic cement (Type 10) gray colour.

.2 Masonry Cement: to CAN/CSA-A3002 and CAN/CSA-A179, Type S.

.3 Mortar Cement: to CAN/CSA-A3002 and CAN/CSA-A179, Type S.

.4 Packaged Dry Combined Materials for mortar: to CAN/CSA-A179, Type S, using gray colour cement.

.3 Aggregate: supplied by one supplier.

.1 Fine Aggregate: to CAN/CSA-A179, natural sand.

.2 Course Aggregate: to CAN/CSA-A179.

.4 Water: clean and potable.

2.2 MORTAR MIXES

.1 Mortar for exterior masonry above grade:

.1 Load Bearing: type N based on property proportion specifications.

.2 Mortar for interior masonry:

.1 Load Bearing: type S based on property specifications.

.2 Non-Load Bearing: N based on property specifications.

.3 Following applies regardless of mortar types and uses specified above:

.1 Mortar for calcium silicate brick and concrete brick: type O based on proportion specifications.

.2 Mortar for grouted reinforced masonry: type S based on property specifications.

2.3 MORTAR MIXING

.1 Mix mortar ingredients in accordance with CAN/CSA-A179 in quantities needed for immediate use.

.2 Maintain sand uniformly damp immediately before mixing process.

.3 Do not use anti-freeze compounds including calcium chloride or chloride based compounds.

.4 Do not add air entraining admixture to mortar mix.

.5 Use a batch type mixer in accordance with CAN/CSA-A179.

.6 Pointing mortar: prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than 1 hour no more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.

.7 Re-temper mortar only within two hours of mixing, when water is lost by evaporation.

.8 Use mortar within 2 hours after mixing at temperatures of 32 degrees C, or 2-1/2 hours at temperatures under 5 degrees C.

2.4 GROUT MIXES

.1 Grout: Minimum compressive strength of 20 MPa at 28 days. Maximum aggregate size and grout slump: CAN/CSA-A179.

2.5 GROUT MIXING

.1 Mix batched and delivered grout in accordance with CSA A23.1/A23.2 transit mixed.

.2 Mix grout ingredients in quantities needed for immediate use in accordance with CAN/CSA-A179 fine grout.

.3 Add admixtures in accordance with manufacturer's instructions; mix uniformly.

.4 Do not use calcium chloride or chloride based admixtures.

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 masonry installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

3.2 PREPARATION

.1 Plug clean-out holes with block masonry units. Brace masonry for wet grout pressure.

3.3 CONSTRUCTION

.1 Do masonry mortar and grout work in accordance with CAN/CSA-A179 except where specified otherwise.

3.4 MIXING

.1 All pointing mortar can be mixed using a regular paddle mixer. Only electric motor mixers are permissible. Mixers run on hydrocarbons are not permitted, due to fumes.

.2 Clean all mixing boards and mechanical mixing machine between batches.

.3 Mortar must be weaker than the units it is binding.

.4 Contractor to appoint one individual to mix mortar, for duration of project. In the event that this individual must be changed, mortar mixing must cease until the new individual is trained, and mortar mix is tested.

3.5 MORTAR PLACEMENT

.1 Install mortar to requirements of CAN/CSA-A179.

.2 Remove excess mortar from grout spaces.

3.6 GROUT PLACEMENT

.1 Install grout in accordance with manufacturer's instructions.

.2 Install grout in accordance with CAN/CSA-A179.

.3 Work grout into masonry cores and cavities to eliminate voids.

.4 Do not install grout in lifts greater than 400 mm, without consolidating grout by rodding.

.5 Do not displace reinforcement while placing grout.

3.7 CLEANING

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

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

.2 Remove droppings and splashings using clean sponge and water.

.3 Clean masonry with low pressure clean water and soft natural bristle brush.

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

3.8 PROTECTION

.1 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 032000 Concrete Reinforcing

.2 Section 040512 Masonry Mortar and Grout

.3 Section 042200 Concrete Unit Masonry.

1.2 REFERENCES

.1 ASTM International

.1 ASTM A36/A36M, Standard Specification for Carbon Structural Steel.

.2 ASTM A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

.3 ASTM A641/A641M-[09a], Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.2 CSA Group

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

.2 CAN/CSA-A179, Mortar and Grout for Unit Masonry.

.3 CAN/CSA-A370, Connectors for Masonry.

.4 CAN/CSA-A371, Masonry Construction for Buildings.

.5 CSA G30.18, Carbon Steel Bars for Concrete Reinforcement.

.6 CSA S304.1, Design of Masonry Structures.

.3 Reinforcing Steel Institute of Canada (RSIC)

.1 Reinforcing Steel Manual of Standard Practice.

1.3 QUALITY ASSURANCE

.1 Certificates: upon request submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements, if requested.

1.4 SITE MEASUREMENTS

.1 Make site measurements necessary to ensure proper fit of members.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials off ground and in accordance with manufacturer's recommendations.

Part 2 Products

2.1 MATERIALS

.1 Bar reinforcement:Steel to CAN/CSA-A371 and CSA G30.18, Grade.

.1 Joint Reinforcement Ties: to CAN/CSA-A370:

.1 Single Wythe Joint Reinforcement: ladder type:

.1 Steel wire, hot dip galvanized: to ASTM A641, Class [3] [1] after fabrication.

.2

.2 Conventional Bolts:

.1 Bolts: to ASTM A36, bar stock shop threaded, straight bolts with square or hex-headed nuts.

2.2 FABRICATION

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

.2 Fabricate connectors in accordance with CAN/CSA-A370.

.3 Ship reinforcement and connectors, clearly identified in accordance with drawings.

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 anchorage and reinforcing materials installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Supply and install masonry connectors and reinforcement in accordance with CAN/CSA-A370, CAN/CSA-A371, CSA A23.1/A23.2 and CSA S304.1 unless indicated otherwise.

.2 Prior to placing grout, obtain Departmental Representative's approval of placement of reinforcement and connectors.

.3 Supply and install additional reinforcement to masonry as indicated.

3.3 BONDING AND TYING

.1 Install unit, adjustable, single wythe and multiple wythe joint reinforcement where indicated and in accordance with CAN/CSA-A370 and CAN/CSA-A371 and manufacturer's instructions.

.1 Install horizontal joint reinforcement 400 mm on centre.

.2 Lap joint reinforcement ends minimum 150 mm.

3.4 REINFORCED LINTELS AND BOND BEAMS

.1 Reinforce masonry beams, masonry lintels and bond beams as indicated on the plans.

.2 Place and grout reinforcement in accordance with CSA S304.1, CAN/CSA-A371, and CAN/CSA-A179.

.3 Support and position reinforcing bars in accordance with CAN/CSA-A371.

3.5 GROUTING

.1 Grout masonry in accordance with CSA S304.1, CAN/CSA-A371 and CAN/CSA-A179 and as indicated.

3.6 LATERAL SUPPORT AND ANCHORAGE

.1 Supply and install lateral support and anchorage in accordance with CSA S304.1 and as indicated.

3.7 MOVEMENT JOINTS

.1 Reinforcement will not be continuous across movement joints unless otherwise indicated.

3.8 FIELD BENDING

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

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

.3 Replace bars and connectors which develop cracks or splits.

3.9 FIELD QUALITY CONTROL

.1 Site inspections in accordance with Section 04 05 00 - Common Work Results for Masonry.

.2 Obtain Departmental Representative approval of placement of reinforcement prior to placing grout.

3.10 CLEANING

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

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

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 05 19 Masonry Anchorage and Reinforcing.

.2 Section 04 05 12 Masonry Mortar and Grout.

1.2 REFERENCES

.1 CSA Group

.1 CAN/CSA-A165 Series-2004, CSA Standards on Concrete Masonry Units.

.2 CAN/CSA-A371-04, Masonry Construction for Buildings.

.3 CSA S304.1-04, Design of Masonry Structures.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for concrete masonry units and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE AND HANDLING

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

.1 Offload concrete unit masonry packages using equipment that will not damage the surfaces.

.2 Do not use brick tongs to move or handle masonry.

.2 Storage and Handling Requirements:

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

.2 Do not double stack cubes of concrete unit masonry.

.3 Cover masonry units with non-staining waterproof membrane covering.

.4 Allow air circulation around units.

.5 Installation of wet or stained masonry units is prohibited.

.6 Store and protect concrete unit masonry from nicks, scratches, and blemishes.

.7 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Standard concrete block units Type H/15/C/M: to CAN/CSA-A165 Series CAN/CSA-A165.1 .

.1 Classification: H/15

.2 Dimensions Nominal:

.1 200mm wide x 200 mm high x 400 mm long - perimeter walls.

.2 250mm wide x 200 mm high x 400 mm long – interior shear walls

.3 Special shapes: provide square units for exposed corners. Provide purpose-made shapes for lintels, beams and bond beams. Provide additional special shapes as indicated.

.4 Profile/Texture for Architectural Concrete Unit Masonry:

.1 Split faced: full split units - perimeter walls.

2.2 REINFORCEMENT

.1 Reinforcement in accordance with Section 03 20 00 - Concrete Reinforcing.

2.3 MORTAR MIXES

.1 Mortar and mortar mixes in accordance with Section 04 05 12 - Masonry Mortar and Grout.

2.4 GROUT MIXES

.1 Grout and grout mixes in accordance with Section 04 05 12 - Masonry Mortar and Grout.

2.5 TOLERANCES

.1 Tolerances for standard concrete unit masonry tolerances in accordance with CAN/CSA-A165.1, supplemented as follows:

.1 Maximum variation between units within specific job lot not to exceed 2 mm.

.2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.

.3 Out of square tolerance not to exceed 2 mm.

.2 Tolerances for architectural concrete masonry units in accordance with CAN/CSA-A165.1, supplemented as follows:

.1 Maximum variation in length or height between units within specific job lot for specified dimension not to exceed 2 mm.

.2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.

.3 Out of square tolerance not to exceed 2 mm.

.4 Maximum variation in width between units within specific job lot for specified dimension not to exceed 2 mm.

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 concrete unit masonry installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Protect adjacent finished materials from damage due to masonry work.

3.3 INSTALLATION

.1 Concrete block units:

- .1 Bond: running.
- .2 Coursing height: 200 mm for one block and one joint.
- .3 Jointing: concave where exposed or where paint or other finish coating is specified.

.2 Architectural concrete unit masonry:

- .1 Bond: running.
- .2 Coursing height: 200 mm for one block and one joint.
- .3 Jointing: concave where exposed or where paint or finish coating is specified.

.3 Special Shapes:

- .1 Install special units to form corners, returns, offsets, reveals and indents without cut ends being exposed and without losing bond or module.
- .2 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.
- .3 End bearing: not less than 200 mm.
- .4 Install special site cut shaped units.

3.4 REINFORCEMENT

.1 Install reinforcing in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.5 CONNECTORS

.1 Install connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.6 MORTAR PLACEMENT

.1 Place mortar in accordance with Section 04 05 12 - Masonry Mortar and Grout.

3.7 GROUT PLACEMENT

.1 Place grout in accordance with Section 04 05 12 - Masonry Mortar and Grout.

3.8 CONSTRUCTION

.1 Cull out masonry units, in accordance with CAN/CSA-A165 with chips, cracks, broken corners, excessive colour and texture variation.

.2 Build in miscellaneous items such as bearing plates, steel angles, bolts, anchors, inserts, sleeves and conduits.

.3 Construct masonry walls using running bond unless otherwise noted.

.4 Build around frames previously set and braced. Fill behind hollow frames within masonry walls with mortar or grout and embed anchors.

.5 Fit masonry closely against electrical and plumbing outlets so collars, plates and covers overlap and conceal cuts.

.6 Install movement joints and keep free of mortar where indicated.

.7 Hollow Units: spread mortar setting bed from outside edge of face shells. Gauge amount of mortar on top and end of unit to create full joints, equivalent to shell thickness. Avoid excess mortar.

.8 Ensure compacted head joints. Use full or face-shell joint as indicated.

.9 Tamp units firmly into place.

.10 Do not adjust masonry units after mortar has set. Where resetting of masonry is required, remove, clean and reset units in new mortar.

.11 Tool exposed joints concave; strike concealed joints flush.

.12 After mortar has achieved initial set up, tool joints.

.13 Do not interrupt bond below or above openings.

3.9 REPAIR/RESTORATION

.1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.

3.10 CLEANING

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

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

.2 Standard Concrete Unit Masonry:

.1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block. Clean wall surface with suitable brush or burlap.

.3 Architectural Concrete Unit Masonry:

.1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block. Clean wall surface with suitable brush or burlap.

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

.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 ASTM International

.1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 CSA International

.1 CSA B111-1974 , Wire Nails, Spikes and Staples.

.2 CSA O141-05, Softwood Lumber.

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

.1 Material Safety Data Sheets (MSDS).

.4 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2010.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Roof Truss Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.

1.3 QUALITY ASSURANCE

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

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle roof trusses 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 roof trusses in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 FRAMING STRUCTURAL AND PANEL MATERIALS

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

- .1 CSA O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Glued end-jointed (finger-jointed) lumber is not acceptable.

.3 Light-frame trusses in accordance with "Truss Design and Procedures for Light Metal Connected Wood Trusses", The Truss Plate Institute of Canada.

.4 Framing and board lumber: in accordance with NBC, except as follows:

- .1 Top of wall bearing plates: D.Fir species, NLGA #1/2 grade.

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

- .1 S2S is acceptable for all framing.
- .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.

.6 Plywood: to CSA O325.

.7 Douglas fir plywood DFP: to CSA O121, standard construction.

2.2 ACCESSORIES

.1 Polyethylene film: to CAN/CGSB-51.34, Type 1, 0.254 mm thick.

.2 Air seal: closed cell polyurethane or polyethylene.

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

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

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

.5 Nails, spikes and staples: to CSA B111. All nails to be galvanized.

.6 Bolts: 16 mm diameter unless indicated otherwise, complete with nuts and washers. All bolts to be galvanized

.7 Joist hangers: minimum 1mm thick sheet steel, galvanized ZF001 coating designation.

.8 Fastener Finishes:

- .1 Galvanizing: to ASTM A123/A123M, use galvanized fasteners for all nailing.

Part 3 Execution

3.1 MATERIAL USAGE

.1 Roof sheathing:

.1 Plywood, DFP sheathing grade, T&G edge, 16 mm thick.

.2 Electrical equipment mounting boards:

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

3.2 INSTALLATION

.1 Install members true to line, levels and elevations, square and plumb.

.2 Construct continuous members from pieces of longest practical length.

.3 Install plywood roof sheathing in accordance with requirements of NBC and as noted on the drawings.

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

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

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

.7 Install sleepers as indicated.

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

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

.10 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

3.3 CLEANING

.1 Progress Cleaning:.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.4 PROTECTION

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

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Manufactured cement fibre reinforced panel siding.

.2 Manufactured cement fibre reinforced trims.

.3 Manufactured cement fibre reinforced perforated soffit panels.

1.2 RELATED SECTIONS

.1 Section 06 10 00 - Rough Carpentry

.2 Section 07 61 00 – Sheet Metal Roofing.

1.3 REFERENCES

.1 CSA B111-M: Wire Nails, Spikes and Staples.

.2 ASTM C1186: Standard Specifications for Grade II, Type A, Non-Asbestos Fibre Cement Flat Sheets.

1.4 DELIVERY AND STORAGE

.1 Deliver materials in original unopened packaging with manufacturers labels intact.

.2 Store in accordance with manufacturer's instructions.

1.5 SAMPLES

.1 Submit samples to requirements of Section 01 33 00.

Part 2 PRODUCTS

2.1 MINERAL FIBRE CEMENT SIDING.

.1 Panel siding: 6mm minimum thickness, smooth finish, use maximum lengths to be covered with vertical trims.

.2 Vented soffit: 6mm thickness, perforated and non perforated smooth finish soffit panels, per drawings, maximum lengths to minimize joints, allowing for a minimum of 5 square inches / lineal foot for perforated material.

.3 Vertical/Horizontal Trims: smooth finish sizes per drawings, maximum lengths to minimize joints,.

.4 Finish: Factory prefinished to all above items .1, .2, .3 ; Cement Fibre Coating; custom colour to match sample as selected by DFO representative. Finished on all surfaces.

.5 Screws: corrosion resistant hot dipped galvanized; head and lengths as recommended by siding manufacturer for use on applicable substrates. Install screws behind trims for panel fastening. Coloured heads for exposed trim fastening conditions.

.6 Sealants: Manufacturers recommended sealant, colour to match siding material.

.7 Joint/Sill Flashings: Prefinished steel; 0.60 mm thick, finish to match panel and trim siding, installed at joint intersections between concrete block and cement panels.

.8 Underlayment: minimum 0.9 mm thick self-adhering composite sheet membrane,; comprised of 0.8 mm thick rubberized asphalt fully bonded to 0.1 mm thick film of polyethylene; incorporating 50mm overlaps to seal at joints; complete with system primer, mastic and sealant recommended by membrane manufacturer to suit plywood substrate and application conditions.

Part 3 EXECUTION

3.1 EXAMINATION

.1 Ensure that related metal flashings and trim have been installed and approved.

3.2 INSTALLATION - PANELS

.1 Provide panel/soffit panels and trims of longest applicable length to minimize joints in material, all fasteners to be hidden wherever possible.

.2 Install all cement panels over membrane underlayment .

.3 Touch up any damage to soffit, panels and trims with coatings supplied and approved by manufacturer. Install to manufactures instructions.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.2 ASTM A653/A653M-09a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM A792/A792M-09a, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process.

.4 ASTM C1177/C1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.5 ASTM D523-08, Standard Test Method for Specular Gloss.

.6 ASTM D822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.2 Health Canada.

.1 Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).

.3 NBC, National Building Code of Canada edition stated in Section 01 41 00 - Regulatory Requirements.

.4 Roofing Contractors Association of British Columbia (RCABC).

.1 RGC, RCABC Guarantee Corporation.

.2 RGC Manual, RGC Roofing Practices Manual published by RCABC.

1.2 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for Glazing materials and sealants. Include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS - Material Safety Data Sheets.

.1 Indicate VOC for glazing materials during application and curing.

.3 Manufacturers instructions

.1 Submit installation instructions

1.3 QUALITY ASSURANCE

.1 Comply with RCABC published manuals, detail and specifications and with metal roof manufacturer recommendations, unless detailed/indicated or stated otherwise. Comply with more stringent requirements of these 2 provisions.

.2 Engage crew(s) of competent, qualified trade workers, using adequate plant and equipment to perform work of this Section.

.3 Health and safety requirements: do construction occupational health and safety in accordance with WorkSafe B.C. Requirements.

1.4 PERFORMANCE REQUIREMENTS

.1 Provide metal roofing that will:

.1 withstand wind loads, snow loads and rain loads listed in NBC for building location, unless more stringent values are identified on drawings,

.2 accommodate local temperature extremes,

.3 accommodate building movement per NBC,

.4 withstand snow loads on standing seams using proprietary clamps and

.5 produce watertight installations.

.2 Provide for drainage of any trapped moisture to exterior, discharging moisture in a manner avoiding staining of architectural finishes, collecting in puddles, formation of icicles and dripping onto pedestrians.

.3 Design metal roofing and connections for seismic conditions for building location listed in NBC.

.4 Design snow guards including spacings and fastening to withstand snow loads listed in NBC for building location.

.5 Use qualified professional structural engineer registered in British Columbia for:

.1 Wind load and seismic designs.

.2 Snow guard designs.

1.5 DESIGN CRITERIA

.1 Provide metal roofing system that is:

.1 continuous from ridge to eaves without horizontal lap or horizontal seam,

.2 free of through fasteners, except at ridges where all such fasteners must be covered by cap flashings and

.3 not dependant on sealants for primary exclusion of water.

1.6 SUBMITTALS

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

.2 Product data:

.1 Submit manufacturer printed product literature, specifications and data sheets for sheet membranes and for insulation. Include:

.1 Product characteristics.

.2 Performance criteria.

.3 Limitations.

.2 Provide mill certificates for sheet metal materials indicating country of origin.

.3 Submit Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).

.1 Indicate precautions for workers during handling of primers, mastics and sealant products.

.3 Shop drawings:

.1 Indicate arrangements of sheets and joints, types and locations of fasteners and special shapes and relationship of panels to building roof framing.

.2 Indicate snow guard attachment.

.3 Submit shop drawings under seal of same qualified professional structural engineer responsible for wind, seismic and stanchion designs.

.4 Samples:

.1 Submit full colour range of metal roofing for DFO Representative colour selection use.

.2 Submit samples of metal roofing for final finish/colour verification prior to ordering project material. Samples to be cured finish applied to metal. Paper colour samples not acceptable.

.3 Submit 300 mm length full width metal roof panel of each type proposed for use prior to commencement of work.

.5 Manufacturer instructions:

.1 Submit manufacturer installation instructions.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Store and handle pre-formed and pre-finished materials in a manner to prevent permanent deformation and marring of surfaces and finishes.

.2 During storage, keep materials away from corrosive materials and elements.

.3 Store materials requiring protection from weather in weatherproof shelters. Avoid exposing light or heat sensitive materials to sunlight for prolonged periods of time.

.4 Do not store materials on roof in concentrations which exceed design live loads.

.5 Protect installed work and materials from damage. Replace damaged materials and damaged roofing panels, at no additional cost to Contract.

.6 Protect surfaces and finishes adjacent to work from damage. Where hoisting is necessary, hang tarpaulins to protect walls during delivery of materials from ground to installation level.

.7 Make good damage caused by insufficient protection, at no additional cost to Contract.

1.8 JOB CONDITIONS

.1 Do not install during periods of precipitation to prevent moisture from becoming trapped in assemblies.

.2 Do not apply roofing to wet, frozen or unsuitable deck surfaces.

.3 Do not expose material vulnerable to water or sun damage in quantities greater than what can be weatherproofed during same day.

.4 Limit access across installed metal roofing to:

.1 roofing trade,

.2 testing agency,

.3 DFO Representative and

.4 roofing manufacturer representative.

.5

1.9 WASTE MANAGEMENT AND DISPOSAL

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

1.10 WHMIS

.1 Comply with WHMIS requirements regarding use, handling and storage of primers, mastics and sealants.

1.11 INSPECTION AND WARRANTY

.1 Inspection:

.1 Appoint and pay costs for RCABC listed inspection agency to verify that roofing meets required RCABC Guarantee Standards. Perform remedial work directed by inspection agency to make roofing meet required RCABC Guarantee Standards, at no additional cost to Contract.

.2 Inspections to be daily at start of roofing as would be required for required RCABC Guarantee.

.3 Accompany inspection agency during inspections.

.4 Correct all defects and irregularities, at no additional cost to Contract.

.2 Warranty:

.1 For Work of this Section, 12 months warranty period is extended to:

.2 60 months that roofing and related flashings will remain in place and maintain leakproof assemblies. Warranty to be form of RGC FIVE (5) Year Guarantee.

.3 Start warranty at date of Final Certificate of Completion.

1.12 CLOSEOUT SUBMITTALS

.1 Provide following in accordance with Section 01 78 00 - Closeout Submittals.

.1 "RCABC Roofing System Records" which includes RGC Guarantee, copies of inspection reports and Roof Maintenance Guide.

.2 Certification under seal of same professional engineer responsible for sealing shop drawings that roofing and snow guards have been installed in accordance with sealed shop drawings.

Part 2 Products

2.1 SHEET METAL MATERIALS

.1 Zinc coated steel sheet: to ASTM A653/A653M, commercial quality, Grade 33 with Z275 designation galvanized zinc coating.

.2 Aluminum-zinc alloy coated steel sheet: to ASTM A792/A792M, commercial quality, Grade 33 with AZM180 designation coating, pre-finished.

.1 Pre-finish aluminum-zinc alloy coated sheet steel with coil stock applied polyvinylidene fluoride gloss paint on epoxy primer prior to profile fabrication with colour coat containing not less than 70% pvdf resin. Include permanent-type treatment to reverse side of coil stock to prevent corrosion of backside surfaces.

.1 Class F2S.

.2 Colour: selected by DFO Representative.

.3 Specular gloss: 30 units +/-5 to ASTM D523.

.4 Coating thickness: not less than 22 micrometres.

.5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20% to ASTM D822 as follows:

.1 Outdoor exposure period 2500 hours.

.2 Humidity resistance exposure period 5000 hours.

.3 Sheet metal materials to be produced by North American mills.

2.2 COMPONENTS

.1 Screw fasteners with plates: self-drilling self-tapping screws fitted, for fixing roof clips to sheathing roof deck.

.2 Underlayment: minimum 1 mm thick self-adhering composite sheet membrane, suitable for applications at temperatures above 10 degrees C; comprised of 0.8 mm thick rubberized asphalt full bonded to 0.1 mm thick film of polyethylene; incorporating an edge bead of rubberized asphalt or sealant at laps to seal at joints,

top surface embossed or sanded to provide slip resistance for workers during installation; complete with system primer, mastic and sealant recommended by membrane manufacturer to suit substrate and application conditions.

.3 Vent mat: proprietary rainscreen drainage mat, nominal 10 mm thick, consisting of extruded polymer matrix of tangled monofilaments, weighing 260 g/m^2.

.4 Roofing clips: zinc coated sheet steel purpose-made formed shapes, designed specifically to engage and friction retain metal roofing panels allowing for panel movement.

.5 Metal roofing panels:

.1 Description: factory fabricated or site rolled metal roof panels suitable for concealed clip installation, with site machine-rolled locking (cinched) edge seams, with no horizontal seams. Site rolled profile is to be full length, one piece for entire slope of roof.

.2 Profile: coverage, profile and colour acceptable to DFO Representative to match adjacent metal roof system, minimum 25 mm high edges, with intermediate minor ribs to lessen oil-canning between edge seams.

.3 Material: minimum 0.61 mm (24 ga.) design thickness aluminum-zinc coated sheet steel.

.6 Fasteners:

.1 Concealed locations: stainless steel alloy or galvanized steel, type of sizes/strengths required for adequate anchorage of components.

.2 Exposed locations: stainless steel, type of sizes and strengths required to provide adequate anchorage of components, socket head design, complete with self-sealing soft neoprene washers.

.7 Filler strips: closed cell PVC or neoprene foam, over-sized 30-50% to ensure tight fitting installation.

.8 Sealants: non-sag polyurethanes, to provide permanent seal at temperature ranges anticipated, 25 to 30 year service rating, colours selected by DCC Representative where exposed to view.

.9 Touch-up coating: paintable type recommended by panel manufacturer for use in repairing minor surface damage.

.10 Gutters and downpipes: Material: constructed from minimum 0.61 mm (24 ga.) thickness aluminum-zinc coated sheet steel to match roof type.

2.3 FABRICATION

.1 Fabricate items in accordance with reviewed shop drawings.

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

.3 Fabricate all components in sizes required to produce least number of joints.

.4 Fabricate metal roof panels using commercial production quality progressive die forming equipment capable of producing repeated identical straight, accurate, crisp formed panels free of distortion, buckles and damage to pre-finished surfaces.

.5 Trim, edging, flashings, fascia:

.1 Fabricate using minimum 0.61 mm (24 ga.) design thickness aluminum-zinc coated sheet steel to match roof panels, unless noted otherwise on drawings.

.2 Fabricate flashings required for metal roof areas. Produce in accordance with RCABC standards and details or metal roofing system standards whichever more stringent. Use standing seam construction throughout spaced to align with metal roof standing seams.

.3 Hem exposed edges. Fold under minimum 10 mm.

2.4 SNOW GUARDS

.1 Description: proprietary engineered devices consisting of continuous horizontal tubing spanning between guard blocks/flags to retain snow from sliding off roof eaves.

.2 Fabrication:

.1 Snow guard blocks/flags: extruded and milled 6061-T6 aluminum.

.2 Tubing: 25 mm o.d. x 3 mm wall thickness 6005-T5 aluminum.

.3 Threaded couplings: 125 mm long 6061-T6 aluminum.

.4 End caps: Type 302 stainless steel.

.5 End collars: 6061 T-6 aluminum shaft collars.

.6 Fasteners: Type 302 or Type 304 stainless steel.

.3 Finish: powder coated, in colour selected by DFO Representative to best match metal roofing.

Part 3 Execution

3.1 MANUFACTURERS INSTRUCTIONS

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

3.2 INSTALLATION

.1 General: install metal roof system in accordance with reviewed shop drawings.

.2 Underlayment:

.1 Apply membrane in accordance with material manufacturer directions to obtain 100% adhered installation, including application of primers to roof deck and adjacent surfaces that will receive membrane.

.2 Arrange joints to shed moisture down roof

.3 Vent mat:

.1 Apply over completed underlayment installations to enhance venting of underside of metal roofing.

.4 Roof panels and flashings:

.1 Install roof panels to comply with RCABC requirements and roofing manufacturer recommendations complete with associated flashings and assembly components.

.2 Use metal roofing manufacturer proprietary fastener clips to anchor roof panels to deck.

.3 Form and tailor panels to ensure weathertight installation.

.4 Install metal panels, associated flashings and assembly components rigidly secured in place, with laps as required to allow for expansion/contraction, weathertight and to meet performance requirements specified.

.5 Install components progressively, in a manner to prevent damage to finished surfaces.

.6 Install related metal flashings.

.5 Snow guards:

.1 Install in accordance with reviewed shop drawings.

.2 Install without compromising water tightness of installed metal roofing.

3.3 REPAIR AND REPLACEMENT

.1 Replace metal roofing and flashings that show visible dents, buckling, warp, holes, cuts and excessive damage.

.2 Touch up minor paint damage. Extent of paint touch-up is subject to DFO Representative approval.

3.4 CLEANING

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

.2 Clean metal roofing and flashings to remove all stains and marks caused during installation. Remove excess sealant with recommended solvent.

.3 Remove surplus materials, rubbish, tools and equipment barriers.

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-19.13- M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.

.3 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.

.4 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

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

.1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

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

.2 Product Data:

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

.2 Manufacturer's product to describe:

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Samples:

.1 Submit samples of each type of material and colour.

.2 Cured samples of exposed sealants for each colour where required to match adjacent material.

.4 Manufacturer's Instructions:

.1 Submit instructions to include installation instructions for each product used.

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 Storage and Handling Requirements:

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

1.4 WHMIS

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

1.5 WASTE MANAGEMENT AND DISPOSAL

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

1.6 SITE CONDITIONS

.1 Environmental Conditions:

.1 Proceed with installation of joint sealants only when:

.1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.

.2 Joint substrates are dry.

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

.2 Joint-Width Conditions:

.1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Proceed with installation of joint sealants only after contaminants capable of

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

Part 2 Products

2.1 SEALANT MATERIALS

.1 VOC limit maximum 250 g/L for sealers used within the building envelope.

.2 Where sealants are qualified with primers, use only these primers as recommended by manufacturer.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Polyurethanes: colours selected by DFO Representative.

.1 Non-sag formulation: 1-part, to CAN/CGSB-19.13, Type 2, MCG-2-25, MCG-2-40.

.2 Self-levelling formulation:

.3 1-part: to CAN/CGSB-19.13, Type 1.

.4 2-part: to CAN/CGSB-19.24, Type 1, Class B.

.2 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 Preformed compressible and non-compressible back-up materials:

.1 Polyethylene, urethane, neoprene or vinyl foam:

.1 Extruded closed cell foam backer rod.

.2 Sized as required.

.2 Neoprene or butyl rubber:

.1 Round solid rod, Shore A hardness 70.

.3 High density foam:

.1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m^3 density, or neoprene foam backer, size as recommended by manufacturer.

.4 Bond breaker tape:

.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

.1 Junctions between floor edges and foundation walls to produce permanent sealed vapour-resistant joints, junctions between new floor edges and existing floor edges to produce permanent sealed joints.

.1 Polyurethane, self-levelling.

.2 Penetrations in exterior walls door frames to fill joints watertight including but not limited to exterior perimeters of door frames, exterior perimeters of wall vents; exterior perimeters of all other wall penetrations into concrete block.

.1 Polyurethane, non-sag.

.3 Interior perimeters of door frames, frames to make junctions filled, smooth and invisible suitable for subsequent "painting out" with interior wall finishes.

.1 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 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.2 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.3 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.4 MIXING

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

3.5 APPLICATION

.1 Sealant:

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing:

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Non-rated, pressed steel frames.

.2 Non-rated, hollow metal steel doors.

1.2 RELATED SECTIONS

.1 Section 08 71 00 - Door Hardware: Hardware, silencers, and weather-stripping.

.2 Section 08 80 50 - Glazing.

.3 Section 09 91 23 – Exterior Painting: Field painting of frame and door.

1.3 REFERENCES

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

.2 CSDFMA (Canadian Steel Door and Frame Manufacturers Association).

.3 DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

.4 SDI-100 - Standard Steel Doors and Frames.

1.4 SUBMITTALS

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Indicate frame configuration and finishes. Indicate door configurations, location of cut-outs for hardware reinforcement.

.3 Shop Drawings: Indicate frame elevations, reinforcement, anchor types and spacings, location of cut-outs for hardware, and finish. Indicate door elevations, internal reinforcement, closure method, and cut-outs for glazing, louvers, and finishes.

1.5 QUALITY ASSURANCE

.1 Conform to requirements of CSDFMA SDI-100.

1.6 REGULATORY REQUIREMENTS

.1 Not used

1.7 PROJECT CONDITIONS

.1 Coordinate the work with new masonry construction opening for door, door and hardware installation.

Part 2 Products

2.1 FRAMES

.1 Frames: 0.058 inch thick material, base metal thickness with ZF75 coating.

.2 Removable Stops: Rolled steel shape, mitered corners; prepared for countersink style tamper proof screws.

.3 Anchors: purpose made to rigidly secure frames, 3 per jamb for grout in application.

.4 Primer: Zinc chromate type.

.5 Silencers: Resilient rubber set in steel fitted into drilled hole.

.6 Aluminum threshold: as scheduled, door frames to allow for threshold to be installed fully underneath the frames, outside of jamb to jamb at rough opening.

.7 Metal grout box at strike location, fully sealed to prevent grout migration.

2.2 DOORS

.1 Honeycomb Core Doors: minimum, 1.2 mm surface sheets and top and bottom end channels; cores filled with honeycomb material laminated under pressure to surface sheets.

.2 Reinforcement for hardware:

.1 Locks: minimum 1.52 mm steel.

.2 Butts: minimum 3.42 mm steel.

.3 Flush Bolts: minimum 3.42 mm steel.

.4 Door Closures: minimum 1.9 mm steel.

.3 Glazing Stops: 0.9 mm rolled steel channel shape, butted corners; 16 mm high profile; prepared for countersink tamper proof screws.

2.3 FABRICATION FRAMES

.1 Fabricate frames as a single welded unit.

.2 Fabricate frames with hardware reinforcement plates welded in place.

.3 Reinforce frames, wider than 1 200 mm with roll formed steel channels fitted tightly into frame head, flush with top.

.4 Prepare frames for silencers. Provide three single silencers for single doors and mullions of double doors on strike side. Provide two single silencers on frame head at double doors without mullions.

.5 Attach channel spreaders at bottom of frames for shipping.

2.4 FABRICATION - DOORS

.1 Fabricate hollow metal doors and panels in accordance with requirements of "Canadian Manufacturing Standards for Steel Doors and Frames" produced by the Canadian Steel Door and Frame Manufacturer's Association and as indicated on Drawings. Fabricate doors with hardware reinforcement welded in place.

.2 Reinforce and prepare doors to receive all hardware. Refer to Section 08 71 00 for hardware requirements.

.3 Doors provided with reinforcing to accept an insulated glazing unit and appropriate metal glazing stops mounted from the inside with tamper proof fasteners.

.4 Fabricate door to accept 8mm thick tempered glazing vision panel.

Part 3 Execution

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify that opening sizes and tolerances are acceptable.

3.2 INSTALLATION

.1 Install frames in accordance with CSDFMA.

.2 Coordinate with masonry construction, for anchor placement, use anchor types to allow for frames to be grouted in solid fully all around.

.3 Coordinate installation of glass, glazing and stops.

.4 Coordinate installation of doors and frames with installation of hardware specified in Section 08 71 00

.5 After installation, touch up all scratched or damaged surface and prime.

.6 Install door louvers, plumb and level as/when required by mechanical trade.

3.3 ERECTION TOLERANCES

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

.2 Clearance on steel doors at head and jambs shall be: 3 mm maximum, maximum between pairs of doors

3.4 ADJUSTING

.1 Adjust door for smooth and balanced door movement.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Manual overhead sectional door.

.2 Operating hardware, supports.

1.2 RELATED SECTIONS

.1 Section 04 22 00 Concrete Unit Masonry : reinforcing prepared opening in concrete block openings.

.2 Section 07 92 00 - Joint Sealants: Perimeter sealant and backup materials.

1.3 REFERENCES

.1 ANSI A216.1 - Sectional Overhead Type Door (NAGDM 102).

.2 ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

.4 ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.4 SYSTEM DESCRIPTION

.1 Panels: steel, un-insulated.

.2 Lift Type: Low headroom operating style with track and hardware.

.3 Operation: Chain hoist

.4 Loads: Design and size components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with British Columbia Building Code (BCBC) and the National Building (NBC) which ever is the most stringent.

.5 Design door assemblies to withstand:

- .1 Local wind loads listed without suffering reduction in operation.
- .2 Local seismic conditions listed without suffering collapse or becoming dislodged from wall openings.
- .3 Design door assembly to withstand not less than 50,000 cycles per year and not less than 5 years total life cycle.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, installation details and installation for a low headroom condition.

.3 Product Data: Provide component construction, anchorage method, hardware, and

.4 Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

.5 Shop drawings:

.1 Submit drawings stamped and signed by qualified professional structural engineer registered or licensed in British Columbia.

.2 Indicate sizes, service rating, types, materials, operating mechanisms, details, hardware and accessories and required clearances.

1.6 QUALITY ASSURANCE

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

.2 Single-Source Responsibility: Provide doors, tracks and accessories from one manufacturer.

1.7 WARRANTY

.1 Correct defective Work within a [one] 1 year period after Date of Substantial Completion.

Part 2 Products

2.1 MANUFACTURERS

.1 Richards Wilcox:

.2 Steelcraft:

.3 Overhead Door:

2.2 PANEL CONSTRUCTION

.1 Panel Assembly: Assembly with rabbeted meeting rails to provide full-width interlocking detail for structural rigidity.

.2 Panel Thickness: 2 inches (51 mm).

.3 Exterior Surface: Ribbed.

.4 Section Material: Nominal 22 gauge, galvanized steel.

.5 Center and End Stiles: 14 gauge steel.

.6 Springs: Rated for minimum 50,000 cycles.

.7 Finish and Color: Two coat baked-on polyester, white color.

2.3 DOOR COMPONENTS

.1 Track: Rolled galvanized steel minimum 2.3mm thick; 50mm wide, continuous one piece per side; galvanized steel mounting brackets, 3 mm thick.

.2 Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of 3mm galvanized steel, floating hardened steel bearing rollers, located at top and bottom of each panel, each side.

.3 Lift Mechanism: Torsion spring, oil tempered with brackets for low headroom installation, with braided 3mm galvanized steel lifting cables.

.4 Manual Operation: A design for a maximum exertion of 25 lbs. force.

.5 Track guards: not less than 4 mm core thickness, formed galvanized sheet steel, mounted 1500 mm high from floor.

.6 Sill Weatherstripping: Resilient and hollow EPDM rubber tube seal strip, one piece; fitted to bottom of door panel, full length contact.

.7 Jamb Weatherstripping: Roll formed aluminum section full height of jamb, fitted with EPDM rubber seal, one piece full length, placed in moderate contact with door panels.

.8 Head Weatherstripping: EPDM rubber seal, one piece full length.

.9 Panel Joint Weatherstripping: Neoprene foam seal one piece full length.

.10 Lock: Inside side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle; lock, keyed alike master keyed to match that of man door.

2.4 FINISHES

.1 Door sections: 2 coat baked-on paint system consisting of primer plus polyester finish coat.

.2 Colour: selected by DFO Representative.

2.5 EXAMINATION

.1 Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

2.6 PREPARATION

.1 Prepare opening to permit correct installation of door unit to perimeter air and vapour barrier seal.

2.7 INSTALLATION

.1 Install door unit assembly in accordance with [manufacturer's instructions.]

.2 Anchor assembly to wall construction and building framing without distortion or stress.

.3 Securely brace door tracks suspended from structure. Secure tracks to structural members.

.4 Fit and align door assembly including hardware.

.5 Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 92 00.

2.8 ERECTION TOLERANCES

.1 Maximum Variation from Plumb: 1.5 mm.

.2 Maximum Variation from Level: 1.5 mm.

.3 Longitudinal or Diagonal Warp: Plus or minus 3 mm from 2 m straight edge.

.4 Maintain dimensional tolerances and alignment with adjacent work.

2.9 ADJUSTING

.1 Adjust door assembly to smooth operation and in full contact with weather stripping when in closed position.

2.10 CLEANING

.1 Clean doors, frames, and hardware.

.2 Remove temporary labels and visible markings.

2.11 PROTECTION OF FINISHED WORK

.1 Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Hardware for hollow metal steel doors and pressed steel door frames.

.2 Thresholds

.3 Weatherstripping, seals, and door gaskets.

1.2 RELATED SECTIONS

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

.2 Section 08 80 50 Glazing.

1.3 REFERENCES

.1 American National Standards Institute (ANSI).

.1 ANSI/BHMA A156.1-2006, American National Standard for Butts and Hinges.
.2 ANSI/BHMA A156.2-2003, Bored and Preassembled Locks and Latches.
.3 ANSI/BHMA A156.6-2005, Architectural Door Trim.
.4 ANSI/BHMA A156.18-2006, Materials and Finishes.

.2 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).

.1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.

.3 NBC, National Building Code of Canada (issue date listed in Section 01 41 00 - Regulatory Requirements).

1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00: Submission procedures.

.2 Samples:

.1 Provide hardware samples requested by DFO Representative.
.2 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.

.3 Shop Drawings:

.1 Provide product data sheets to describe fully to Departmental Representative all products of this Section.
.2 Include descriptions of materials, composition, cautions, installation requirements.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

.1 Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

.2 Special tools:

.1 Provide 2 sets of wrenches for each type of door closer and lock set installed, for project maintenance use.

.2 At completion of installations and adjustments turn over to DFO Representative all tools supplied by hardware manufacturers with hardware items installed for later use in hardware maintenance. Seal tools together with respective hardware data/installation sheets supplied with hardware in clear plastic bags.

1.6 QUALITY ASSURANCE

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

1.7 DELIVERY, STORAGE, AND PROTECTION

.1 Deliver, store and handle materials in accordance with respective material manufacturer requirements.

.2 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.3 Store door hardware in locked, clean and dry area.

.4 Include hardware templates and full installation/adjustment information.

.5 Supply hardware complete with all factory supplied mounting fasteners required for installation.

1.8 WASTE DISPOSAL AND MANAGEMENT

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

1.9 WARRANTY

.1 For Work of this Section 08 71 00 - Door Hardware, 12 months warranty period is extended to:

.1 60 months for door closers of this Section will be free from manufacturing defects.

.2 Manufacturing defects will be deemed to occur if any of following conditions are noted.

.1 Defects of material and factory workmanship.

.2 Fluids leaks.

.2 Defective products to be corrected, replaced or maintained without cost to Canada as necessary to enable such products to perform as warranted.

.3 Start warranties at date of Final Certificate of Completion.

Part 2 Products

2.1 MANUFACTURERS

.1 Hardware items to be of the best grade, free from defect and of first line quality production suitable for this level of project.

.2 Use one hardware manufacturer product only for each similar hardware item.

.3 Acceptable manufacturers:

.1 Hinges: McKinney, Stanley, Ives.
.2 Locks: Schlage, Sargent, Corbin.
.3 Closers: LCN, Sargent, Corbin.

2.2 HARDWARE - GENERAL

.1 General: refer to paragraph, 3.5 Hardware Schedule for further description and finishes of following items.

.2 Locks and latches:

.1 Bored and pre-assembled locks and latches: to ANSI/BHMA A156.2, series 2000 pre-assembled lock, grade 1, designed for functions scheduled.
.2 Mortise locks and latches: to ANSI/BHMA A156.13, series 1000 mortise lock, grade 1, designed for functions scheduled.
.3 Escutcheons: designs scheduled.
.4 Normal strikes: box type, lip projection not beyond jamb.
.5 Cylinders: keyed into keying system directed by Departmental Representative.

.3 Butts and hinges:

.1 Butts: to ANSI/BHMA A156.1, 5-knuckle, sizes x finishes scheduled, concealed bearing for scheduled doors, NRP.

.4 Door closers and accessories:

.1 Door controls (closers): to ANSI/BHMA A156.4, designated by letter C, sizes as required by NBC and to provide following requirements.
.2 Maximum degree of opening required.
.3 Size to door.

.5 Architectural door trim: to ANSI/BHMA A156.6, designated by letter J and as scheduled.

.1 Door protection plates.

.6 Door bottom seals: as scheduled, one length per door bottom without joins or splices.

.7 Thresholds: aluminum 200mm deep, full width outside of jamb to jamb, allowing to run under frame, one length per door opening without joins or splices.

.8 Weatherstripping/sound seals: durable, non-absorbing material, resistant to deterioration caused by aging, types and materials scheduled, one length per door head and side application without joins or splices.

2.3 KEYING

.1 Obtain final keying from DFO Representative before ordering.

.2 Prepare keying schedule in co-operation with DFO Representative.

.3 Assist in taking building off construction key system.

.4 Key locks into master key (MK) and grand master key (GMK) systems directed by DFO Representative.

.5 Key alike (KA) and key different (KD) locks directed by DFO Representative.

.6 Use a bonded locksmith for all keying work. Stamp all keys "Do Not Copy".

2.4 FINISHES

.1 Finishes: Identified in Schedule.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

3.2 INSTALLATION

.1 Install hardware in accordance with manufacturer's instructions.

.2 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.

.3 Use templates provided by hardware item manufacturer.

.4 Use only manufacturer supplied fasteners. Failure to comply may void manufacturer warranties and applicable licensed labels. Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

3.3 ADJUSTING

.1 Adjust hardware for smooth operation.

3.4 PROTECTION OF FINISHED WORK

.1 Do not permit adjacent work to damage hardware or finish.

3.5 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer instructions.

3.6 SCHEDULE

1.5 pair	Ives	Hinges	5BB1HW 114 x 114 NRP	26D
1 EA	Schlage	L9070-17A	Mortise Classroom Lever Keyed to existing system 70mm backset	626
1 EA	LCN	Door Closer	4041XP Rw/PA	689
1 EA	CBH	Wall Stop	CBH 133 (Concave)	26D
1 EA	DraftSeal	Threshold	DS5000 x Full Length required	AL
1 EA	DraftSeal	Rain Drip	DS162 x Length required C/w cap	AL
1 Set	DraftSeal	Weather-strip	DS130C 1 x width, 2 x height	C
1 EA	CBH	Kick Plate both sides	CBH 903 10 x length required	32D

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

- .1 ASTM D2240-05, Standard Test Method for Rubber Property - Durometer Hardness.
- .2 ASTM E84-10, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .3 ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .4 ASTM F1233-08, Standard Test Method for Security Glazing Materials and Systems.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
- .2 CAN/CGSB-12.8-9, Insulating Glass Units.
- .3 CAN/CGSB-12.9-M91, Spandrel Glass.
- .4 CAN/CGSB-12.10-M76, Glass, Light and Heat Reflecting.
- .5 CAN/CGSB-12.11-M90, Wired Safety Glass.

.3 IGMAC, Insulating Glass Manufacturer's Association of Canada, Glazing Guidelines for Sealed Insulating Glass Units..

.4 NBC, National Building Code of Canada (issue date listed in Section 01 41 00 - Regulatory Requirements).

.5 Underwriters' Laboratories of Canada (ULC).

- .1 .1 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.2 SUBMITTALS

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

.2 Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for Glazing materials and sealants. Include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS - Material Safety Data Sheets.
  - .1 Indicate VOC for glazing materials during application and curing.
- .3 Manufacturers instructions
  - .1 Submit installation instructions

1.3 QUALITY ASSURANCE

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

1.4 DESIGN CRITERIA

.1 Provide continuity of building enclosure barrier using glass and glazing materials as follows:

.1 Utilize light of units for continuity of air and vapour seal.

.2 Size glass to withstand local positive and negative wind loads listed in NBC for location of building or identified on structural drawings, whichever more severe.

.3 Size glass to withstand seismic conditions for building location listed in NBC.

1.5 DELIVERY, STORAGE AND HANDLING

1.6 WASTE MANAGEMENT AND DISPOSAL

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

1.7 WHMIS

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

1.8 WARRANTY

.1 For Work of this Section 08 80 50 - Glazing, 12 months warranty period is extended to:

.1 120 months for insulating glass units of this Section to be free from manufacturing defects.

.2 Manufacturing defects will be deemed to occur if any of following conditions are noted.

.1 Appearance of condensation between panes.

.2 Obstruction of vision within unit perimeter.

.3 Measurable deterioration (more than 10%) of specified thermal transmission or shading coefficient performance ratings.

.4 Chipping, cracking or breakage of glass panes occurring due to manufacturing defects or under specified service conditions.

.5 Migration or breakdown of edge spacer.

.2 Defective products to be corrected, replaced or maintained without cost to Canada as necessary to enable such products to perform as warranted.

.3 Start warranties at date of Final Certificate of Completion.

Part 2 Products

2.1 MATERIALS

.1 Flat Glass:

.1 Safety glass: to CAN/CGSB-12.1,

.1 Type 2-tempered.

.2 Class B-float.

.3 Transparent.

.4 8mm thickness minimum.

2.2 ACCESSORIES

.1 Setting blocks: neoprene, EPDM or silicone, 80-90 durometer hardness to ASTM D2240, to suit each application.

.2 Spacer shims: neoprene, EDPM or silicone, 50-60 durometer hardness to ASTM D2240, Sized to suit each application

.3 Glazing tape: Glazing tapes: pre-formed macro-polyisobutylene tape with continuous integral neoprene shim (to prevent "pumping out" of tape under glass load conditions), paper release, black colour, width x thickness to suit installations.

.4 Primers, sealers, cleaners: to glass manufacturer standards and compatible with framing system material/finish.

.5 Glazing sealant: purpose-made for glazing use, compatible with insulating glass units.

.6 Weather sealant: polyurethane, non-sag, 1-part formulation, colours selected by DCC Representative.

Part 3 Execution

3.1 MANUFACTURERS INSTRUCTIONS

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

3.2 GENERAL GLAZING REQUIREMENTS

.1 Clean sealing surfaces at perimeter of glass and sealing surfaces of rabbets before applying glazing tapes and sealant. Use solvent and cleaning agents recommended by manufacturer of sealing materials. Wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Install glazing tapes uniformly with accurately formed corners and bevels. Ensure that proper contact is made with glass and rabbet interfaces.

.4 Set glass on setting blocks, spaced as recommended by glass manufacturer. Place at least one block at quarter points from each corner.

.5 Centre glass in glazing rabbet to maintain required clearances at perimeter on all 4 sides.

.6 Use glazing sealant for heel beads to seal glazing vapour tight to frames..

.7 Make door glass installations rattle-free.

3.3 INSTALLATION

.1 Install glass to metal doors:

.1 Use glazing tape, on both sides. Butt tape tight at corners. Use full length pieces of glazing tape, from corner to corner.

.2 Install removable stops without displacing glazing tape.

.3 For interior side:

.4 Set glazing tape flush with glass sight line.

.5 Trim off glazing tape protruding above top of stops.

.6 For exterior side:

.7 Set glazing tape approximately 2 mm below glass sight line to allow cap bead of sealant.

.8 Place cap bead of weather sealant to exterior side full perimeter of glass.

.9 Apply sealant to uniform and level line, flush with sight line.

.10 Tool sealant to a smooth concave appearance.

3.4 CLEANING

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

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

.1 Remove traces of primer, caulking.

.2 Remove glazing materials from finish surfaces.

.3 Remove labels.

.4 Clean glass [and mirrors] using approved non-abrasive cleaner in accordance with manufacturer's instructions.

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

3.5 PROTECTION

.1 After installation, mark each light with an "X" by using removable plastic tape or paste.

.2 Remove markings when directed by DFO Representative

END OF SECTION

Part 1 General

1.1 REFERENCES

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

.1 Material Safety Data Sheets (MSDS).

.2 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - [February 2004].

.2 Standard GPS-1-05, MPI Green Performance Standard for Painting and Coatings.

1.2 QUALITY ASSURANCE

.1 Qualifications:

.1 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work

.2 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.

.3 Conform to latest MPI requirements for exterior painting work including preparation and priming.

.4 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.

.5 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

.6 Standard of Acceptance:

.1 Steel Door Frames: No defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Steel Doors: No defects visible from ground at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.3 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 30 – Health and Safety Requirements.

.3 Upon completion, submit records of products used. List products in relation to finish system and include the following:

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour numbers.

.4 Manufacturer's Material Safety Data Sheets (MSDS).

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

.1 Submit draw down paint samples according to Finish Schedule

.2 Finish schedule to be provided after contract award.

1.4 MAINTENANCE

.1 Extra Materials:

.1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Submit one, one litre can of each type and colour of finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials as follows:

.1 Deliver and store materials in original containers, sealed, with labels intact.

.2 Labels: to indicate:

.1 Manufacturer's name and address.

.2 Type of paint or coating.

.3 Compliance with applicable standard.

.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Provide and maintain dry, temperature controlled, secure storage.

.5 Observe manufacturer's recommendations for storage and handling.

.6 Store materials and supplies away from heat generating devices.

.7 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.8 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.2 Waste Management and Disposal:

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

.2 Paint finishes and related materials (thinners, solvents, etc.) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.

.3 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

.4 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.5 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground, the following procedures shall be strictly adhered to:

.1 Retain cleaning water for water-based materials to allow sediments to be filtered out.

.2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.

.3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.

.4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.

.5 Empty paint cans are to be dry prior to disposal or recycling (where available).

.6 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

.7 Close and seal tightly partly used sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

1.6 AMBIENT CONDITIONS

.1 Surface and Environmental Conditions:

.1 Do not apply sealers or paint in wet or inclement weather

Part 2 Products

2.1 MATERIALS

.1 Paint materials listed in latest edition of MPI Approved Products List (APL) are acceptable for use on this project.

.2 Paint materials for paint systems: to be products of single manufacturer.

2.2 COLOURS

.1 Exterior Color schedule to be provided by DFO Representative after Contract award.

.2 Colour schedule will be based upon selection of 1 base colours and 1 accent colours. No more than 2 colours will be selected for entire project and no more than 4 colours will be selected in each area.

.3 Colors will also include touch up materials for existing exterior finishes.

.4 Selection of colours will be from manufacturers full range of colours.

.5 Where specific products are available in restricted range of colours, selection will be based on the limited range

2.3 GLOSS/SHEEN RATINGS

.1 Paint gloss: defined as sheen rating of applied paint, in accordance with following values:

Gloss Level Category/	Units @ 60 Degrees/	Units @ 85 Degrees/
G4 - satin finish	20 to 35	min. 35

2.4 EXTERIOR PAINTING SYSTEMS

.1 Metal doors and frames- EXT 5.3G – WB light industrial coating to all surfaces.

2.5 MANUFACTURER'S INSTRUCTIONS

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

2.6 PREPARATION

.1 Perform preparation and operations for exterior painting in accordance with MPI Painting Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

.3 Clean and prepare exterior surfaces to be painted in accordance with MPI Painting Manual requirements. Refer to the MPI Manual in regard to specific requirements and as follows:

.1 Remove dust, dirt, and surface debris by wiping with dry, clean cloths.

.2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.

.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.

.4 Allow surfaces to drain completely and allow to dry thoroughly. Allow sufficient drying time and test surfaces using electronic moisture meter before commencing work.

.5 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.

.6 Many water-based paints cannot be removed with water once dried. Minimize use of kerosene or such organic solvents to clean up water-based paints.

.4 Clean metal surfaces to be repainted by removing rust, dirt, oil, grease and foreign substances in accordance with MPI requirements. Remove such contaminates from surfaces, pockets and corners to be repainted by brushing with clean brushes, blowing with clean dry compressed air, or brushing/vacuum cleaning as required.

.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.

.6 Do not apply paint until prepared surfaces have been accepted by DFO Representative.

.7 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

2.7 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 such surfaces as directed by Departmental Representative.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Protect passing pedestrians, building occupants and general public in and about building.

2.8 APPLICATION

.1 Apply paint by brush or roller. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:

.1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple.

.5 Remove runs, sags and brush marks from finished work and repaint.

.3 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.4 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.5 Sand and dust between coats to remove visible defects.

.6 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.

2.9 CLEANING

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

.1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section includes common work results for Divisions 21, 22, 23 and 25.

1.2 RELATED SECTIONS

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

1.3 DEFINITIONS

.1 Provide means supply and install.

.2 Consultant means WSP Canada Inc.

.3 Engineer means WSP Canada Inc.

.4 Departmental Representative means DFO construction manager.

.5 DFO means Department of Fisheries and Oceans.

.6 Work means material and labour.

.7 The specification sections are titled and divided under the headings of General, Products and Execution and under clause headings. These titles and headings are for general organization only and shall in no way limit or restrict the specification requirements.

1.4 GENERAL SCOPE

.1 Provide the work indicated in the Contract Documents and as required to provide complete, tested and fully operational systems including all work not normally indicated but necessary for a complete and operational installation.

.2 The Contractor is expected to be experienced and competent and knowledgeable about the trades and applicable codes, ordinances and industry standards and shall perform the work accordingly, on schedule and fully coordinated with all other trades.

.3 Except where precisely indicated, the Contract Documents are diagrammatic and generally indicating the scope of work, general arrangement, and establishing minimum quality and performance requirements. Where there are conflicting requirements the Contractor shall allow for and provide the better quality and/or greater quantity unless the conflicting requirements are interpreted otherwise in writing by the Departmental Representative .

.4 The Contract Documents for this Division are an integral part of the complete Contract Documents for the project and will be interpreted in conjunction with all other Divisions.

1.5 CODES, REGULATIONS AND STANDARDS

.1 Mechanical work shall conform to the following codes, regulations and standards, and all other codes in effect at the time of award of Contract, and any others having jurisdiction. The revision of each code and standard and their amendments which are adopted by the

Authority Having Jurisdiction shall apply unless otherwise specified in the Contract Documents:

.1 Bylaws
  .1 Local Building Bylaws.
.2 Canadian Standards Association
  .1 CSA Standard C22.1, Canadian Electrical Code.
.3 National Fire Codes
  .1 NFPA 10 Portable Fire Extinguishers.
.4 National Research Council of Canada
  .1 NRCC 23174 National Building Code of Canada.
  .2 NRCC 23178 National Building Code of Canada, Supplement.
  .3 NRCC 23175 National Fire Code of Canada.
.5 Province of British Columbia
  .1 BC Building and Plumbing Code (2012).
  .2 BC Fire Code (2012).
  .3 BC Amendment to Canadian Electrical Code.
  .4 BC Electrical Safety Branch Bulletins.
  .5 BC Industrial Health & Safety Regulations, WorkSafeBC.
.6 SMACNA Publications
  .1 HVAC Duct Construction Standards.
  .2 Fire, Smoke and Radiation Damper Installation Guide.
  .3 Guidelines for seismic restraints of mechanical systems.

.2 All specification references to the Building Code refer to the BC Building .

1.6 PERMITS AND FEES

.1 Obtain all required permits and pay all fees including service connection fees as applicable to the mechanical work. Comply with all Provincial, Municipal and other legal regulations and bylaws applicable to the work.

.2 Arrange for inspection of all Work by the Authorities Having Jurisdiction. On completion of the Work, furnish final unconditional certificates of approval by the inspecting authorities.

1.7 DRAWINGS AND MEASUREMENTS

.1 Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of work. They are not detailed installation drawings.

.2 Do not scale the drawings.

.3 Obtain accurate dimensions from the Architectural and Structural Drawings.

.4 Consult the Architectural drawings for exact locations of fixtures and equipment. Obtain this information from the Departmental Representative where not obtainable from the drawings.

.5 Field measure as required to size and locate services and equipment.

1.8 SITE VISIT

.1 Visit the site before tendering.

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

1.9 TENDER PERIOD ADDENDA

.1 Bidding Contractors may forward queries to the Departmental Representative during the tender period. Only issues included in issued, written addenda will affect the content of the tendered documents. No verbal information will be binding for the Contract.

.2 It is incumbent on the bidding contractors during the tender period to bring to the Departmental Representative's attention any discrepancies, conflicts, obscurities, omissions or lack of sufficient information in the Contract Documents. Where these are not clarified or corrected by addendum, allow for the most expensive interpretation.

1.10 LIST OF EQUIPMENT AND SUBTRADES

.1 Submit a list to the Departmental Representative of the manufacturer of equipment and material and the names of Subtrades intended to be used within ten [10] days of award of Contract.

.2 Items on the list may be changed only with the approval of the Departmental Representative. Changes may be considered where it is demonstrated that the change is necessary to maintain the construction schedule or where the change will mean substantial improvement in the final installation or where the named product or subtrade cannot meet the requirement of the specification. Revise and resubmit the list if and when any approved change is made.

1.11 PRICE BREAKDOWN

.1 Within ten [10] days of award of the Contract provide to the Departmental Representative a price breakdown in the following categories as applicable. This information is for the Departmental Representative's use in evaluating progress claims. All work shall be included and the component prices shall add up to the total Contract price.

.2 Prices for the Proposed Changes shall be submitted broken down sufficiently for the Departmental Representative's review and shall show mark-ups.

.3 Submit any further breakdown as determined by the Departmental Representative as necessary to allow assessment of Progress Claims or Proposed Changes.

.4 Price breakdown categories:

.1 Start-Up

.2 Building Underground Services:

.1 Material

.2 Labour

.3 Plumbing Piping Systems:

.1 Material
.2 Labour

.4 Ductwork
.1 Material
.2 Labour

.5 Air Handling Equipment
.1 Material

.6 Controls:
.1 Material
.2 Labour

.7 Commissioning, Testing,

.8 Contract Close Out (Record Drawings, Maintenance Manuals, Submissions).

.9 Total Mechanical Contract Price.

1.12 PROGRESS CLAIMS

.1 Submit a single figure for a Progress Claim showing total contract, previous approved claims total, amount of current claim and remaining amount, all both in dollar value and as a percent of the total.

.2 To assist and enable the Departmental Representative to review the Progress Claim amount, provide along with the claim a separate breakdown of the claim in the same categories as required under Price Breakdown showing the total, previous, current and remaining amounts in dollars and percent for each category. Also show the claims for each Change Order being progressed.

.3 The Departmental Representative's review is of the single figure total claim-to-date only. The Departmental Representative bears no responsibility for review of the breakdown portions.

.4 Progress Claims beyond 95% of the mechanical work may not be certified for payment until the commissioning is complete. This is to allow for holdback for deficiencies which are identified during commissioning.

1.13 WARRANTY

.1 Use of installed equipment during construction shall not shorten or alter the warranty period as specified in the General Conditions.

.2 Take note of and submit written information for any extended warranties specified.

1.14 WORKMANSHIP

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

.2 The Departmental Representative may reject any work not conforming to the Contract Documents or to accepted standards of performance, quietness of operation, finish or appearance.

.3 Employ only tradesmen with valid Provincial Trade Qualification Certificates. Tradesmen shall perform only work permitted by their certificates. Certificates shall be available for review by the Departmental Representative.

1.15 ACCESSIBILITY

.1 All work shall be readily accessible for adjustment, operation and maintenance.

1.16 SUBMITTALS

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

.2 Shop Drawings:

.1 Process:

.1 Shop drawings/product data shall be submitted as elsewhere specified.

.2 Shop drawings/product data shall be reviewed, signed and processed as described in the General Conditions and as further described by the Mechanical Contractors Association of British Columbia.

.2 Content:

.1 Shop drawings submitted title sheet (Mechanical Contractors Association of British Columbia).

.2 Data shall be specific and technical.

.3 Identify each piece of equipment.

.4 Information shall include all scheduled data.

.5 Advertising literature will be rejected.

.6 The project shall be identified on each document.

.7 Information shall be given in S.I. or Imperial units consistent with the system of units in the Contract Documents.

.8 The shop drawings/product data shall include:

.1 Dimensioned construction drawings with plans and sections showing size, arrangement and necessary clearances, with all equipment weights and mounting point loads.

.2 Mounting arrangements.

.3 Capacity and performance characteristics indicated on performance curves for fans and pumps.

.4 Sound Power Data, where requested.

.5 Motor efficiencies on motors 1 HP and larger.

.6 List of the manufacturers and figure numbers for all valves, traps and strainers.

.7 Detailed drawings of bases, supports and anchor bolts.

.8 Control explanation and internal wiring diagrams for packaged equipment.

.9 Pneumatic and electrical control system drawings.

.10 Interlock wiring and pneumatic control schematic diagrams including details of all component parts in order that the function of each is displayed.

.11 A written description of control sequences relating to the schematic diagrams.

.9 Clearly indicate selected options and accessories. Cross out any items that do not apply. Add any additional specified features such as finishes, high temperature seals, etc.

.3 Format:

.1 Black line print 216 mm x 280 mm [8-1/2” x 11”] or 280 mm x 430 mm [11” x 17”].

.2 Larger drawings may be submitted on reproducible sepia with space for stamps and signatures - master set plus one working copy.

.3 An assembly of related components, e.g. grilles, registers and diffusers or radiation with sheet metal cabinets, etc. between covers with the contents [identified by model number] listed on the front cover with item identification numbers.

.4 A brochure for plumbing fixtures between covers with the contents named with model numbers listed on the front cover with item identification numbers

.4 Number of copies:

.1 Provide a minimum of 3 copies for the Departmental Representative .

.5 Coordination: Where mechanical equipment requires electrical connections, power or other services, the shop drawings shall also be circulated through the Electrical Contractor or other "services" contractor(s) prior to submission to the Departmental Representative s.

.6 Keep one (1) copy of shop drawings and product data, on site, available for reference

.7 Review or non-review of shop drawings does not alter the requirements of the equipment and materials provided to conform to the specification.

.8 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

.3 Closeout Submittals:

.1 Operation and Maintenance Manuals:

.1 Provide maintenance data for incorporation into Operational and Maintenance manual .

.2 Provide one suitably sized 3-ring binder with suitable label with all required materials inside to the Departmental Representative as a draft copy for review. Make all required changes and resubmit the one binder to the Departmental Representative. Repeat until accepted. Then submit three manuals identical to the accepted copy to the Owner. Obtain a receipt and send a copy to the Departmental Representative.

.3 Provide an index and tab each section.

.4 The manual shall include:

.1 Commissioning report.

.2 Copy of any required approvals, certifications and acceptance by Authorities Having Jurisdiction.

.3 All shop drawings.

.4 List of local source of supply.

.5 Manufacturer’s operating and maintenance literature and wiring and control diagrams.

.2 Operating and Maintenance Manuals:

.1 Provide maintenance data for incorporation into Operational and Maintenance manual .

.2 Provide operation and maintenance data for incorporation into manual specified in the General Conditions.

.3 Operation data to include:

.1 Description of each system and its controls.

.2 Operation instruction for each system and each component.

.3 Description of actions to be taken in event of equipment failure.

.4 Maintenance data shall include:

.1 Servicing, maintenance, operating and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency of tasks, tools required and task time.

.5 Performance data to include:

.1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.

.6 Approvals:

.1 Submit two [2] drafts of Operating and Maintenance Manual to Departmental Representative for approval.

.2 Submission of individual data will not be accepted unless so directed by Departmental Representative.

.3 Make changes as required and re-submit as directed by the Departmental Representative.

.7 Additional Data:

.1 Prepare and insert into operation and maintenance manual when need for same becomes apparent during demonstrations and instructions.

.3 Site Records:

.1 Keep a set of contract prints on site for the sole purpose of keeping an up-to-date record marked in red of the installation of the mechanical work and site services where they vary from the drawings.

.2 Changes for all mechanical work and piped site service trades, including sketches for Change Orders and Site Instructions shall be kept on this set of drawings.

.3 For all buried new services and all existing services exposed by the work indicate the inverts and dimensioned locations at all connections and changes in direction.

.4 Services shall not be buried or concealed until the Record Drawings are up-to-date for the services.

.5 All inaccessible concealed services shall be accurately located.

.6 Minor changes in the routing of services within a space which are readily observable and obvious after all construction is complete, need not be recorded.

.7 Identify each drawing in lower right hand corner in letters at least 10 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" and under this add the Contractor's name, an authorized signature and the date.

.8 Submit the prints for review by the Departmental Representative. Make any additional changes identified by the Departmental Representative including returning to the site if necessary to make measurements and/or to confirm installation locations and details. Resubmit to the Departmental Representative.

.4 Record Drawings:

.1 Upon completion of the Departmental Representative's review, submit final Record Drawings to the Departmental Representative. Final record drawings shall include revised CAD files and one set of plots on 0.15 mm [0.003"] mylar to be prepared by a qualified draftsperson to the same standards as the original drawings.

.2 The Departmental Representative will prepare mylar record drawings and submit them to the Contractor. The Contractor shall add the contracting firm's name and authorized signature and date certifying the drawings as "RECORD DRAWINGS" and return them to the Departmental Representative.

1.17 QUALITY ASSURANCE

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

1.18 DIMENSIONS AND UNITS

.1 The Contract Documents are generally in metric units and in places are followed by non-metric equivalents in square brackets.

.2 Generally the conversions for the equivalents are not exact but close enough that both are sufficiently accurate to be used.

.3 Many sizes or capacities shown are an indication of a nominal size, not an exact dimension, and these are as generally understood by the trade.

.4 Pipe sizes are nominal pipe sizes. Neither the metric size in mm or the often used Imperial sizes in inches are either equal to the inside or outside diameter of the pipe; they are used as follows to be equivalent to the NPS sizes (Nominal Pipe Size):

.1 NPS 1/2, 12 mm, 1/2".

.2	NPS 3/4,	20 mm,	3/4”.
.3	NPS 1,	25 mm,	1”.
.4	NPS 1-1/4,	30 mm,	1-1/4”.
.5	NPS 1-1/2,	40 mm,	1-1/2”.
.6	NPS 2,	50 mm,	2”.
.7	NPS 2-1/2,	65 mm,	2-1/2”.
.8	NPS 3,	75 mm,	3”.
.9	NPS 4,	100 mm,	4”.
.10	NPS 5,	125 mm,	5”.
.11	NPS 6,	150 mm,	6”.
.12	NPS 8,	200 mm,	8”.
.13	NPS 10,	250 mm,	10”.
.14	NPS 12,	300 mm,	12”.

.5 Duct sizes are intended to be the actual size shown. However, some duct products are premanufactured in standard sizes or a sheet metal shop may be set up to work in standard sizes (generally Imperial based sizes) in which case a size shown in metric shall be soft converted to the Imperial inch size which is slightly larger e.g.:

.1 300 mm shall be 12”.

.2 600 mm shall be 24”.

.3 1200 mm shall be 48”.

.6 Sheet metal thickness is shown in gauges (ga) only as it is not generally referred to in its metric or Imperial thickness.

.7 Equipment dimensions are nominal sizes but are close to actual size. A 600 x 600 diffuser shall be close to 600 x 600 mm in overall dimension but where it is in a T-bar grid ceiling it shall be sized to lay in the grid whether it is a metric grid at 600 mm centres or an Imperial grid at 609 mm centres. A 600 x 600 mm surface mounted diffuser will be larger overall than 600 x 600 mm depending on the flange width.

1.19 DELIVERY, STORAGE, AND HANDLING

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

Part 2 Products

2.1 MAINTENANCE

.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Obtain signed receipt from the Owner when spare parts are handed over.

.3 Provide one set of special tools required to service equipment as recommended by manufacturers .

2.2 PRODUCT QUALIFICATION

.1 Standard of Acceptance means that the item named and specified by manufacturer and/or model or catalogue number forms part of the specification and sets standards regarding performance, quality of material and workmanship and when used in conjunction with a referenced standard, shall be deemed to supplement the standard.

.2 The product indicated Standard of Acceptance was used in preparing the design. Tenders may be based on the Standard of Acceptance or on any Acceptable Product provided that they meet every aspect of the drawings and specifications including efficiency and energy consumption.

.3 Where multiple manufacturers and or models are named but no single one is indicated as Standard of Acceptance, any one of those named shall be acceptable provided they meet the specified requirements.

.4 Where other than the Standard of Acceptance is selected or approved, include for the cost of any resulting work (both under this Division and other Divisions) and any necessary redesign of installation or structure. Submit redesign drawings for review with Shop Drawings. Maintain installation, access and servicing clearances. Redesign drawings shall be to scale and of a standard equal to the Project Drawings.

.5 Multiple items of equipment material of the same type shall be of the same manufacturer.

.6 Install and test all equipment and material in accordance with the detailed instructions and recommendations of the manufacturer.

.7 A visible nameplate shall indicate manufacturer's name, model number, serial number, capacity data, electrical characteristics and approval stamps.

2.3 ADDITION OF ACCEPTABLE MANUFACTURERS

.1 Material or products of a manufacturer other than those named as Acceptable Product may be submitted to the Consultant for consideration not later than ten [10] working days prior to closing of tender or of bid depository subtrade tender whichever is earlier.

.2 Addition of manufacturer's names as Acceptable Products will be by addendum only.

2.4 CENTRIFUGAL - IN-LINE

.1 In-line centrifugal fan with axial flow construction and integral backdraft damper.

.2 Square housing, steel with galvanized or baked powder paint with ceiling exhaust opening complete with aluminum exhaust grille.

.3 Hinged door to provide cleaning and service access.

.4 Backward inclined, non-overloading wheel.

.5 Drip-proof motor.

.6 Permanently lubricated pillow block ball bearings.

.7 Rust preventative coating on shafts.

.8 Direct driven as scheduled.

.9 Accessories:

.1 Twist lock electrical disconnect switch, mounted on the outside of the fan housing.

.2 Insulated housing lining.

.3 Solid state speed controller where scheduled.

.10 Standard of Acceptance: As scheduled on drawings or approved alternate

.11 Acceptable Products: Greenheck, Cook, Panasonic

2.5 DUCTS - GALVANIZED STEEL

.1 All ductwork shall be constructed and sealed to withstand without damage or permanent deformation at least 150% of the working static pressure.

.2 Construct rectangular ducts in accordance with Section I of the SMACNA Duct Standards. Of the tables and figures, use only Tables 1-5, 1-10, 1-11, 1-12, 1-13 and Figs. 1-4 through 1-18.

.3 500 Pa [2" w.g.] working static pressure on:

.1 All exhaust and relief air ductwork, except where otherwise specified (welding/sawdust exhaust).

2.6 BASEBOARD HEATERS - ELECTRIC

.1 Steel enclosure 178 mm [7"] high.

.2 Stainless steel element with aluminum fins.

.3 Integral over-temperature protection.

.4 Accessories:

.1 Wall mounted line voltage, integral thermostat.

.5 Capacity:

.1 As noted on the drawing.

.2 Electrical service: [208/1/60].

.6 Standard of Acceptance: As scheduled on drawings or approved alternate - CSA approved.

.7 Acceptable Products: Chaudair, Chromalox BL series, Q-Mark, Ouellet

2.7 UNIT HEATERS - ELECTRIC

.1 CSA approved.

.2 Electric Coils: Nickel - chrome electric resistance coils embedded in refractory material and enclosed in steel sheathing.

.3 Fan: Direct drive propeller type.

.4 Motor: Thermally protected, prelubricated sealed bearings and resilient motor supports.

.5 Air Outlet: Independently adjustable horizontal louvres.

.6 Controls:

.1 Overheat protection (automatic and manual reset).

.2 Magnetic contactor.

.3 Transformer for controls.

.4 Heater shall require only power wiring connections and remote wiring to temperature controller

.5 Shop drawings to include wiring diagrams.

.7 Cabinet: cold rolled steel, phosphatized, factory baked enamel, mounting brackets for rod hangers.

.8 Accessories:

.1 Mounting bracket for wall mounting.

.2 Built-in thermostat.

.9 Standard of Acceptance: As scheduled on drawings or approved alternate - CSA approved.

.10 Acceptable Products: Chromalox, Chaudair, QMark, Ouellet.

2.8 ASBESTOS

.1 All material/products provided shall be free of asbestos.

2.9 FASTENING TO BUILDING STRUCTURE

.1 Do not use inserts in base material with a compressive strength less than 13.79 MPa [2000 psi].

.2 All inserts supporting piping shall have a factor of safety of 5. All other inserts shall have a factor of safety of 4.

.3 Cast-in-place type:

.1 Channel type: Acceptable Product: Burndy, Canadian Strut, Unistrut or Cantruss.

.2 Wedge type galvanized steel concrete insert: Standard of Acceptance: Grinnell Fig. 281 for up to 200 mm [8”] pipe size.

.3 Universal type malleable iron body insert: Standard of Acceptance: Grinnell Fig. 282 for up to 200 mm [8”] pipe size.

.4 Screw concrete insert: Standard of Acceptance: Grinnell Fig. 152 for up to 300 mm [12”] pipe size.

.4 Drilled, mechanical expansion type:

.1 Standard of Acceptance:

.1 Hilti HSL or UCAN LHL heavy-duty anchors for use in concrete with compressive strength not less than 19.6 Mpa [2840 psi].

.2 Hilti Kwik-Bolt or UCAN WED stud anchor for concrete. (Do not use in seismic restraint applications).

.3 Hilti HKD or UCAN IPA drop-in anchor for concrete.

.4 Hilti or UCAN Sleeve Anchor (medium and light duty) for concrete and masonry.

.5 Hilti or UCAN Zamac pin bolt (light duty) for concrete and masonry.

.5 Drilled, adhesive type:

.1 Standard of Acceptance:

.1 Hilti or UCAN Adhesive Anchor consisting of anchor rod assembly with a capsule containing a two-component adhesive, resin and hardener.

.2 For use in concrete housekeeping bases (in vertical downward position) where the distance to the edge of the concrete base could cause weakness if a mechanical expansion type anchor were used.

.3 Rod assemblies shall extend a minimum of 50 mm [2"] into the concrete slab below the housekeeping bases.

.6 Note:

.1 All drilling for inserts shall be performed using the appropriate tool specifically designed for the particular insert. The diameter and depth of each drilled hole shall be to the exact dimensions as specified by the insert manufacturer.

.2 Refer to manufacturer's recommendations for tightening torques to be applied to inserts.

2.10 PERIMETER DRAINS

.1 Pipe and Fittings:

.1 Polyvinyl Chloride (PVC) series 100 perforated building sewer pipe and fittings conforming to CSA-B137.3.

.2 Perimeter drainage shall be nominal diameter 150 mm [6”] unless noted otherwise on the contract drawings.

.2 Cleanouts:

.1 Cleanouts shall be 100 mm [4”] minimum on pipe up to 150 mm [6”].

.2 For exterior cleanouts in traveled areas:

.1 Heavy-duty epoxy coated cast iron construction with a 12 mm [1/2"] thick cover, terminated at grade.

.2 Standard of Acceptance: Ancon CO-200 or approved alternate.

.3 Acceptable Products: Enpoco, J.R. Smith, Zurn.

.3 Drain Gravel: 100% granular material of 14 mm to 17 mm [9/16" to 11/16"] diameter.

.4 Pea Gravel: 100% granular material of 12 mm to 25 mm [1/2" to 1"] diameter.

.5 Filter Cloth:

.1 2.2 mm [0.0866”] thick polyester filter cloth.

.2 Standard of Acceptance: Amoco 4535 or approved alternate.

.3 Acceptable alternate manufacturers: Nilex, Permaliner, Staff, Terrafix, Mirafi.

2.11 INTERIOR CLEANOUTS

.1 Cleanouts shall be full size for pipe sizes up to 100 mm 4" and not less than 100 mm [4"] on larger sizes complete with a clamping collar other than outside or slab on grade type.

.2 Cleanouts in inside finished areas shall all be round. Covers shall be scoriated.

.3 All interior of building covers shall be nickel bronze.

.4 Pipe manufacturers' cleanouts are acceptable for vertical installation at the base of soil and waste stacks or rainwater leaders only.

.5 Make cleanouts with Barrett type fitting that has a bolted cover plate and gasket, fitting that has a threaded plug, or a cleanout ferrule that is installed in a wye or extended wye.

.6 Unfinished concrete area cleanouts shall be of heavy duty construction and have a fully exposed scoriated cover.

.1 Standard of Acceptance: Zurn Z1500 or approved alternate.

.2 Acceptable Product: Zurn Z1500, RTS, Enpoco, Watts

2.12 DRAIN, WASTE AND VENT PIPE AND FITTINGS

.1 Below ground:

.1 Class 4000 cast iron mechanical joint pipe to CAN/CSA-B70.

.1 Mechanical joints: Neoprene or butyl rubber compression gaskets to ASTM C564 or CAN/CSA-B70.

.2 Stainless steel clamps.

.2 Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Drain Waste and Vent Pipe Fittings.

.1 Conforming to CSA/CAN 3-B181.1 and ASTM F628.

.2 Standard of Acceptance: Canron Cellular Core ABS Schedule 40 DWV pipe marked "BC-W" or approved alternate.

.3 Acceptable Products: Scepter.

.4 Joints: solvent weld to ASTM D2235.

.3 Polyvinyl Chloride (PVC) Drain Waste and Vent Pipe and Pipe Fittings:

.1 Conforming to CSA B181.2.

.2 Joints: solvent weld to ASTM D2564.

.4 Additional requirements:

.1 Plastic (PVC or ABS) piping where used underground shall adapt to approved non-plastic material prior to penetration above the building slab; where such above slab piping will not be concealed within drywall or a non-flammable plumbing fixture.

.2 Pressure waste piping from pumping stations and other equipment shall be pressure piping and fittings as specified for domestic water.

.2 Above ground:

.1 DWV copper drainage pipe to ASTM B306

.1 Cast brass or wrought copper drainage pattern fittings to CAN/CSA-B125.

.2 Solder: 50/50 Sn/Pb recessed solder joints to ASTM B32.

.2 Class 4000 cast iron mechanical joint pipe to CAN/CSA-B70.

.1 Mechanical joints (up to 200 mm [8"]): Neoprene or butyl rubber compression gaskets to ASTM C564 or CAN/CSA-B70.

.2 Stainless steel clamps.

.3 Acrylonitrile-Butadiene-Styrene (ABS) Drain Waste and Vent Pipe Fittings (Fire separations limit the use of this material.)

.1 Conforming to CSA/CAN 3-B181.1 and ASTM F628.

.2 Standard of Acceptance: Canron Cellular Core ABS Schedule 40 DWV pipe marked "BC-W" or approved alternate.

.3 Acceptable Products: Scepter.

.4 Joints: solvent weld to ASTM D2235.

.4 Polyvinyl Chloride (PVC) Drain Waste and Vent Pipe and Pipe Fittings conforming to CSA B181.2. (Not to be used if penetrating fire separations.)

.1 Joints: solvent weld to ASTM D2564.

2.13 FLOOR/AREA DRAIN

.1 To CSA B79.

.2 Area Drain FD:

.1 Cast iron floor drain with anchor flange and adjustable collar, round 305mm heavy duty ductile iron tractor grate, vandal proof.

.2 Pipe size to be 100 mm, provide sediment bucket.

.3 Acceptable Product: Watts, MIFAB, JRSmith

2.14 OIL INTERCEPTOR (OI-1)

.1 The interceptor shall consist of a minimum of two chambers by internal baffling. Wastewater shall enter the first chamber through a drop tube. An air gap shall be provided between all chambers. Water shall exit the interceptor through a drop tube in the final chamber, with 50 mm [2”] invert differential between inlet and outlet. Each chamber shall be provided with a minimum 75 mm [3”] vent port. A minimum 600 mm [24”] diameter access way shall be provided to the top of the interceptor for inspection and cleaning, with access ring extensions to grade and a traffic loading rated, gasketted frame and cover.

.2 Wall construction shall be fiberglass. Interceptor fabrication material shall be inert, non-corrosive and impervious to retained wastes.

.3 Custom drop tubes, inlet and outlet connection sizes: 100 mm [4”] diameter.

.4 Interceptor shall be suitable for underground outdoor installation and shall be installed as per the manufacturer's recommendations with anti-buoyancy slab base.

.5 Total liquid capacity: 189 l [50 USgal]

.6 Maximum Oil capacity: 45 l [12 USgal]

.7 Maximum Solids capacity: 42 l [11 USgal]

.8 Standard of Acceptance: As scheduled on drawings or approved alternate

.9 Acceptable Product: Watts, Schier, JR Smith, Langley Concrete Group

2.15 MISCELLANEOUS METAL

.1 Be responsible for all miscellaneous steel work relative to the mechanical work of the Specifications, including but not limited to:

- .1 Support of equipment
- .2 Hanging, supporting, anchoring, guiding and related work as it applies to piping, ductwork and mechanical equipment.
- .3 Earthquake restraint devices.
- .4 Pipe anchor and/or support posts.
- .5 Ceiling ring bolts - secure to structure or steel supports.

.2 All exterior miscellaneous steel shall be hot-dipped galvanized.

.3 All steelwork not galvanized shall be prime and undercoat painted ready for finish under Painting Division. On galvanized materials that are subsequently welded apply galvicon. Refer to drawings for details.

2.16 ELECTRIC MOTORS

.1 Provide high efficiency motors for mechanical equipment as specified. Motors efficiencies shall be as measured by IEEE Standard 112 Method B.

.2 Unless noted otherwise, provide open drip-proof, ball bearing, continuous duty motors of EEMAC class B, suitable for 40°C [104°F] ambient and for 40°C [72°F] temperature rise, for all mechanical equipment.

.3 Motors shall have standard voltage ratings consistent with the project distribution voltages. Motors less than 1/2 HP to be 120 volt, 60 cycle, single-phase power. Motors 1/2 HP and larger to be 3 phase power and for the scheduled voltage.

.4 All motors to be standard 1800 RPM unless specifically scheduled otherwise.

.5 Provide all motors with terminal boxes, suitable for power connections.

.6 Provide screw adjustable bases on all belt connected motors.

.7 Motors to be of the capacitor start type when they may be manually cycled from a starting switch, which is located in the finished space.

.8 Motors exposed to outdoor temperature to be lubricated with lubricants suitable for operation at 6°C [11°F] below the lowest temperature recorded by ASHRAE or the Climatic Information (BC Building Code), for the location in which they are installed.

.9 Motor bearings shall be factory lubricated suitable for two years continual operation without additional lubricant.

.10 Assist Electrical Division to ensure proper connection, correct thermal overload protection and correct motor controls.

.11 Where starters are included in this Division as an integral part of packaged equipment, they shall contain thermal overload protection in all ungrounded lines.

.12 Equipment, which has more than one voltage rating, shall be fed from a single power source through a disconnect switch.

Part 3 Execution

3.1 SEQUENCE OF WORK

.1 All trades in this Division shall make allowance for the implications of having to totally complete all work in the new addition before proceeding with work in the existing building.

3.2 COORDINATION

.1 Examine all Contract Drawings to verify space and headroom limitations for the required work. Coordinate the work with all trades and modify without changing the design intent to facilitate a satisfactory installation. Make no changes to the design intent involving extra cost to the Owner, without the Departmental Representative's prior written approval.

.2 The drawings indicate the general location and route to be followed by the piping and ductwork. Where details are not shown on the drawings or are only shown diagrammatically, the pipes and ductwork shall be installed in such a way as to conserve headroom and interfere as little as possible with the free use of space through which they pass. Service lines shall run parallel to building lines. All ducts and pipes in the ceiling shall be kept as tight as possible to beams or other limiting members at high level. All pipes and ducts shall be coordinated in elevation to ensure that they are concealed unless indicated otherwise.

.3 Work out jointly all interference problems on the site and coordinate all work before fabricating, or installing any material or equipment. No consideration of payment will be made for additional work due to fabricating or installing materials before a coordination issue was identified and resolved. Where necessary produce interference drawings showing exact locations of mechanical equipment within service areas, shafts and the ceiling space. Ensure that all materials and equipment fit into the allotted spaces and that all equipment can be properly serviced and replaced, if and when required. Advise the Departmental Representative of space problems before fabricating, or installing any material or equipment. Demonstrate to the Departmental Representative on completion of the work that all equipment installed can be properly, safely serviced and replaced, if and when required.

3.3 PROTECTION OF WORK

.1 Protect equipment and materials, stored or installed, from the weather, moisture, dust and physical damage.

.2 Mask machined surfaces. Secure temporary covers over equipment openings and open ends of piping, ductwork and conduits, as required to keep them clean.

.3 Rusting, pitting or physical damage will be cause for rejecting equipment.

.4 Make good damaged or marred factory finish.

3.4 EQUIPMENT INSTALLATION

.1 Provide unions and flanges to permit equipment maintenance, disassembly or removal, to minimize disturbance to piping and duct systems and to avoid interfering with building structure or other equipment.

.2 Provide means of access for servicing equipment including permanently lubricated bearings.

.3 Align equipment, rectangular cleanouts and similar items with building lines wherever possible.

.4 Ensure that equipment does not transmit noise or vibration to other parts of the building as a result of poor installation practices.

3.5 DUCT SEALING

.1 Apply sealant to outside of joint to manufacturer's recommendations.

.2 Duct tape is not a permitted sealing method.

3.6 HEATING UNITS INSTALLATION

.1 Install in accordance with the manufacturer's installation drawings, recommendations and requirements.

.2 Verify electrical service work with characteristics stamped on unit.

.3 Set unit heater discharge pattern required to suit application.

.4 Touch up scratches in factory paint finishes on units.

.5 Install thermostats in locations indicated.

3.7 ANCHORS AND TEMPLATES

.1 Supply anchors and templates for installation by other Divisions.

3.8 CUTTING, PATCHING, DIGGING, CANNING AND CORING

.1 Lay out all cutting, patching, digging, canning and coring required to accommodate the mechanical services. Coordinate with other Divisions. The performance of actual cutting, patching, digging, canning and coring is specified under other Divisions. Be responsible for correct location and sizing of all openings required under the mechanical work, including pipe sleeves and duct openings.

.2 Be responsible for all cutting, patching, digging, canning and coring required to accommodate the mechanical services.

.3 Openings through structural members of the building shall not be made without the approval of the Departmental Representative .

3.9 SERVICE PENETRATIONS OF NON-RATED SEPARATIONS

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

3.10 CLEANING AND FINAL ADJUSTMENT

.1 Clean mechanical systems daily.

.2 Clean interior and exterior of all systems including strainers and vacuum the interior of air handling units and ductwork.

.3 Clean and refurbish all equipment and leave in first class operating condition including replacement of all filters in all air and piping systems.

.4 Balance and adjust all systems and each piece of equipment to operate efficiently.

3.11 DEMOLITION

.1 All piping, ducting and equipment which becomes redundant and is no longer required due to the work shall become the property of the Contractor and shall be completely removed from the site.

3.12 PERIMETER DRAINS

.1 Any unstable areas or unsatisfactory conditions i.e. poor compaction slopes shall be reported to the Departmental Representative.

.2 Ensure foundation wall waterproofing has been inspected and approved by the Architect.

.3 Installation of perimeter drainage shall not begin until subgrade and foundation wall deficiencies have been corrected.

.4 Pipe and Fitting Installation:

.1 Prior to pipe placement ensure sub-grade complies with the required drainage pattern.

.2 Pipe joints spigots shall face downstream of flow.

.3 Install so perforations are on the bottom half of the pipe.

.4 Use manufacturer's recommended fittings only.

.5 Shims to establish pipe slope is not acceptable.

.6 Pipe bedding shall be drain gravel to 150 mm [6"] minimum below pipe, 300 mm [12"] minimum above pipe and 500 mm [20"] wide. Backfill above the drain gravel shall be 300 mm [12”] minimum above the drain gravel.

.7 Perforated pipe and drain gravel shall be covered with filter cloth.

.8 Pipe and fittings cast in walls shall be schedule 40 ABS or cast iron.

.9 ABS and cast iron fittings shall adapt to PVC Pipe with recommended manufacturer's adapters.

.10 Prior to backfilling, the Departmental Representative shall approve the piping installation.

.5 Cleanouts:

.1 Provide cleanouts as indicated on the contract drawings, at the start of all runs and at 15 m [50 ft] intervals.

.2 Cleanouts will be rejected if not accessible for maintenance.

.3 Location of all cleanouts shall be clearly recorded on the as-built drawings.

.6 Excavation and Backfill:

.1 Excavation for perimeter drainage shall be a minimum of 150 mm [6"] below invert of pipe unless otherwise stated in the contract document.

.2 Backfill material above the pipe shall be drain gravel and above drain gravel shall be pea gravel.

.7 Inspection:

.1 Do not backfill until pipe grade and alignment is inspected and accepted by the Engineer.

.2 Provide a minimum of 2 working days notice to the Departmental Representative for field inspections prior to backfilling.

3.13 DEMONSTRATION AND INSTRUCTION TO OWNER

.1 Provide certified personnel to demonstrate plant operation and to instruct operating staff on operation of mechanical equipment. Provide maintenance specialist personnel to instruct operating staff on maintenance and adjustment of mechanical equipment and any changes or modification in equipment made under terms of guarantee.

.2 The demonstration shall include:

.1 Operation and maintenance requirements of all equipment and systems under each mode of operation including:

.1 Fans.

.2 Oil Interceptor

.3 Provide instruction during regular work hours prior to acceptance and turnover to operating staff for regular operation.

.4 Use Operating and Maintenance manuals for instruction purposes.

.5 Finalize demonstration and instructions by obtaining a signed statement from the Owner that the demonstration and instructions have been given satisfactorily.

3.14 SUBSTANTIAL PERFORMANCE REQUIREMENTS

.1 Before the Departmental Representative is requested to make an inspection for substantial performance of the work:

.1 Commission all systems.

.2 Submit a letter certifying that all work (including calibration of instruments and balancing of systems) is complete, operational, clean and all required submissions have been completed.

.2 The work will not be considered to be ready for use or substantially complete until the following requirements have been met:

.1 All reported deficiencies have been corrected.

.2 Testing completed.

.3 Operation and Maintenance Manuals completed.

.4 Record Drawings ready for review.

.5 System Commissioning has been completed and verified.

.6 All demonstrations to the Owner have been completed.

3.15 DEFICIENCY HOLDBACKS AND DEFICIENCY INSPECTIONS

.1 Work under this Division which is still outstanding when substantial performance is certified will be considered deficient and hold-back will be established equal to at least twice the Departmental Representative's cost estimate of completing that work.

.2 It is expected that outstanding work will be completed in an expeditious manner and the entire holdback sum will be retained until the requirements for Total Performance of the mechanical work have been met and verified.

END OF SECTION