PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for excavation and for site work for buildings.

.2 Included in the work of this section are:

a) Site preparation, demolition, clearing, stripping

b) Structural Excavation and Backfill

c) Trenching and Backfilling for underground piping

d) Grading

e) Topsoil and Seeding

f) Subgrade preparation for roads and parking areas

g) Granular sub-base and base course for roads and parking areas

h) Asphalt surfacing

1.2 RELATED WORK

.1 Section 02650 - Underground Pipe.

.2 Section 03300 - Cast-In-Place Concrete or as shown on Drawings.

1.3 REFERENCE STANDARDS

.1 Refer to ASTM Sieve Analyses and ASTM Tests for specifications for aggregates and soils.

.2 Other materials are specified with reference to CGSB Standards, CSA Standards, ASTM Standards and AASHO Standards.

1.4 SUBMITTALS

.1 At least 2 weeks before beginning work the Contractor shall submit to the Engineer for review, a complete and detailed outline of the procedures and methods that he/she will employ for this section of the Work.

.2 The Contractor shall not begin work until the Engineer has reviewed the submittal.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to the site and store in a manner such that granular materials are kept in separate piles and manufactured materials are stored according to the recommendations of the manufacturer.

1.6 JOB CONDITIONS AND REGULATIONS

.1 Perform work under observation of Worker's Compensation Board.

.2 Perform work in a manner that will cause the least disruption to traffic.

.3 The Contractor is responsible for posting of warning and traffic signs; supply and placing of barricades and protective hoarding.

1.7 QUALITY ASSURANCE

.1 Refer to Section 01400 Quality Control.

.2 Submit to the Engineer a list of sources of materials including sand, gravel, borrow materials and concrete aggregates.

.3 Provide samples, test results, sieve analyses and reports for preliminary approval of materials.

.4 Preliminary approval of materials does not constitute general acceptance. Acceptance depends upon satisfactory field test results and performance in place.

.5 Submit to the Engineer for review:

a) concrete mix design

b) certified laboratory analysis for each shipment of asphalt cement.

c) copies of results of aggregate tests for each class of aggregate, including:

i) Los Angeles Abrasion Test (ASTM C131-81)

ii) Crushed fragments

iii) Specific Gravity and Absorption (ASTM C127/C128)

iv) Material Passing 75 micro-m sieve (ASTM C117)

.6 The Contractor shall pay for and submit a design mix based on the Standard Marshall Test Procedure (ASTM D1559).

1.8 MINIMUM QUALITY CONTROL TEST FREQUENCIES

.1 Refer to Section 01400 - Quality Control.

.2 The following frequencies of testing are the minimum required. The Contractor shall perform as many tests as are necessary to ensure that the work conforms to the requirements of the Contract regardless of the minimum number specified.

.3 Provide moisture/density curves for each type of material from each source of material to be compacted to a specified density.

.4 Field densities:

a) Structures and Embankments (from excavated material) - one for each 4000 m^2 of compacted layers.

b) Pipe Bedding - one for each 100 m of pipe installed.

c) Pipe Zone Backfill - one for each 100 m of pipe installed.

d) Trench Backfill - one for every 100 m of trench of 1.0 metres fill depth.

e) Subgrade Preparation - one field density for every 2000 m^2 of 150 mm compacted layers.

f) Road Sub-base and Base course - one field density for every 500 m^2 of sub-base and one field density for every 500 m2 of base course.

.5 Field Tests for Asphaltic Concrete Surface Course

a) Asphalt mixtures

i) daily analysis of density and air voids

ii) daily asphalt content determination

b) Field Testing of in place asphalt

i) density determination and air voids at least once each day and one test for every 1000 m^2 of each layer.

ii) nuclear density determinations at the rate of one test for every 200 m^2 of each layer.

iii) final curing and analysis tests at the rate of one test for every 4000 m^2 of pavement in place.

1.9 DISPOSAL

.1 All materials on site whether stockpiled, stored or excavated are the property of the Owner, and the Owner reserves the right to keep any part or all of the material.

.2 The Contractor shall dispose of debris, waste, unsuitable material, rock or excess material in accordance with the Contract Specification.

.3 The Contractor shall dispose of all materials at sites to be located by the Contractor.

.4 In areas shown on the plans or designated by the Engineer for clearing and grubbing, all timber logs, trees, stumps, brush and other rubbish must be disposed of as follows:

a) Remove all waste material from the site and dispose of in accordance with Article 1.9.3.

PART 2 PRODUCTS

2.1 GRANULAR MATERIALS

.1 Granular Fill shall comply with the following gradation.

Sieve Size	Percent Passing
75 mm	95 - 100
25 mm	50 - 90
4.75 mm	20 - 60
425 micro m	5 - 35
75 micro m	0 - 5

.2 Sand shall comply with the following gradation.

Sieve Size	Percent Passing
9.5 mm	100
4.75 mm	90 - 100
150 micro m	20 max.

.3 Base Course Gravel shall comply with the following gradation.

Sieve Size	Percent Passing
25 mm	100
19 mm	95 - 100
9.5 mm	60 - 80
4.75 mm	40 - 60
2.00 mm	25 - 45
425 micro m	10 - 25
75 micro m	2 - 10

.4 Sub-Base Course Gravel shall comply with the following gradation.

Sieve Size	Percent Passing
75 mm	95 - 100
25 mm	50 - 90
4.75 mm	20 - 60
425 micro m	5 - 35
75 micro m	0 - 5

.5 The combined aggregates for asphalt surface course shall comply with the following gradation.

Sieve Size	Percent Passing
12.50 mm	100
9.50 mm	78 - 94
4.75 mm	58 - 80
2.36 mm	52 - 74
2.00 mm	42 - 64
1.18 mm	28 - 48
425 micro m	19 - 38
150 micro m	10 - 24
75 micro m	5 - 14

A minimum of 70% of the material retained on the 4.75 mm sieve shall have a minimum of 2 crushed faces.

2.2 FILTER CLOTH

.1 Non woven polyester in accordance with CGSB-148.1, 175 g/m^2, 1.7 mm thickness, Nilex 4545 or approved equivalent alternative.

2.3 CEMENT

.1 Type 10 with concrete supplied in accordance with Contract Specifications in Section 03300, Cast-in-Place Concrete.

2.4 BITUMINOUS PRIMER

.1 MC-0 or MC-30 as approved by the Engineer.

2.5 ASPHALT CEMENT

.1 Uniform in character, delivered between 135°C and 177°C.

.2 Use grade AC 5.

2.6 RIPRAP

.1 Use Class 1 Nominal Size 300 mm hand placed rock riprap.

.2 Riprap shall be:

100% smaller than 450 mm or 136 kg

20% larger than 350 mm or 68 kg

50% larger than 300 mm or 36 kg

80% larger than 200 mm or 11 kg

PART 3 EXECUTION

3.1 SITE PREPARATION

.1 Clearing

a) Cut, remove and dispose of all timber, brush, windfall, stumps and rubbish except such trees and shrubs as are designated for preservation.

b) Trim branches from timber and salvage usable timber. Salvaged timber shall be the property of the Contractor.

c) Dispose of branches and debris in accordance with Article 1.9 - Disposal.

d) Excavate, remove and dispose of roots, stumps, logs.

.2 Demolition

a) Demolish and remove from the site all objects designated for removal as well as any obstructions, fences or debris. Salvageable items, as designated by the Engineer, are to be deposited in the Owner's storage yard.

b) Items which are hidden or buried, shall be removed if they are in the way of the structure or trenches. Structures and underground pipes which are not in the way, but are to be abandoned, may be left in place and capped or plugged.

.3 Stripping

a) Strip the site to the limits shown on the drawings, or strip those areas specified or ordered in writing.

b) Strip all areas to be excavated for structures, pipes or roadways.

c) Strip the full depth of topsoil or organic material.

d) Stockpile topsoil temporarily and dispose of stripped material that is not suitable as topsoil.

e) Disposal of unsuitable material shall be in accordance with Article 1.9 - Disposal.

.4 Stockpiling

a) Prepare space around the site for stockpiling excavated material and borrow materials.

3.2 EXCAVATION

.1 All excavation, whether in trenches or excavation for structures is classified as either rock excavation or common excavation.

.2 Common excavation is excavation of all materials, whatever their nature, which are not defined as rock. Common excavation includes dense till, hardpan, frozen materials, partially cemented materials or any other materials which can be ripped and excavated with heavy construction equipment.

.3 Rock

a) Rock is either single boulders, pieces of concrete or masonry with a volume in excess of 0.50 m^3 or any material that cannot be removed by a tracked machine, having a bucket capacity of 0.95 to 1.15 m^3, and which requires for its removal, drilling and blasting or breaking up with a power operated hand tool.

b) No soft or disintegrated rock which can be removed with a hand pick; no material which can be ripped with a crawler tractor having a rated horsepower of 200 to 249; no loose or previously blasted rock or broken stone and no rock exterior to the minimum limits for measurement allowed, which may fall into the excavation will be measured or allowed. Removal and disposal of boulders from the excavation will not be considered rock excavation, unless they are 0.50 m^3 or greater in volume.

c) Frozen material is not classified as rock.

.4 Temporary work, cofferdams, shoring and bracing

a) Provide all equipment and material to construct temporary works as required including sheeting, timbering, shoring and bracing.

b) Engage the services of the professional engineer to design temporary shoring and dewatering systems.

.5 Dewatering

a) It is the responsibility of the Contractor to remove water from trenches and excavations, regardless of origin.

b) Provide pumps and other equipment and materials necessary to keep excavations free of water while work is in progress.

c) Equipment used for dewatering shall be of a suitable and rugged type to ensure continuous operation.

d) Make provision as necessary to prevent floatation or damage to the work in case of accidental stoppage of de-watering equipment.

e) Protect excavations against flooding and damage due to surface run-off.

f) Dispose of the water away from the Work in a manner such that there is no damage to the Work or other property or persons.

g) Dewatering operations shall not impact existing infrastructure facilities, roadways or railways.

.6 Excavate and remove all materials to the depths and dimensions necessary for the construction of the structure and/or pipe to the limits shown on the drawings.

.7 Stockpile excavated materials suitable for backfill in designated locations.

.8 Dispose of unsuitable excavated materials in accordance with Article 1.9 - Disposal.

.9 Excavate for structures and pipes allowing sufficient space to construct structures, lay pipes and to compact backfill.

.10 Minimize disturbance to supporting soil.

.11 Excavate to a depth greater than shown on the drawings, where soil is unsuitable for foundation and the Engineer orders such changes in elevations and dimensions.

.12 Fill with 15.0 MPa compressive strength concrete, any overexcavation carried out in error or carried out without prior approval of the Engineer.

.13 Remove debris and trim excavations. If material at the bottom of the excavation has been disturbed, compact to a density equal to undisturbed soil.

.14 Inspection

a) Notify the Engineer for inspection after the excavation is completed.

b) Do not place any material on the soil until the Engineer has viewed the depth of excavation and the character of the foundation material.

.15 Granular Base

a) Place granular materials in accordance with details on the drawings, and compact to 100% of the maximum density as determined by the Standard Proctor Compaction Test.

b) Place bedding sand in trenches in accordance with the Specifications for Underground Piping.

3.3 UNDERGROUND PIPING

.1 Underground pipe material and installation is specified in Section 02650 - Underground Piping. Installation of the pipe includes backfilling in the pipe zone to 300 mm over the top of the pipe.

3.4 BACKFILL

.1 Do not proceed with backfill until the Engineer has inspected the work in place.

.2 Use only backfill materials meeting the Contract Specifications.

.3 Backfill cannot commence until concrete has sufficient strength to withstand earth and compaction pressures.

.4 Do not use frozen backfill.

a) Surround the drain pipe with filter cloth then place and compact gravel to a width of at least 250 mm on each side of the pipe and 200 mm over the pipe.

.5 Trench Backfill

a) Place backfill in a dry trench and roll backfill material down a slope or lower by machine.

b) Where pit run gravel or sand (Class 1) backfill is required, place the backfill material in uniform lifts and compact to 95% of the maximum density as determined by the Standard Proctor Compaction Test.

c) Where compacted native material can be used (Class 2) place the material in uniform lifts and compact to 95% of the maximum density as determined by the Standard Proctor Compaction Test.

d) Control moisture content by adding water or drying the material, at the Contractor's expense.

e) Bring the compacted backfill material up to the subgrade elevation of roads; or the bottom of topsoil.

.6 Backfill for structures

a) Backfill evenly around structures to minimize unbalanced lateral earth pressure.

b) Where granular material is required, place pit-run gravel or sand in layers not more than 200 mm in thickness and compact to 95% of the maximum density as determined by the Standard Proctor Compaction Test.

c) Where compacted native material can be used, place material in layers not more than 200 mm thick and compact to 95% of the maximum density as determined by the Standard Proctor Compaction Test.

d) Control moisture content of the backfill material by adding water or drying the material, at the Contractor's expense.

e) Keep heavy equipment at least 1.5 m away from structures.

3.5 EMBANKMENTS AND GRADING

.1 Place all fills and embankments to elevations, contours and slopes shown on the drawings.

.2 Compaction shall be as specified in Article 3.5 - Backfill.

.3 Grade the top layer to a smooth regular surface.

.4 If there is insufficient suitable material from excavation, supply and place common fill and compact as specified in Article 3.5 - Backfill.

.5 If there are surplus materials after backfilling and embankments and grading are complete, remove surplus materials from the site.

.6 Grade the site as necessary for grassed areas, gravelled areas, parking lots, roadways, sidewalks and curbs and gutters.

3.6 DRAINAGE

.1 Grade the site as shown on the drawings to provide drainage.

.2 Install culverts on a uniform foundation of gravel 150 mm thick.

.3 Backfill as for trenches using compacted granular material as specified in Article 3.5 - Backfill.

.4 Hand place riprap on the ends of culverts.

3.7 ROADWAYS AND PARKING AREAS

.1 Scarify and shape the subgrade and compact the top 150 mm to 100% of the maximum density as determined by the Standard Proctor Compaction Test.

.2 Obtain the Engineer's approval before laying sub-base or base course.

.3 Place granular sub-base and base course to the thickness shown on the drawings. Place in layers not exceeding 150 mm in compacted thickness and compact at optimum moisture content to 100% of the maximum dry density as determined by the Standard Proctor Compaction Test.

.4 Place prime coat when temperature is lower than 10°C, at a rate of 2.0 L per m^2.

.5 Use a mixing plant approved by the Engineer, meeting ASTM D995 which can produce a mixture conforming to the design mix and the job mix.

.6 Deliver hot mix at a temperature within 10°C of the specified temperature.

.7 Ambient air temperature shall be 5°C or greater at the time of placing asphalt.

.8 Breakdown roll using approved equipment and follow immediately with steel wheeled rollers.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE

.1 For all concrete specifications, see notes and details on the design drawings.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section refers to the supply and installation of concrete block unit masonry.

.2 Do cutting and patching of masonry required to make work come together properly and all cutting and patching with respect to piping, ducts, conduit, etc., as shown on Architectural, Mechanical and Electrical drawings.

.3 Install steel frames for doors, sidelights, screens, etc. in masonry walls.

.4 Supply dovetail anchor slots for holding masonry anchors in concrete for installation under Section 03300.

1.2 RELATED WORK

.1	Cast-in-Place Concrete or as shown on Drawings	Section 03300
.2	Miscellaneous Metal	Section 05500
.3	Insulation	Section 07200
.4	Caulking and Sealants	Section 07900
.5	Painting	Section 09900

1.3 REFERENCED STANTARDS

.1	CSA Standards on Concrete Masonry Units	CSA/CAN3-A165
.2	Mortar and Grout for Unit Masonry	CSA-A179
.3	Masonry Design for Buildings	CSA/CAN3-S304.1
.4	Connectors for Masonry	CSA/CAN3-A370
.5	Masonry Construction for Buildings	CSA/CAN3-A371

.6 Where masonry walls or furring are required to act as loadbearing, fire separations or barriers, or as fire protection for structural steel, they shall conform to the latest British Columbia Building Code.

1.4 DEFINITIONS

.1 Loadbearing means supporting a load other than itself and any unit masonry wall which supports floor loads, roof loads, landing loads, staircase loads, or any other such loads whether directly or indirectly, or which is indicated on the drawings as loadbearing or which is shown on the Structural drawings, shall be considered to be a load bearing wall; type of block as specified.

.2 Exposed means visible on completion of project, unpainted, painted or otherwise surface treated.

1.5 QUALITY CONTROL

.1 Refer to Section 01400.

PART 2 PRODUCTS

2.1 MATERIALS FOR CONCRETE UNIT MASONRY

.1 Concrete block: high pressure steam cured, load bearing: CSA-A165.1, Classification H/15/C/M. Size to be modular metric unless noted. Average moisture content at time of setting shall not exceed 20% of total absorption; stone aggregate and lightweight aggregate (slag or expanded shale only). Exposed block shall all be made by one manufacturer, approved by Engineer, and shall be uniform in colour, shade, texture and aggregate. Regular and split ledge types of blocks are intended for use. See drawings for details.

.2 Coloured, split face veneer block. Half height nominal 100 x 100 x 400, in full split face, include split 2 faces for corner units, Classification: H/15/A/M

.3 Spray on sealer applied after installation: clear, colourless, penetrating, non-yellowing, silane-siloxane or silane type with not less than 8% solids. Water repellent coating shall meet the requirements of BC Masonry Quality Assurance Program for wind driven rain test. Sternson Huls Chem-Trete BSM 40 or approved alternate.

.4 Provide square units for exposed corners. Provide purpose made shapes for lintels and bond beams. Provide additional special shapes as indicated.

.5 Mortar to be Type S, based on CSA-A179.

.6 Masonry accessories to be as follows:

a) Control joint filler: purpose made elastomer to ASTM D2240-75 of size and shape indicated on drawings.

b) Nailing inserts: 0.6 mm thick purpose made galvanized steel inserts for setting in mortar joints.

c) Dovetail anchors: galvanized sheet steel 3.0 mm, formed to require shape or sizes.

.7 Reinforcing to be as follows:

a) Wire reinforcement: truss or ladder type to CAN3-A370 galvanized 3.75 mm side and cross rods, width 50 mm less than masonry.

b) High yield steel bars : Deformed billet steel bars to CSA G30.12M, grade 400, plain finish.

c) Wall ties : 1.0 mm galvanized corrugated steel to CSA-A370. Bedding distance at least 75% of masonry depth.

d) Bolts and anchors: to CAN3-A370, for metal ties and horizontal reinforcing in exterior walls.

.8 Grout to be to CSA-A179.

PART 3 EXECUTION

3.1 WORKMANSHIP

.1 Maintain wall/partition surface flatness in plane to 3 mm in 2500 mm and variation from plumb 6 mm in 3000 mm. Maximum variation in wall openings 6 mm from true size.

.2 Extend all walls/partitions to underside of structure except where otherwise shown on drawings.

.3 All concrete block walls shall have raked and caulked joints at the intersection of fire rated concrete block walls to concrete walls, loadbearing concrete block walls to structural concrete.

3.2 INSTALLATION

.1 Installation to CSA-A371 and as specified herein:

.2 When mortar is "thumb-print" hard, tool joints slightly concave for exposed work, elsewhere, strike joints flush and clean out all chases and other cavities. Use sufficient force to press mortar right against masonry units on both sides of joint. Remove excess material and burrs.

.3 Lay block in running bond, except as noted otherwise.

.4 In block walls install continuos truss type wire reinforcement every second block course, and as hereinafter specified. Outer rods 25 mm from each face. Lap splices minimum 150 mm.

.5 Tie intersecting walls/partitions together with trussed wire reinforcing every second course. Where indicated on drawings provide vertical reinforcement as detailed and fill all cores with concrete. Similarly reinforce jambs of overhead door openings, two blocks wide each side.

.6 Provide continuous galvanized dovetail anchor slots where block walls abut concrete walls and columns, to be located at 600 mm OC in walls. Provide dovetail anchors at 400 mm OC.

.7 Provide nailing inserts as detailed on drawings.

3.3 MASONRY WALL OPENINGS

.1 Fill spaces between wall and structure, ducts, pipes and sleeves with cement mortar completely from one side of wall to other in such a way as to maintain its integrity as a sound or fire barrier.

3.4 CUTTING AND PATCHING

.1 Minimize cutting block. Cut exposed block with power driven abrasive cutting disc or diamond cutting wheel for flush-mounted electrical outlets, grilles, pipes, conduit, leaving 3.0 mm maximum clearance.

.2 Patching of chases shall not be permitted without Engineer's approval.

3.5 BUILDING-IN

.1 Build-in all door frames, lintels, sleeves, anchor bolts, anchors, reinforcement, nailing strips and any other items supplied by others which have to be built into masonry.

.2 Notify others where materials to be set in masonry will be required. Tear out any such work which has been improperly located, re-set, and make good to the satisfaction of the Engineer.

.3 Bed anchors of door frames in mortar and fill door frames solid with mortar where indicated as well as erected.

3.6 BOND BEAMS

.1 Install block bond beams where indicated and required for bearing of structural members.

.2 Bond beams shall be made of channel blocks reinforced as indicated on the structural drawings, or if not indicated, with two 15 M continuous reinforcing bars placed in bottom with the appropriate cover, and filled with 20 MPa concrete.

3.7 REINFORCED LINTELS

.1 Install reinforced concrete block lintels at openings where steel lintels are not indicated, reinforced as indicated on the structural drawings.

.2 Cast and cure lintels in a straight form. Set special channel lintel blocks using specified mortar. Place wood stops at either end of lintel to prevent movement during cure.

3.8 LATERAL SUPPORT AND ANCHORGE

.1 Comply with CAN3-S304 and CAN3-A3171 and as shown on drawings.

3.9 CLEANING

.1 On completion, remove any excess mortar and smears that may remain, using wood paddles or scrapers.

.2 Paint or replace defective mortar to match adjacent work.

.3 Scrub surfaces to be cleaned using a non-acid cleaning solution of type which will not harm constructed masonry. Use non-metallic tools in cleaning operations. Clean a trial test area and obtain approval to proceed.

.4 Use copious amounts of water and do cleaning in accordance with solution manufacturer's directions.

.5 Repeat cleaning operations as often as necessary until work is satisfactory.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies the supply and installation of rough carpentry for timber, concrete, masonry and steel buildings.

1.2 RELATED WORK

.1 Sheet Metal Roofing - Section 07610

.2 Painting - Section 09900

1.3 QUALITY ASSURANCE

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

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

PART 2 PRODUCTS

2.1 LUMBER MATERIAL

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% for exterior work, maximum 12% for interior work and in accordance with following standards:

a) CSA-O141.

b) NLGA Standard Grading Rules for Canadian Lumber

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

a) Board sizes: "Standard" or better grade.

b) Dimension sizes: "Standard" light framing or better grade.

c) Post and timber sizes: "Standard" or better grade.

2.2 PANEL MATERIALS

.1 Douglas fir plywood (DFP): to CSA-O121, standard construction.

.2 Canadian softwood plywood (CSP): to CSA-O151, standard construction.

2.3 FASTENERS

.1 Nails, spikes and staples: to CSA-B111.

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

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

.4 Galvanizing: to CSA-G164, use galvanized fasteners for all works.

2.4 WOOD PRESERVATIVE

.1 Pressure treated and surface-applied wood preservatives: copper napthenate or 5% pentachlorophenol solution, water repellant preservative, conforming to CSA-080..

PART 3 EXECUTION

3.1 CONSTRUCTION

.1 Comply with requirements of NBC 2005, Part 9, supplemented by following Articles.

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

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

.4 Install spanning members with "crown edge" up.

.5 Select exposed framing for appearance. Install lumber and panel materials so that grade marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.

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

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

3.2 FURRING AND BLOCKING

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

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

3.3 NAILING STRIPS, GROUNDS AND ROUGH BUCKS

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

3.4 CANTS, CURBS, FASCIA BACKING

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

.2 Install wood backing, dressed, tapered, and recessed slightly below top surface of roof insulation for roof hopper.

3.5 SLEEPERS

.1 Install sleepers as indicated.

3.6 FASTENERS

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

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

3.7 SURFACE - APPLIED WOOD PRESERVATIVE

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

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

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

.4 Treat material as indicated on drawings and as follows:

a) Wood cants, fascia backing, curbs, nailers, sleepers on roof deck.

b) Wood sleepers for roof top equipments.

3.8 ELECTRICAL EQUIPMENT BACKBOARD

.1 Provide backboards for mounting electrical equipment as indicated. Use 19 mm thick plywood on 19 x 38 mm furring around perimeter and at maximum 300 mm intermediate spacing.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Provide clear, kiln dried, dressed, or resawn material exposed to view, including casework, frames, standing and running trim, and other wood-related products.

.2 Provide composite wood panel as indicated and specified with accessories required for a complete installation.

.3 Install wood and metal doors and frames.

.4 Install glazing to wood and metal doors and frames.

.5 Install finish hardware.

1.2 RELATED SECTIONS

.1 Section 01560: Project Waste Management.

.2 Section 01561: Environmental Procedures.

.3 Section 01563: LEED Principles and Goals.

.4 Section 06100: Rough Carpentry.

.5 Section 06400: Architectural Woodwork.

.6 Section 09900: Paints and Coatings.

1.3 REFERENCES

.1 SDI 122-99, Installation and Troubleshooting Guide for Standard Steel Doors and Frames, Steel Door Institute.

.2 SDI 128-97, Guidelines for Acoustical Performance of Standard Steel Doors and Frames.

.3 SDI 129-00, Hinge and Strike Spacing.

.4 ANSI/DHI A115.1 1990, Preparation for Mortise Locks for 1¾" Doors.

.5 ANSI A250.6-97, Hardware on Steel Doors (Reinforcement Application).

.6 ANSI A250.8-98 (SDI-100), Recommended Specifications for Standard Steel Doors Frames.

.7 NFPA 80, Fire Doors and Windows.

1.4 SUBMITTALS

.1 Submit in accordance with Section 01330 Submittal Procedures.

.2 Shop Drawings: Indicating detailed connections to adjacent construction.

.3 Samples: Finished samples of trim items in finishes specified, for pre-approval of colour matching by Consultant. Do not proceed with finishing until Consultant approves samples as standard for the Work.

1.5 QUALITY ASSURANCE

.1 Items shall meet the requirements of the Architectural Woodwork Manufacturers Association of Canada for Custom Grade, whose manual will form part of this specification. Any modifications to this standard, which occur in this specification or on the Drawings, will take precedent over the standard.

.2 Lumber grading shall conform to NLGA, National Lumber Grade Authority.

.3 Plywood, particleboard, and hardboard shall be graded in accordance with applicable CSA or CGSB standards. MDF shall be formaldehyde free.

.4 Douglas Fir plywood grades to conform to requirements for Standard and painted finish.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Store, handle, and protect materials to prevent marring of surfaces. Cover in an approved manner to protect from damage. Disfigured or twisted fabrications will be rejected.

.2 Materials shall not be delivered or stored on site until immediately prior to installation commencing. Only quantities sufficient to permit efficient installation are to be delivered at any one time.

.3 Do not subject moisture equilibrium of finished products to excessive changes.

.4 Store all doors and frames vertically under cover.

.5 Place the units on at least 102 mm high wood sills or in a manner that will prevent rust or damage. Avoid the use of non-vented plastic or canvas shelters that can create a humidity chamber. Provide 6mm space between the doors to promote air circulation. If the wrapper on the door becomes wet, remove immediately.

PART 2 PRODUCTS

2.1 PRODUCTS

.1 Pegboard:

.1 100 % recycled wood content

.2 No added urea-formaldehyde

.3 Finish: Refer to Finish Schedule and Section 09900 Paints and Coatings.

.4 Formaldehyde Emission Requirements: ANSI A208.2, Table A and HUD 24 CFR Part 3280.308.

2.2 ACCESSORIES

.1 Fasteners: Fasteners shall be adequately sized to fasten millwork and carry imposed loads. Fasten millwork items as required to resist seismic loading. Refer to details and confirm types and sizes of typical fastener types on shop drawings.

.2 Wood Screws: Select the material, type, size, and finish required for each use.

.3 Nails: Select the material, type, size, and finish required for each use.

.4 Anchors: Select the material, type, size, and finish required by each substrate for secure anchorage. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts and anchors, as required, to be set into concrete or masonry work for subsequent woodwork anchorage.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Examine surfaces to which the work of this section is applied with installer present and ensure conditions are suitable to provide a complete and satisfactory installation. Correct unsatisfactory conditions.

.2 Start of work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Ensure that the work of other trades is completed prior to the installation of factory applied finished painted products.

3.3 INSTALLATION - GENERAL

.1 Install work straight, plumb, level and in true alignment except where otherwise indicated.

.2 Fit joints closely and fasten pieces rigidly in place. Neatly match and mitre joints. Fill exposed joints prior to jointing.

.3 Use only finish or casing nails. Countersink nail heads and leave ready for putty.

.4 Finished size shall be as indicated on the drawings.

.5 Leave surfaces free from hammer marks, warp, twist, open joints or other defects, and clean, scraped and sanded ready for finishing.

.6 Where finishes are applied at job site, clean millwork and fill nail holes in preparation for finishes application. Where work is to receive a transparent finish, use matching wood filler.

3.4 INSTALLATION OF METAL DOORS AND FRAMES

.1 Place frames prior to construction and enclosing of walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

.2 Install labeled fire rated wood doors in accordance with the requirements of NFPA 80 and the authority having jurisdiction. Do not remove labels. Maintain integrity of doors.

.3 Frame Installation:

.1 Install frames plumb, level, rigid, and in true alignment as recommended in SDI 122 and ANSI/DHI A115.IG. Fasten all frames, other than drywall slip-on types to the adjacent structure so as to retain their position and stability. Install drywall slip-on frames in prepared wall openings in accordance with manufacturer's instructions.

.2 Where grouting is required in masonry installations, brace or fasten frames in such a way that will prevent the pressure of the grout from deforming the frame members. Mix grout to provide a 102 mm maximum slump consistency, hand troweled into place. Do not use grout mixed to a thinner, "pumpable" consistency.

.3 Steel Frames, including fire rated frames do not require grouting. Grouting is not recommended for frames installed in drywall.

.4 Door Installation:

.1 Install and fasten doors to maintain alignment with frames to achieve maximum operational effectiveness and appearance. Fit hollow metal doors accurately in their respective frames with clearances specified in ANSI A 250.8. Adjust doors to maintain perimeter clearances as specified in ANSI A 250.8. Shim as indicated in ANSI/ DHI A115.I and SDI-122.

3.5 FINISH HARDWARE INSTALLATION

.1 Coordinate the installation of finish hardware in accordance with the manufacturer's instructions. Fit hardware accurately, using full complement of screws and draw up tight.

.2 Install hardware items in accordance with the hardware manufacturer's recommendations and templates. Consult ANSI/DHI A 115.I and ANSI A250.6 for other pertinent information.

.3 Install hardware to standard hardware location dimensions in accordance with Door and Hardware Institute Guide.

.4 Clean and polish hardware. Remove scratched, marred or damaged hardware and replace with new.

.5 Upon completion of installation, the Owner’s independent Hardware Inspector shall review the installation and confirm in writing to the Consultant that the finish hardware has been installed correctly. Replace items incorrectly installed at no additional cost to the project.

3.6 INSTALLATION OF GLAZING TO METAL DOORS, WOOD AND METAL FRAMES

.1 Work shall be by skilled glaziers with a minimum of 5 years experience.

.2 Install glazing to wood or metal frames in accordance with reviewed shop drawings.

.3 Install glass in frames without bending or twisting, with planes true and parallel to frame faces, with thickness or bedding even and regular all around.

.4 Ensure wood and steel frames and stops are primed before glazing. Do not mark or chip prefinished metal surfaces.

.5 Obtain glass sizes from site measurements, making allowances to suit glass thickness and sizes as recommended by the manufacturers.

.6 Glass weight and thicknesses shall be as required by size of glass unit in accordance with code requirements, but in no case shall be less than as detailed.

.7 Install glass on glazing blocks and with spacer blocks, both of sizes required, and to ensure adequate spaces for glazing, as recommended by the manufacturer of tapes.

.8 Wood Doors: Wood stops; install glass type as indicated or scheduled and as required by light size. Set glass in continuous tape, both sides, according to the manufacturer's recommendations for interior glazing. No movement, sagging or rattling of glass allowed. Trim excess material.

3.7 PROTECTION AND CLEANING

.1 Protect adjacent work from damage, staining, and disfigurement caused by the work of this section.

.2 Promptly, as the work proceeds and on completion, keep the premises clean and free from rubbish, debris, surplus materials, and equipment accumulation.

.3 Protect materials and installed woodwork from damage by the work of other trades until acceptance of the work. Ensure required temperature/humidity conditions are maintained during remainder of the construction period in areas of finish woodwork installations.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

.1	Rough Carpentry	Section 06100
.2	Pre-formed Metal Siding	Section 07411
.3	Membrane Roofing	Section 07500
.4	Aluminum Windows	Section 08520
.5	Flexible Membrane	Section 07111

1.2 DELIVERY/STORAGE

.1 Deliver and store materials, undamaged in original wrappings, in a suitable environment.

1.3 SPECIAL PROTECTION

.1 Provide adequate protection of materials and work of this section from damage by weather and other causes.

.2 Protect the work of other trades from damage resulting from work of this Section. Make good such damage to the satisfaction of the Engineer.

1.4 ENVIRONMENTAL PROTECTION

.1 Maintain surfaces and ambient air temperature 5°C minimum, for a minimum period of 72 hours prior to, during, and after waterproofing application.

1.5 WARRANTY

.1 The warranty shall state that the installed air/vapour barrier membrane within the detailed building element is warranted against air/moisture infiltration or loss of adhesion form substrates for a period of three (3) years from the date of the Engineer's Substantial Performance Review Report and that any defective material will be replaced including making good any damage to adjacent building finishes and components.

1.6 MOCK UP

.1 Construct mock-up in accordance with Section 01340 – Shop Drawings, Product Data, Samples and Mock-ups.

.2 Allow 24h for inspection of mock-up by Engineer before proceeding with air/vapour barrier work. Mock-up may remain as part of the work.

1.7 INSPECTION OF WORK

.1 Notify Engineer for inspection of completed air/vapour barrier membrane installation prior to proceeding with subsequent work.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Membrane : 1.0 mm thick, composite sheet, rubberized asphalt edge bead. Acceptable products : Sopraseal Stick 1100, Bakor Blueskin SA, GRACE Perm-A-Barrier or approved alternate,

.2 Primer: rubber based solvent, compatible with the membrane.

.3 Mastic: rubberized asphalt, compatible with the membrane.

.4 Liquid Membrane: two component, 100% solid.

PART 3 EXECUTION

3.1 INSTALLATION

.1 The air/vapour barrier membrane shall be installed generally as specified herein and in strict accordance with the manufacturer's written recommendations.

.2 Install membrane in dry weather conditions at temperatures from 5 degree C upward. For applications at subzero temperatures consult the manufacturer.

3.2 PREPARATION

.1 Prepare all surfaces to receive air/vapour barrier membrane to manufacturer's requirements.
.2 Substrate surfaces shall be free from loose particles, grease, oil and other non-compatible matter before work start.
.3 Fill in all holes, cracks, form tie holes, masonry joints and other irregularities, smoothen out to an even surface.
.4 Remove any projections out of substrate surfaces. All substrate surfaces shall be dry.
.5 Co-ordinate with other sections to achieve smooth acceptable surfaces.

3.3 PRIMING

.1 Apply primer to clean and dry surfaces at a rate of 0.6 to 0.8 litres per sq. metre with lamb wool roller. Allow to dry for 30 minutes to a tacky surface.
.2 Prime only an area to be covered in one day. Areas not covered without 24 hours must be re-primted.

3.4 MEMBRANE

,1 Install membrane to all exterior wall primed surfaces in 2.4 m lengths or as otherwise recommended by the manufacturer.
.2 Lap all side edges 64 mm and end laps 150 mm and more.
.3 Apply sufficient pressure to top and bottom terminations to achieve full adhesive bond.
.4 Roll the membrane immediately after application to achieve full adhesion to substrate.
.5 Trowel mastic to all edge laps at the end of each day's work.
.6 Connect and secure a bond between the roof air/vapour membrane when specified.
.7 Lap membrane and seal all joints at all protrusions through exterior wall.
.8 Ensure that the membrane, upon completion, is fully sealed and bonded to substrate as well as properly lapped and sealed to adjacent work prior to inspection.

3.5 INSPECTION AND REPAIR

.1 Repair and correct any deficiencies immediately after installation and before subsequent covering work begins.
.2 Patch punctures and seal inadequately lapped membrane joints.
.3 Repair any damage caused to adjacent work as a result of executing the work of this section.

3.6 COMPLETION AND CLEAN UP

.1 Clean up and remove all rubbish and surplus materials from the site as the work proceeds and at completion leaving the site in a clean and tidy condition to the Engineer's approval.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for rigid insulations and adhesives for buildings, foundations and underground uses.

1.2 RELATED WORK

.1 Concrete Unit Masonry - Section 04200

.2 Structural Excavation and Backfill - Section 02220

.3 Trenching - Section 02221

.4 Roofing - Section 07500

1.3 REFERENCE STANDARDS

.1 Rigid insulation is specified in accordance with CGSB Standards and ASTM Standards.

1.4 SUBMITTALS

.1 Submit a representative sample of each type of insulation material proposed for use.

1.5 PRODUCT DELIVERY, STORAGE, HANDLING

.1 Pile insulation on raised platforms and cover with waterproof covers. Protect from direct sunlight.

.2 Store adhesives and coatings in a heated, dry location.

PART 2 PRODUCTS

2.1 POLYSTYRENE - FOR GENERAL WALL, FOUNDATION INSULATION

.1 Extruded expanded polystyrene meeting CGSB-51.20, Type 4, Styrofoam SM or approved equivalent alternative, shiplapped edges.

.2 R.S.I. - 0.87 per 25 mm.

.3 Standards

-	Permeability	-	ASTM E96
-	Dimensional Stability	-	ASTM D2126
-	Compressive Strength	-	ASTM D 1621
-	Water Absorption	-	ASTM C272/D2842
-	Thermal Resistance	-	ASTM C177/C518

.4 Adhesive - conform to CGSB-71GP-24M.

.5 Primer - for concrete - as recommended by the adhesive manufacturer.

2.2 POLYSTYRENE - FOR BELOW GRADE AND TRENCH INSULATION

.1 Extruded, expanded polystyrene meeting CGSB-51GP-20M - Type 4 -Styrofoam H1 or approved equivalent alternative.

.2 R.S.I. - 0.87 per 25 mm.

.3 Standards

-	Compressive Strength	-	ASTM D1621
-	Thermal Resistance	-	ASTM C518/C177
-	Water Absorption	-	ASTM D2842

.4 Compressive Strength

-	HI-35	-	240 kPa
-	HI-60	-	410 kPa

2.3 POLYSTYRENE - FOR ROOF INSULATION

.1 Extruded, expanded polystyrene meeting CGSB-51-GP-20M (Type 4). Roofmate or approved equivalent alternative with shiplapped edges.

.2 R.S.I. value 0.87 per 25 mm.

.3 Standards

-	Compressive Strength	-	ASTM D1621
-	Water Absorption	-	ASTM D2842
-	Thermal Resistance	-	ASTM C518
-	Expansion	-	ASTM D696

.4 Adhesive conform to ULC Guide 360R13.

2.4 BATT INSULATION

.1 Fibrous Glass Batts: preformed insulation without a membrane, manufactured to CAN/ULCS702- 1997, type 1, sized for friction fit between framing, thermal resistance (RSI) as indicated on the drawings.

PART 3 EXECUTION

3.1 WORKMANSHIP

.1 Install insulation after building substrate materials are dry.

.2 Install insulation to maintain continuity of thermal protection.

.3 Fit insulation tight to plumbing, heating pipes, electrical boxes, etc. and around doors and windows.

.4 Seal joints and junctions with adhesive.

.5 Install in accordance with the manufacturer's recommendations.

3.2 INSTALLATION - CAVITY WALL

.1 Apply adhesive to insulation with daubs 40 mm dia. at 200 mm each wall.

.2 Maintain air space clear of obstructions.

3.3 INSTALLATION - FOUNDATION

.1 Apply adhesive to insulation with daubs 40 mm dia. at 200 mm each way.

.2 Place board as shown on the drawings and cover to prevent damage.

3.4 INSTALLATION - UTILITY TRENCH

.1 Place sand backfill over top of the pipe to 300 mm and level.

.2 Cut insulation to widths shown on the drawings or to trench width and lay in place, butting ends tightly.

.3 Insulation shall be fully supported by sand.

.4 Cover carefully with 400 mm sand and backfill trench in accordance with specifications for trenching and backfilling.

3.5 INSTALLATION - ROOF

.1 Refer to specifications for roofing.

.2 Apply insulation over gypsum board, staggering joints and butting sheets together.

.3 Cut insulation accurately to fit openings and edges.

.4 Protect from damage by sunlight by covering permanently within 24 hours or cover temporarily.

END OF SECTION

PART 1 GENERAL

1.1 CONTENTS

.1 This section specifies the requirements for the supply and installation of complete prepared two-ply. Styrene-Butadiene-Styrene (SBS) modified bitumen roofing membrane including all related sealants, insulation, accessories and metal flashings indicated on the Drawings.

1.2 RELATED WORK

.1	Rough Carpentry	Section 06100
.2	Flexible Membrane	Section 07111
.3	Building Insulation	Section 07210
.4	Flashing and Trim	Section 07620
.5	Counter Flashing for Mechanical Equipment Lead Flashing for Plumbing & Drains	Division 15

1.3 QUALITY ASSURANCE

.1 Workmanship Standards:

Conform to the latest Guaranteed Standards of the Roofing Contractors Association of British Columbia (RCABC) as published in the “RCABC Roofing Practices Manual” for a five (5) year Guarantee, unless modified by the contract documents to exceed those minimums.

.2 Qualification of Workers:

Employ skilled applicators approved by membrane manufacturer.

.3 Independent Inspection:

(a) Will be performed using an independent inspection company acceptable to RCABC appointed by the Owner.

(b) Will be performed as required by RCABC under the five (5) year Guarantee Program.

(c) Inspection costs for this Guarantee are to be included in this contract.

1.4 SUBMITTALS

.1 Provide the Owner with an "RCABC Roofing System Record" upon completion of this contract. (Includes RCABC Guarantee, copies of inspection reports, and Roof Maintenance Guide.)

.2 Provide the Owner with one set of any required Material Safety Data Sheets (MSDS) prior to commencement of work, for review and posting on job site.

.3 Provide four (4) copies of manufacturer's specification, installation procedures and samples for approval.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Deliver and store materials in original containers with manufacturer's labels and seals intact.

.2 Store materials elevated from contact with ground and moisture, and protected from weather.

.3 Store membrane rolls on end, one pallet high, selvage edge up; do not store in a leaning position.

.4 Where climatic conditions warrant, store membrane rolls in heated enclosures prior to use, as recommended by manufacturer; bring only enough rolls for immediate use to work area.

.5 Avoid prolonged exposure of light and heat sensitive materials to sunlight.

.6 Store combustible materials away from heat and open flame.

.7 Consult the manufacturer's material safety data sheets for materials on this project.

1.6 GUARANTEE

.1 Provide the standard Roofing Contractors Association of BC (RCABC) five (5) year Guarantee.

1.7 EXAMINATION OF SURFACES

.1 Examine all surfaces to receive roofing or flashing.

.2 Notify the Engineer of surfaces unacceptable to receive the work of this Section.

.3 The commencement of roofing or flashing will imply unconditional acceptance of the surfaces to receive this work.

.4 All roof openings, except roof drains, shall be curbed. Curbs shall be mounted on and attached directly to the structural deck. Curb height shall be 203 mm for vents, and 254 mm for all other curbs, measured from the top of the membrane, unless otherwise noted on the drawings.

.5 Roof drains shall be installed at the proper elevation relative to the finished roof surface.

.6 Plywood and lumber nailer plate to walls and parapets shall be located and installed as detailed.

.7 Control joints and expansion joints shall be located and installed as detailed.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Gypsum Board Sheathing: Exterior gypsum sheathing board with water resistant paper surfaces, 12.7 mm thickness. Reference Standard CSA-A82, 27-M1979.

.2 Asphalt primer: SOPRALENE/ELASTOCOL
Description:
Primer shall be applied on all surfaces to be covered with membrane.
.1 Nature: Black bituminous varnish.
.2 Composition: Asphalt modified bitumen with thermoplastic polymers and volatile solvents.

.3 Asphalt: Type II or Type III (based on slope) in compliance with C.S.A. A123.4M 1979.

.4 Vapour barrier: Elastophene sanded

.5 Roof Insulation

Urethane(Isocyanurate): Faced to CGSB 51.26
Provide min. 1 1/2% slope
Min. R.S.I. insulation values: R.S.I. 3.47 (R=20)

.6 Insulation Overlay: 11 mm asphalt-impregnated fibreboard conforming to CAN//CSA-A247-M86, Type 1; (asphalt-coated one side) as required by manufacturer.

2.2 MEMBRANES

.1 Membrane base sheet - ELASTOPHENE P.S. (or approved equal)

.1 Description: Roofing membrane shall have a glass mat reinforcement and thermofusible elastomeric asphalt.

.2 Components:
.1 Reinforcement: glass mat 95 g./m^2
.2 Elastomeric asphalt: mix of selected bitumen and SBS thermoplastic polymer.

.3 Physical Properties:
.1 Tensil strength, N/5cm.:
Longitudinal: 840
Transversal: 660

.2 Ultimate elongation:
Longitudinal: 4%
Transversal: 4%

.3 Static puncture strength: 98N

.4 Low temperature flexibility: no cracking at -30ºC.

.2 Base sheet stripping (flashing) - SOPRALENE FLAM 180 (or approved equal)

.1 Description: Roofing membrane shall have a non-woven polyester reinforcement and thermofusible elastomeric asphalt. Both sides shall be protected by a thermofusible plastic film. This membrane is to be applied by hot asphalt only.

.2 Components:
.1 Reinforcement: non-woven polyester, 180 g/m^2.
.2 Thermofusible elastomeric asphalt: mix of selected bitumen and SBS thermoplastic polymer.

.3 Physical Properties:
.1 Tensile strength, N/5 cm.:
Longitudinal: 1060
Transversal: 785

.2 Ultimate elongation:
Longitudinal: 58%
Transversal: 64%

.3 Static puncture strength: 300N

.4 Low temperature flexibility: no cracking at -30ºC.

.3 Membrane cap sheet and cap sheet stripping (flashing) - SOPRALENE FLAM 250 GR (or approved equal)

.1 Description: Roofing membrane shall have a non-woven polyester reinforcement and thermofusible elastomeric asphalt. The top side shall be self-protected with green coloured granules. The underside shall be protected by a thermofusible film. This membrane is to be applied by torching only.

.2 Components:
.1 Reinforcement: 250 g./m^2 of non-woven polyester.
.2 Elastomeric asphalt: mix of selected bitumen and BS thermoplastic polymer.

.3 Physical Properties:
.1 Tensile strength, N/5cm.:
MD: 1450
XD: 1090

.2 Ultimate elongation:
Longitudinal: 60%
Transversal: 69%

.3 Static puncture strength: 370N

.4 Low temperature flexibility: no cracking at -30□C.

2.3 ACCESSORIES

.1 Roofing nails: #10 hot dipped zinc coated with 12.7 mm diameter heads.

.2 Gypsum board sheathing screws and plates: For metal deck thickness 0.759 mm and less, use 32 mm long, self tapping, coated drywall screws with cone shaped shoulders, flat head, and Phillips drive. For metal deck thickness over 0.759 mm, use 32 mm long, self drilling, coated drywall screws with cone shaped shoulders, flat head, and Phillips drive. Plastic plates 76 mm diameter.

.3 Tape 50 mm wide self adhering cloth duct tape.

.4 Joint filler: Ethafoam rod.

.5 Metal deck flute closures: Urethane foam shaped to profile of deck.

.6 Flexible membrane air seal in accordance with Section 07111.

PART 3 EXECUTION

3.1 SURFACE INSPECTION AND PREPARATION

.1 Before commencing work, the roofing contractor shall inspect and approve the deck condition (slopes and nailing supports, if applicable) as well as parapet walls, roof drains, stack vents, vent outlets and others, building joints, etc. If applicable, a non-compliance notice shall be submitted to the contractor so that adjustments can be made. Commencement of work shall imply acceptance of surface and conditions.

.2 Before commencing work, all surfaces must be smooth, dry, clean and free of ice and debris. No salt or calcium shall be used to remove ice or snow.

.3 Check if the work of other trades has been properly completed.

.4 Do not install materials in conditions of rain, snow or fog.

3.2 INSTALLATION

.1 Install roofing elements on clean and dry surfaces, in accordance with the manufacturer's requirements and recommendations.

.2 Roofing work shall be performed on a continuous basis as surface and weather conditions allow.

.3 Adjoining surfaces shall be protected against any damage that could result from the roofing installation.

.4 Apply only as much insulation to the roof as can be covered the same day with roofing membrane. At the conclusion of each day's work, seal exposed edges of the roof insulation. This seal shall be cut and removed upon continuation of the work.

.5 Install all roofing material in accordance with manufacturer's written instructions and details.

3.3 EQUIPMENT

.1 Maintain all equipment and tools in good working order.

.2 Use torch types recommended by the manufacturer of the elastomeric asphalt capsheet.

3.4 GYPSUM BOARD INSTALLATION ON STEEL DECK

.1 On steel decks, fasten gypsum boards with specially designed screws and plates approved by the Engineer and applied according to applicable local standards. Where gypsum board seams coincide with a steel deck flute, add galvanized sheets in order to ensure a continuous support.

.2 Fastener spacing to meet RCABC requirements. Use 10 screws and plates per 4 x 8 sheet.

3.5 ASPHALT PRIMER APPLICATION

.1 Wood, concrete, metal or gypsum surfaces shall receive an asphalt primer coating at the rate of 350 g./m^2 (200 sq.ft./gallon).

3.6 VAPOUR BARRIER INSTALLATION

.1 Primer coating shall be dry before vapour barrier installation. Vapour barrier shall be unrolled on a hot asphalt bed at the rate of 1-1 1/2 kg./m^2 (20-30 lb./sq.).

.2 Application shall provide a surface free of air pockets, wrinkles, fishmouths or tears.

.3 Install vapour barrier over parapets and seal to wall air vapour barrier and flexible membrane to ensure a continuous air/vapour seal.

3.7 APPLYING INSULATION OVER VAPOUR BARRIER

.1 Mechanical fasten insulation to roof structure as per RCABC requirements.

.2 Use sloped insulation to achieve the drainage patterns indicated except where sloped structure will provide required roof slope.

.3 Apply 1.2 kg/m^2 coat of hot asphalt to top of first layer of insulation and embed fibreboard insulation. Place sheets with joints in line each way. Stagger joints of second layer with those of first layer.

3.8 APPLYING CANT STRIPS

.1 Install wood fibre cant strips over rigid insulation.

.2 Apply hot asphalt to receiving surface and embed the cant firmly by hand. Nail to plywood parapet facing if cant strip will not stay tight in corner.

.3 Angle cut all cants to fit tightly on both back and bottom, where roof to wall angle varies from 90^o.

3.9 BASE SHEET INSTALLATION

.1 Base sheet membrane shall be unrolled dry on insulation panels for alignment. Each strip shall have 75 mm side laps and 150 mm end laps.

.2 Base sheet shall be re-rolled from both ends and unrolled in a hot asphalt bed.

.3 Asphalt shall be applied at a minimum temperature of approximately 230°C and heated in a kettle at approximately 250°C. Asphalt shall be applied at a rate of 1 to 1.5 kg/m^2 (20-30 lb./sq.) at a distance not to exceed 1 m from the roll to provide a sufficient thermal mass to melt and amalgamate with the asphalt of the membrane. For low temperature application, it may be necessary to heat asphalt at higher temperatures so that application temperature is adequate. However, the heating temperature of the asphalt shall not exceed 260°C, the recommended absolute limit. Care must be taken that the asphalt in the kettle is continuously used to prevent distillation. Generally speaking do not apply mopped membranes at temperatures below -10°C. The wind chill will affect proper adhesion of the bitumen.

.4 Application shall provide a smooth surface free of air pockets, wrinkles, fishmouths or tears.

.5 Apply a light glaze coat max. 1 kg/m^2 (20 lb/sq.) on the surface of the base sheet.

3.10 BASE SHEET STRIPPING (FLASHING) INSTALLATION

.1 Primer coating must be dry before application of the base sheet stripping.

.2 Base sheet stripping shall be laid in strips 1 m wide to the vertical surfaces, extending on to the flat surface of the roof a minimum of 100 mm. Side laps shall be 75 mm and shall be staggered a minimum of 100 mm with the laps of the base sheet.

.3 Base sheet stripping shall be torch welded directly on its support from bottom to top. Torch welding shall soften the under side of the base sheet without overheating, resulting in a uniform adhesion over the entire surface. When allowed by the support, the base sheet top edge shall be nailed on 300 mm centres.

3.11 CAP SHEET INSTALLATION

.1 Once the base sheet and stripping has been applied and does not show any defects, the cap sheet can then be laid.

.2 Cap sheet shall be unrolled starting from the low point of the roof. Cap sheet shall be re-rolled from both ends prior to torching. Care must be taken to ensure good alignment of the first roll (parallel with the edge of the roof).

.3 Cap sheet shall be torch welded in accordance with recommendations of the membrane manufacturer, on to the base sheet membrane. During this application, both surfaces shall be simultaneously melted, forming an asphalt bead that shall be pushed out in front of the cap sheet.

.4 Care must be taken not to burn the membranes, and their respective reinforcements.

.5 Base sheet and cap sheet seams shall be staggered a minimum of 300 mm.

.6 Cap sheet shall have side laps of 75 mm and end laps 150 mm. Surface granules on end laps shall be embedded prior to installation of following sheet.

.7 Make sure the 2 membranes are properly welded, without air pockets, wrinkles, fishmouths or tears.

.8 After installation of the cap sheet, check all lap seams on the cap sheet.

.9 During installation, care must be taken to avoid asphalt seepage greater than 6 mm at seams.

3.12 CAP SHEET STRIPPING (FLASHING) INSTALLATION

.1 Cap sheet stripping shall be laid in strips 1 m wide. Side laps shall be 75 mm and shall be staggered a minimum of 100 mm from cap sheet laps.

.2 Using a chalk line, lay-out a straight line on the cap sheet surface, parallel to roof edge, 150 mm inside the roof from the base of the cant strip.

.3 Using a torch and round nosed roofing trowel, embed the surface granules into the heated and soft bitumen, from the chalk line to the edge of the cap sheet, at the top of the cant.

.4 Cap sheet stripping shall be torch welded directly on its base sheet, proceeding from bottom to top. Torching shall soften the two membranes and ensure a uniform weld.

.5 Cap sheet stripping shall be applied to extend down outside face of exterior edge, across top of parapet, down interior vertical surface and on to flat roof a distance of 150 mm to the extent of area of embedded granules. Cut roll into required lengths and use width of roll 1 m down length of roof, maintaining specified 75 mm side laps.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirements to supply and install all preformed metal roofing products, as detailed on the drawings, and/or herein specified, including the following:

.1 Exterior insulated sheet metal roofing system. Supply all labour and materials necessary to fabricate and install VICWEST Standing Seam Metal Roof System or approved equal including:

.1 Thermal barrier.
.2 Air/vapour barrier.
.3 Exterior metal roofing sheet.
.4 Accessories including associated flashings, closures, sealants.

.2 Exterior sheet metal roofing over wood roof decks; Profile to match VICWEST profile

.3 Metal screws, sealants, gaskets, and all necessary hardware herein not mentioned in order to complete this work.

.4 Exterior corners, cap flashings, copings and closures and all necessary fascia & soffit materials to complete this work.

1.2 RELATED WORK

.1	Structural Steel	Section 05120
.2	Metal Decking	Section 05300
.3	Miscellaneous Metal	Section 05500
.4	Flexible Membrane/Air Barrier	Section 07111
.5	Sealants	Section 07900

1.3 REFERENCE STANDARDS

.1 Structural design to CAN/CSA-S136-M89.

.2 Welding to CSA W59-M1989.

1.4 ROOFING SYSTEM

.1 Roofing assemblies to be field assembled.

1.5 DESIGN

.1 Design in accordance with CAN/CSA-S136-M89.

.2 Design all roofing systems to accommodate snow loads for Summerland, BC

.2 The roofing system to accommodate, by means of expansion joints, any movement in the siding itself and between the siding and the building structure, caused by structural movements deflection and wracking, etc. and/or thermal expansion and contraction without permanent distortion, damage to infills, cracking of joints, breakage of seals, or water penetration.

.3 Design, assemble and secure roofing system to the building structural frame in a manner that will keep any stresses on sealants within manufacturers' recommended maximum.

1.6 SAMPLES

.1 Submit colour samples for approval by the Owner and/or Engineer.

1.7 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01300

.2 Clearly indicate dimensions, siding profiles, attachment methods, schedule of roofs plans, soffits, trim and closure pieces, and related work.

1.8 STORAGE

.1 Protect materials from damage of weather or workmen.

.2 Ensure packaging of prefinished materials permits ventilation.

PART 2 PRODUCTS

2.1 COMPOSITE ROOF COMPONENTS

.1 Thermal Barrier: Exterior grade gypsum sheathing to CSA A82.27M minimum thickness shall be 12 mm (1/2").

.2 Air/Vapour Barrier: Membrane shall be {Ice and Water Shield} {Bituthene 3000} by W. R. Grace or an approved type to meet performance specified in Section 7190

2.2 MATERIALS

.1 Prefinished Sheet Metal Roofing exposed to exterior:

.1 Profile: VICWEST Standing Seam Roofing profile or approved equal , with interlocking ribs at 600 mm spacing
.2 Profile Material: AZ150 Galvalume, sheet steel conforming to ASTM A792M Grade 230.
.3 Coating: Prefinished with "Stelcolor 5000" paint finish, 2 coat system dry paint film thickness of 0.025 mm on two sides.
.4 Colour to be selected from the standard range in manufacturer color chart.

2.3 FASTENING SYSTEMS AND COMPONENTS

.1 Roof Panel Support System: Hidden fastener, purpose-made, thermally responsive full height clip system, designed to accommodate full insulation depth and allow for full thermal expansion and contraction of the exterior roof sheet. Clips to be fabricated from a minimum of 1.22 mm (.050") steel, with minimum Z275 galvanized coating.

.2 Roof Fasteners: As specified by manufacturer, to resist wind uplift and sliding snow forces.

.3 Screws for profiled sheet metal roofing over wood decks: cadmium plated steel, purpose made, head colour same as exterior sheet, and complete with neoprene washers, concealed fastening where possible.

.4 Sealant: one component acrylic to CGSB 19-GP-3b of colour to match siding.

.5 Gaskets: soft pliable vinyl, extruded profile, to achieve weather tightness when installed.

.6 Sub-girts and Furring: To ASTM A525-78A G-90 zinc coating designation, size to suit detailed conditions, spaced to meet design parameters.

.7 Exposed joint: (perpendicular to profile), ends of siding sheet shop cut clean and square, backed with tight fitting filler lapping back of joint, pop rivet connections, all exposed components to be colour matched to siding.

.8 Accessories: cap flashings, drip flashings, internal corner flashings, copings and closures for head, jamb, sill and corners, of same material and finish as exterior siding, brake formed to shape.

PART 3 EXECUTION

3.1 INSPECTION

.1 Confirm acceptability of support system for soundness, measurement and flatness.

.2 Install roofing and attachments to manufacturer/fabricators written instructions.

.3 Install prefinished metal ridge caps, fillers and closure strips with carefully formed and profiled work. Install with concealed fasteners.

.4 Maintain joints in exterior sheets true to line, tight fitting.

.5 Caulk joints, seams and junctions with dissimilar materials, with specified sealant. Refer to Section 07900 for caulking technique and workmanship.

.6 Provide all components including parapet anchor plate, drip and cap flashings, screws and fasteners as required to complete installation.

3.2 CONTROL/EXPANSION JOINTS

.1 Construct expansion joints as recommended by manufacturer.

.2 Cover sheets, of brake formed profile, of same material and finish as adjacent material.

.3 Attach with purpose made fasteners, exposed head of same colour as adjacent surface.

3.3 CLEANING

.1 Wash down exposed exterior surfaces using a solution of mild domestic detergent in warm water, applied with soft clean wiping cloths.

.2 Remove excess sealant by the moderate use of mineral spirits or other solvent acceptable by the sealant manufacturer.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirements for the supply and installation of flashing and trim in connection with roofing, and other areas of the work.

1.2 RELATED WORK

.1	Rough Carpentry	Section 06100
.2	Preformed Metal Siding	Section 07411
.3	Membrane Roofing	Section 07520
.4	Counter Flashing for Mechanical Work	Division 15
.5	Flashing for Plumbing Work	Division 15

1.3 REFERENCE STANDARDS

.1 Carry out work in accordance with the RCABC Manual on Good Roofing Practice and Accepted Roofing Systems.

1.4 QUALITY ASSURANCE

.1 The Owner will employ a roofing inspector, and a B.C. Roofing Contractor's Association Certificate of Assurance will be required, covering the roofing and sheet metal work.

1.5 SUBMITTALS

.1 Submit samples for all pre-finished, coloured materials.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Store roof flashing material off the ground and under cover.

.2 Prevent contact of dissimilar metals during storage, and protect metals from corrosive materials.

PART 2 PRODUCTS

2.1 GALVANIZED STEEL SHEET

.1 Commercial quality sheet to ASTM A526-80 with Z275 designation zinc coating to ASTM A525-80. Thickness 0.50-0.56 mm, minimum.

2.2 PREFINISHED STEEL SHEET

.1 Commercial quality sheet to ASTM A526 with Dofasco Pre-Coat 5000 Finish, or equivalent. Colour as selected by Engineer and to match adjacent siding material.

2.3 ACCESSORIES

.1 Plastic Cement to CGSB-37-GP-5M.

.2 Underlay for metal flashing - dry sheathing to CAN2-51.32; No. 15 perforated asphalt felt to CSA-A123.3-M1979.

.3 Sealants in accordance with Section 07900.

.4 Fasteners: of same material as sheet metal, to CSA-B111.

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

.6 Solder: to ASTM B32; tin and lead 50/50 or to sheet metal manufacturer's proportion.

.7 Flux: commercial preparation suitable for materials to be soldered.

.8 Bituminous paint to CGSB-108M-1GP, Type 11 Alkali Resistant.

.9 Touch-up paint as recommended by manufacturer.

2.4 FABRICATION

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA F.L. Series specifications.

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

.3 Hem exposed edges on underside 12 mm and seal corners with sealant.

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

.5 Apply isolation coatings to metal surfaces to be embedded in concrete or mortar.

2.7 METAL FLASHINGS

.1 Form flashings, copings, cap flashings and fascias to profiles indicated, of prefinished steel sheet. Contractor to note curved corners with flashing installation to suit radius as indicated on drawings.

.2 Form plastic pans from 0.7 mm thick galvanized steel with minimum 75 mm upstand above finished roof and 100 mm continuous flanges with no open corners. Solder joints.

PART 3 EXECUTION

3.1 GENERAL

.1 Install sheet metal work in accordance with BC Roofing Contractor's Association Recommendations for Good Roofing, Section 8.2, Sheet Metal Flashings.

.2 Protect all membrane flashings with base flashings.

.3 Join flashings by means of S-locks with an insert of approximately 25 mm.

.4 Install reglet true, uniform, and level, and caulk with sealant.

.5 Fasten sheet metal to suitable backing.

3.2 BASE AND COUNTER FLASHING

.1 Use base and counter flashings at horizontal to vertical junctions, where one piece wall flashing is not practical.

.2 Extend base flashing up vertical walls 200 mm above roof membrane, cover cant strip and extend over horizontal surfaces.

.3 Overlap counter flashing a minimum of 50 mm.

.4 Mechanically fasten base flashing at intervals of 1200 mm and approximately 200 mm above the roof surface.

.5 Fasten counter flashing into reglets or extend as cap flashing. Fasten at 600 mm intervals.

3.3 CAP FLASHINGS

.1 Overlap base flashings a minimum of 50 mm.

.2 Fasten at 1200 mm intervals, with no exposed fasteners on the top surface.

3.4 ROOF EDGES FLASHINGS

.1 Extend minimum 50 mm down fascia.

.2 Fasten at 1200 mm intervals.

3.5 ROOF DRAIN FLASHING, PLUMBING VENT FLASHING, AND ROOF JACK, VENTILATOR AND GOOSENECK FLASHING

.1 Refer to Division 15, Mechanical Specifications.

END OF SECTION

PART 1 GENERAL

0.1 QUALIFICATIONS

.1 Only competent and qualified tradesmen shall execute the work of this Section, using adequate plant and equipment.

0.2 DELIVERY / STORAGE

.1 Store off ground and under cover in a dry, well ventilated enclosure.

.2 Stack pre-formed material in manner to prevent twisting, bending and rubbing.

.3 Provide protection for galvanized or pre-coated surfaces.

.4 Prevent contact of dissimilar metals during storage. Protect from acids, flux, and other corrosive materials and elements.

0.3 EXAMINATION OF SURFACES

.1 Examine all surfaces to receive flashings.

.2 Ensure all unacceptable surfaces are repaired or replaced before commencing work of this Section.

.3 Commencement of flashing work will imply unconditional acceptance of surfaces and substrate to which flashing is to be affixed.

PART 2 PRODUCT

0.1 MATERIALS

.1 Galvanized steel sheet: Commercial quality to ASTM A653-96 with Z275 designation zinc coating.

.2 Prepainted galvanized steel sheet: Commercial quality to ASTM A653-96, with Z275 designation, factory painted with baked on enamel with colours of proven durability for exterior exposure, 8000 series colours as selected by the Consultant where not noted on the drawings.

.3 Flashing Nails: #12 hot dipped zinc coated, annular ringed.

.4 Sheet Metal Screws: Cadmium plated, self tapping, pan head.

.5 Bituminous Paint: CAN/CGSB-1.108-M89, type II.

.6 Plastic Cement: CAN/CGSB-37.5-M89.

.7 Lap Cement: CAN/CGSB-37.4-M89.

.8 Silicone or polyurethane sealant: to CAN/CGSB-19.13-M87, Sealing Compound, One-Component, Elastomeric, Chemical Curing.

.9 Recessed Reglet: Preformed 0.70 mm galvanized steel channel with face and ends covered with plastic tape.

.10 Eavestrough Brackets: 3 mm x 38 mm galvanized steel strap.

.11 Eavestrough Spacers: 2 mm x 38 mm galvanized steel strap.

.12 Eavestrough Anchors: 10 mm dia. x 150 mm long galvanized lag screws and ferrules.

.13 Precast concrete splash pads: grey concrete, purpose made air entrained.

0.2 FABRICATION

.1 Form metal rake, valley and eave edge flashings from 0.70 mm ∀ 0.08 mm prepainted galvanized steel.

.2 Form curb metal flashings from 0.70 mm ∀ 0.08 mm prepainted galvanized steel.

.3 Form eavestrough and downspouts from prepainted galvanized steel. Form eavestrough of 150 mm widths using continuous rolling process. Downspouts shall be corrugated.

Profile	Nominal size	Girth	Thickness
Ogee	125 mm	320 mm	0.55 mm ∀ 0.08 mm
Rectangular		510 mm	0.55 mm ∀ 0.08 mm
		530 mm to 635 mm	0.70 mm ∀ 0.1 mm

.4 Fabricate all flashings components to maximum length of 2.4 m.

.5 Form rake edge flashing with 100 mm wide deck flange and minimum 100 mm deep fascia flange with 15 mm x 45 deg doubled drip edge.

.6 Form eave edge flashing with 100 mm wide deck flange and minimum 100 mm deep fascia flange.

.7 Over-brake rake and eave flashings slightly so that when installed, fascia flashings are sprung tightly to fascia boards or wall fascia panels.

.8 Form flashing and counterflashing for penetrations from 0.70 mm prepainted galvanized steel.

PART 3 EXECUTION

0.1 WORKMANSHIP

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

0.2 INSTALLATION

.1 Join all prepainted steel components with silicon sealant and cadmium plated screws.

.2 Lap flashing joints 50 mm, and seal both sections along lap with sealant. Nail joints securely.

.3 Back paint sheet metal with bituminous paint on surfaces in contact with concrete, masonry, other cementitious materials, or dissimilar metal.

.4 Where reglet detail is required, insert metal flashing into reglet to form tight fit. Seal flashing into reglet with polysulfide sealant.

.5 Set edge flashing on deck along rake and eave edges.

.6 Nail deck flange to deck with two rows of annular ringed nails. Set one row 25 mm from fascia board, with nails at 200 mm centres. Set second row 25 mm from cut edge of metal, with nails at 400 mm centres, staggered with first row.

.7 Secure eavestroughs over 100 mm wide with brackets at 750 mm centres. Install spacer bars at 750 mm centres. Stagger position of brackets and spacer bars.

.8 Slope eavestroughs to downspouts.

.9 Install eavestroughs in maximum 15 m lengths. Close ends of each length. Allow 15 mm between sections. Install to each section at least one downspout.

.10 Install ells and tees as required, and secure downspouts to wall with 0.55 mm ∀ 0.08 mm prepainted galvanized steel straps at 1.8 m centres, minimum 2 straps per downspout.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirements for sealants and back up materials for all locations indicated on drawings where required to prevent a direct weather penetration and where required to effect a seal.

1.2 RELATED WORK

.1	Caulking for concrete	Section 03300
.2	Caulking in connection with masonry	Section 04200
.3	Caulking in connection with roof flashing	Section 07620
.4	Caulking in connection with metal cladding	Section 07411

1.3 REFERENCE STANDARDS

.1 Products shall be in conformance with CGSB and CSA Standards which are referenced in this section.

1.4 QUALITY ASSURANCE

.1 Materials and workmanship shall be in accordance with the manufacturer's recommendations.

.2 The manufacturer's representative shall be consulted and the intended product use shall be confirmed.

.3 The manufacturer's representative shall visit the site prior to the commencement of sealing to review products, job conditions and application with the Contractor and the Engineer.

.4 Sealant applicators shall be experienced in the application of the specified products.

1.5 SUBMITTALS

.1 Submit samples when colour of sealant is to be approved.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Ship, store and handle compounds and components in accordance with the manufacturer's recommendations.

.2 Do not use materials after the storage period (shelf life) has been exceeded.

.3 Maintain containers and labels on all products.

1.7 JOB CONDITIONS

.1 Sealant and substrate materials shall be suitable for application temperatures from 5°C to 35°C.

.2 For installation of sealants below 5°C consult the manufacturer and follow his recommendations.

1.8 WARRANTY

.1 The Contractor shall warrant that the applied sealants will not leak, crack, crumble, melt, shrink, run, lose adhesion or stain adjacent surfaces.

.2 The warranty shall be in effect for 1 year from the Completion Date.

PART 2 PRODUCTS

2.1 CLEANERS

.1 Use non-corrosive solvent recommended by sealant manufacturer for applicable substrate materials.

2.2 PRIMERS

.1 Use non-staining type primers compatible with the sealant, as recommended by the manufacturer.

2.3 BACKER ROD

.1 Compatible with primers and sealants, outsized 30% to 50%.

.2 Extruded closed cell foam - polyethylene - chemically inert, and resistant to oils, gasoline and solvents.

2.4 BOND BREAKER

.1 Pressure sensitive polyethylene tape that will not bond to sealants.

2.5 JOINT FILLER

.1 Use PVC foam expansion joint filler capable of compression to 50%.

.2 Use semi-rigid grade for cast-in-place concrete.

.3 Use soft grade for masonry, brick, isolation joints in concrete.

.4 Use adhesive that is compatible with joint filler.

.5 Do not use asphalt impregnated board where sealants are used.

2.6 SEALANTS

.1 Use primer and sealant type to meet the requirements of various applications, as recommended by the manufacturer and as specified.

.2 Two component polysulphide base structural sealant for non-sag applications.

Suitable for:

- joints in precast concrete
- expansion and control joints in concrete and masonry walls
- joints in glass and metal curtain wall
- joints in metal siding
- perimeter of aluminum window frames and metal panels
- application temperature range 4°C to 40°C
- movement range to 25%
- to CAN/CGSB 19.24 M80
- Shore A hardness 25-30
- primer necessary for most substrates
- primer necessary for submerged service
- Sternson Duoflex NS or approved equivalent alternative

.3 Epoxidized polyurethane terpolymer sealant to weatherproof building joints for non-sag applications.

Suitable for:

- joints in precast concrete
- expansion and control joints in concrete and masonry walls
- curtain walls
- perimeter joints of doors and sash
- movement range to 25%
- to CAN 2-19-24-M80
- Shore A hardness 25
- Resistant to weathering - 20 years
- Tremco Dymeric or approved equivalent alternative

Not suitable for submerged joints, or areas subject to chemical spillage.

.4 Two component polysulphide base structural sealant for self-leveling applications.

Suitable for:

- expansion and control joints in concrete floors
- expansion joints in tile and brick flooring
- movement range to 25%
- to CAN/CGSB 19.24 M80
- Shore A hardness - 35-40
- primer necessary for most substrates
- primer necessary for submerged service
- Sternson Duoflex SL or approved equivalent alternative

.5 One component silicone base for use as interior caulking

Suitable for:

- glazing, metal to metal, metal to glass, ceramics and porcelain
- movement range to 25%
- to CGSB-19 GP 4 Ma
- Shore A hardness 15-25
- primer is required for some applications
- primer use and type to be Tremco Proglaze or approved equivalent alternative as recommended by the manufacturer of sealant
- for plumbing applications where mildew resistance is necessary, use primer and mildew resistant sealant

.6 Two component epoxy urethane, catalyst cured, self-leveling sealant.

Suitable for:

- load bearing saw cut or preformed control joints
- heavy wear and impact areas
- Shore A hardness 80
- movement to 15%
- use with compatible bonding agent
- Sternson Loadflex or approved equivalent alternative

.7 Corrosion resistant joint filler; chemical and water resistant.

Suitable for joint sealant for corrosive locations

- Shore A hardness 70
- Sternson Talyflex or approved equivalent alternative

PART 3 EXECUTION

3.1 PREPARATION

.1 Prepare surfaces in accordance with the recommendations of the manufacturer.

.2 Surfaces shall be clean, dry and free from contaminants. Remove dust, paint, loose mortar and other foreign matter.

.3 In concrete and masonry, ensure that there is no contamination from form release agents, curing components and water repellents. To effectively remove contaminants, sand blast surfaces or grind surfaces.

.4 Remove oil, grease, mill scale and coatings from metals by wire brush, grinding or sand blasting; or by approved solvents.

3.2 JOINT DIMENSION

.1 Examine joint sizes and correct as necessary to achieve joint width to depth ratio 1:1 for joints up to 13 mm width. Minimum width to be 6 mm. When joint width exceeds 13 mm, joint depth shall be 13 mm. Maximum joint width 50 mm.

3.3 JOINT BACK-UP

.1 To restrict joint depth, use approved backing rod; sized to allow a minimum of 25% compression of the backing when it is placed in the joint.

.2 Use bond breaker to manufacturer's recommendations where joint backing cannot be used.

.3 Mask adjacent surfaces where necessary to prevent staining.

3.4 PRIMING

.1 Prime joint sides immediately prior to caulking, to the manufacturer's recommendations.

.2 Primers are a necessity in immersion conditions, and may be required in heavy traffic areas, depending upon the manufacturer's recommendations.

3.5 APPLICATION OF SEALANT

.1 Mix sealants in accordance with the recommendations of the manufacturer, observe mixing times and work life times.

.2 Apply sealants in accordance with the manufacturer's instructions using approved gun, with proper sized nozzles.

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

.4 Neatly tool surface to a slightly concave joint.

.5 Apply sealant to joints between window or door frames to adjacent building components, around perimeter of every external opening, to control joints in masonry walls, concrete slabs and where indicated.

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

.7 Sealants shall be applied after cast-in-place concrete has cured a minimum of 28 days. If it is necessary to apply sealants before 28 days, obtain product and application advice from the manufacturer, and obtain the approval of the Engineer.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for the supply and installation of hollow steel doors as per drawings.

1.2 RELATED WORK

.1 Steel Door Frames - Section 08102

.2 Hardware - Section 08710

.3 Painting - Section 09900

1.3 REFERENCE STANDARDS

.1 Canadian Steel Door and Frame Manufacturer's Association.

1.4 STORAGE AND PROTECTION

.1 Deliver, store and handle all metal doors and frames in such a manner as to prevent damage and deterioration.

.2 Store doors upright, in a protected dry area, at least 100 mm off the ground and with at least 12 mm air space between individual pieces; protect all prefinished and hardware surfaces as required.

.3 Use all means necessary to protect the installed work and materials of all other trades.

.4 In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at the Contractor's expense.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01300 - Submittals.

.2 Clearly indicate each type of door, material, steel core thicknesses, mortises, reinforcements, locations of exposed fasteners, glazed openings.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Doors 1.6 mm base thickness commercial grade sheet steel galvanized to ASTM A515 zinc finish.

.2 Glazing stops: minimum 1 mm base thickness sheet steel with W25 (wiped) zinc finish to ASTM-A653 and A924 fixed with tamperproof screws.

.3 Insulated core: semi-rigid fibreglass insulation minimum density 24 kg/m^3 for all exterior doors.

.4 Primer: zinc chromate primer to CGSB-1.181.

2.2 FABRICATION

.1 Fabricate steel doors in compliance with Canadian Steel Door and Frame Manufacturer's Association, "Canadian Manufacturing Specification for Steel Doors and Frames", for hollow steel and honeycomb core construction, except where specified otherwise.

.2 Mortise, reinforce, drill and tap doors and reinforcements to receive hardware using templates provided by finish hardware supplier. Refer to Section 08710 - Hardware for mounting heights.

.3 Make provision for louvers and glazing as indicated and provide necessary glazing stops.

.4 Construct matching panels in same manner as doors.

.5 Touch up doors with primer where galvanized finish was damaged during fabrication.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install doors and hardware in accordance with templates and manufacturer's instructions. Maximum permissible warp is 3.0 mm measured diagonally across door. Install door threshold seals as required by hardware schedule and door schedule.

.2 Adjust operable parts for correct function.

.3 Fill surface depressions and butted joints with metallic paste filler and sand to uniform smooth finish, ready to receive finish painting.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for the supply and installation of all hollow steel frames for doors.

1.2 RELATED WORK

.1 Building-in and grouting frames in masonry - Section 04200 - Concrete Unit Masonry.

.2 Caulking of joints between frames and other building components - Section 07900 - Sealants.

.3 Hollow steel doors - Section 08101.

.4 Finish hardware, including weather-stripping - Section 08710 - Hardware.

.5 Painting - Section 09900.

1.3 REFERENCE STANDARDS

.1 Canadian Steel Door and Frame Manufacturer's Association.

1.4 STORAGE AND PROTECTION

.1 Prevent rust and damage to materials during delivery and storage.

.2 Stack suitably to prevent any damage.

.3 Work that becomes dented, misaligned, or otherwise damaged shall be made good or replaced as required.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01300 - Submittals. Clearly indicate each type of frame, material, gauge, mortises, reinforcements, anchors, finish and special features.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Sheet steel: commercial grade galvanized to ASTM A525 zinc finish.

a) Frames: 1.6 mm base thickness steel.

b) Floor anchors, channel spreaders and wall anchors: minimum 1.6 mm base thickness steel.

c) Guard boxes: minimum 0.8 mm base thickness steel.

.2 Reinforcing channel: to CSA-G40.21-300W.

.3 Door bumpers: black neoprene stud.

.4 Primer: to CGSB-1.181.

.5 Thermally broken frame: "Therma-Frame" as manufactured by S.W. Fleming or conforming to CGSB-82.5.

2.2 FABRICATION

.1 Fabricate frames as detailed, to Canadian Steel Door and Frame Manufacturers Association, "Canadian Manufacturing Specifications for Steel Doors and Frames".

.2 Cut mitres and joints accurately and weld continuously on inside of frame profile.

.3 Grind welded corners and joints to flat plane, fill with metallic paste filler and sand to uniform smooth finish.

.4 Touch up frames with primer where galvanized finish is damaged during fabrication.

.5 Provide jamb anchors for fixing at floor.

.6 Reinforce head of frames wider than 1200 mm.

.7 Refer to Section 08710 - Hardware for hardware mounting heights.

.8 Install 2 bumpers at head for double doors.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Set frames plumb, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies metal rolling doors of narrow horizontal slats, operating vertically (rolling up at head of opening) and in wall openings.

1.2 RELATED WORK

.1	Miscellaneous Metals	Section 05500
.2	Door and Frame Schedule	Section 08010
.3	Painting	Section 09900

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01300.

.2 Indicate each type of door, arrangement of hardware, required clearances, etc.

1.4 MAINTENANCE DATA

.1 Provide data for maintenance of rolling metal doors and hardware for incorporation into maintenance manual.

1.5 DESIGN CRITERIA

.1 Design rolling door curtain and assembly to withstand windload of 960 Pa within door opening area.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Doors to be insulated rolling metal doors, Cookson, Wayne Dalton or approved equal.

2.2 DOORS

.1 Doors to be insulated with minimum R.S.I. Valve 1.23 (R=7).

.2 Assemble rolling door curtain of roll formed steel interlocking slat sections.

.3 Rivet continuous end locks to slat ends.

.4 Form guides of metal angles of sections of 5 mm minimum thickness.

.5 Construct counterbalance assembly of heat treated torsion spring with 25% overload factor. Enclose spring in steel pipe to support door curtain and counterbalance mechanism with maximum deflection of 1/360th of opening width. Provide ball bearings at rotating points. Provide spring tension adjusting wheel, accessible for setting.

.6 Support counterbalance assembly on 5 mm minimum thickness steel plate brackets, forming end enclosures.

.7 Enclose counterbalance assembly with sheet formed hood.

.8 Equip door for locking from inside with side mounted, adjustable keeper, spring powered latch bar, operated from interior only, complete with interlock switches for preset electrical operations when locked.

.9 Provide air-tight seal around perimeter of door in closed position.

.10 Finish to be in factory finish, selected by Engineer from standard range.

2.3 OPERATION

.1 Equip door for operation by electric motor driven operator.

.2 Motor to be 3/4 hp 110V single phase.

.3 Provide control panel adjacent to door on inside only.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install doors in accordance with manufacturer's printed instructions.

.2 Adjust door operating components to ensure smooth opening and closing of doors.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies the hardware for all buildings.

1.2 RELATED WORK

.1 Hollow Steel Doors - Section 08101

1.3 STANDARDS

.1 Codes Standards:

a) Conform to British Columbia Building Code.

b) Conform to Underwriters Laboratories of Canada, as applicable for labelled hardware in labelled or rated doors and frames.

1.4 SUBMITTALS

.1 Submittals shall be in accordance with Section 01300 - Submittals.

.2 Submit a detailed hardware schedule prior or ordering hardware.

.3 The hardware schedule shall show:

- door details
- mounting heights
- finish details
- symbols, abbreviations
- manufacturer name and product number

.4 Provide samples if requested by Owner.

.5 Provide templates as required for manufacturer of doors and frames.

.6 Label with permanent labels where hardware must have Underwriters Laboratories of Canada label.

.7 Provide parts and maintenance information, and where wrenches are required for adjustment, provide at least one of each.

1.5 PRODUCT HANDLING

.1 Delivery:

Each item of hardware to be separately wrapped in a manner to prevent damage to finish or surfaces. Deliver items to site with like items packed together, labelled as to exact item identification. Packing list must show quantities of each item shipped.

.2 Packaging:

Include with each item of hardware the following:

- screws, bolts and fastenings necessary for installation
- installation instructions
- special tools required for installation
- keys for locksets (except as hereinafter noted under "Keying Control System") in a suitable envelope tagged and plainly marked with the change number, door designation and all other identifying information as required.

.3 Labelling:

Legibly mark and adequately label, indicating the part of the work for which it is intended. Deliver hardware required for shop application in ample time so as not to impede the progress of the work.

1.6 COORDINATION

.1 After the award of the Contract and before furnishing any hardware, carefully check drawings of work requiring hardware, verify door swings, door and frame material and operating conditions and assure that all hardware will properly fit the work to which it is to be attached.

.2 Check shop drawings and frame and door lists affecting hardware type and installation and certify to the correctness thereof, or advise the Owner in writing of required revisions within fifteen (15) days of acceptance.

.3 Cooperate with trades using hardware supplied under this section.

1.7 GUARANTEES

.1 Provide two (2) year warranty for all hardware except for closers which shall have a five (5) year warranty.

PART 2 PRODUCTS

2.1 GENERAL

.1 Construct hardware to fit indicated details. Furnish hardware to template and with machine screws for use with metal frames or hollow metal doors. Use template strikes and wrought boxes, strike lip flat or curved as required by the latch and not to be projected beyond the jamb or door face.

.2 Furnish hardware with fastenings suitable to assure permanent anchorage. Where exposed, countersink, using oval-head fasteners except use flat-head type for hinges. Provide concealed fastenings wherever possible.

.3 All hardware shall comply with requirements of this section, the Hardware Schedule and local code requirements. The most stringent condition is to be applied. If in doubt, apply to the Owner for clarification.

2.2 FASTENINGS

.1 Furnish all hardware with all necessary screws, bolts, and other fasteners of suitable size and type, to anchor the hardware in position for long life under hard use.

.2 Fastening devices shall be of the same finish and material as the hardware which is to be fastened.

.3 Furnish fastenings where necessary with expansion shields, toggle bolts, hex bolts, and other anchors approved by the Owner, according to the material to which the hardware is to be applied and the recommendations of the hardware manufacturer and as specified.

2.3 KEYING

.1 All of the locks at the lift station shall be keyed alike to one master key.

.2 Deliver all keys to the Owner upon completion.

PART 3 EXECUTION

3.1 DELIVERIES

.1 Stock all items sufficiently in advance to ensure their availability and make all necessary deliveries in timely manner to ensure orderly progress of the work.

3.2 INSTALLATION

.1 Install finish hardware to approved schedule locations.

.2 Install in accordance with manufacturer's written instruction using the proper template supplied.

.3 Install to heights and centres scheduled for the component assemblies involved.

.4 Install each component in compliance with the manufacturer's instructions.

.5 Wherever cutting, drilling and fitting is required to install components onto or into surfaces which are later to be painted or finished, install each component completely and then remove and store in a secure place. After completion of the finishes, reinstall each item. Paint on finished hardware will not be acceptable.

.6 Set all components level, plumb and true to line and location. Adjust and lubricate so that components will operate smoothly and freely.

.7 After installation, provide such protection as will adequately protect all finishes from injury until completion of work. Upon completion, and at the time the Project is turned over to the Owner, each door and frame assembly shall be without blemishes, clean and in proper operating condition.

3.3 ADJUSTMENT

.1 Rehang or replace doors which do not swing or operate freely.

.2 Replace doors, frames and other components of the door openings which have been damaged prior to acceptance of the Project by the Owner.

3.4 ADJUSTING, CLEANING

.1 During installation of hardware and at completion, adjust hardware as necessary to ensure proper smooth and free operation.

.2 If shimming is necessary, use only approved non-corrodile metal shimms. Organic materials will not be allowed.

.3 Ensure key cylinders are properly installed in correct locations in accordance with approved keying schedule and that keys work properly.

.4 Clean and polish all hardware. Remove any scratched, marred or damaged hardware and replace with new. Ensure all screws are fully set, secure and flush.

3.5 HARDWARE SCHEDULE

ACCEPTABLE MANUFACTURERS

.1	Hinges:	Stanley, Hager
.2	Locksets, Cylinders:	Schlage
.3	Exit Devices:	Corbin ED6000
.4	Door Closers:	Norton 7500, Corbin DC2200
.5	Kickplates, Pulls, Stops:	Gallery, CBH, Hager, Gallery
.6	Weatherstrip, Thresholds:	Draftseal, Pemko, K.N. Crowder

General finishes for the specified products shall be:

.1	Hinges:	BHMA 630	Satin Stainless Steel
.2	Locksets:	BHMA 630	Satin Stainless Steel
.3	Exit Devices:	BHMA 630	Satin Stainless Steel
.4	Closers:	BHMA 689	Silver Painted
.5	Balance:	As Scheduled	

HARDWARE LIST TO FOLLOW

END OF SECTION

PART 1 GENERAL

1.1 GENERAL NOTES

.1 Refer to the pages following for room finishes and surface treatment.

.2 All exposed scuppers to be paint finished.

.3 For paint types, refer to Section 09900

.4 Colours of the various paint finishes, concrete, vinyl base and plastic laminates, to be selected by Architect.

.5 Abbreviations used in the following schedules:

st.t.conc hard	Steel trowelled concrete finish with hardener
VCT	Vinyl Composite Tile
Cer.Tile	Ceramic Tile (standard 150mm square)
Vinyl	Vinyl baseboard, 100x3mm thick, premolded, colored

Room	Floor	Base	Walls	Ceiling	Height	Remarks
Plant						
Peach Orchard Lift Station	St.t.conc.hard.	---	Conc. Block Seal and Painted	Moisture Proof, Painted		

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 Include labour, materials, tools, scaffolds and other equipment, services and supervision required to cover the surfaces of the building or structure, the building services and accessories not otherwise protected or covered with paint, as shown and specified in the Contract Documents.

.2 Refer to drawings and schedules for type, location and extent of finishes required, and include the field painting necessary to complete work shown, scheduled and specified, including backpriming.

.3 This section does not include surface preparation and priming to be carried out as specified in Divisions 5, 8, 14, 15, and 16.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1 Preparation of surfaces to receive finish under this section of work, except as specifically called for in Contract Documents.

.2 Concrete block (Section 04200).

.3 Shop painting of structural and miscellaneous metal (Sections 05120 and 05500).

.4 Shop coating of metal doors, frames and steel fittings (Sections 08010, 08110, 08111,).

.5 Shop coating of piping and mechanical equipment (Division 11 and 15).

.6 Miscellaneous equipment not requiring coating. The following equipment will be supplied with factory coatings:

- Pumps,
- electrical panels;
- electric motors;

This equipment is to be cleaned and the factory coatings touched up where they have sustained damage.

.7 Painting is not required on the following:

- Stainless steel - (surface treatment only)
- Brass
- Interiors of pipes and ductwork (unless specified in Division 11 or 15)
- Submerged galvanized metal
- Prefinished components specified in other sections
- Equipment name plates

1.3 REQUIREMENTS OF REGULATORY AGENCIES

.1 Tests by Agencies: shall fully cooperate with the Paint Inspection Agency in the performance of its duties for the duration of the contract.

.2 Design Conditions: Ensure the Paint Inspection Agency inspects surfaces requiring painting. Notify the Engineer and Contractor in writing of any defects or problems, prior to starting work, and after the prime coat is applied and defects become visible in the substrate.

1.4 QUALITY ASSURANCE

.1 Qualification of Manufacturer: the paint products of the Paint manufacturer shall be as listed in the Canadian Painting Contractor Architectural (CPCA) Painting Specification Manual, latest edition, under “Paint Product Recommendation” section.

.2 Qualifications of Applicators: the painting contractor must have a minimum of ten (10) years proven satisfactory experience in related work. Maintain a qualified crew of painters throughout the duration of the work to fully satisfy the requirements of this specification. Engage only qualified journeymen who have a provincial Tradesman Qualification certificate of proficiency and registered apprentices, in painting and decorating work.

.3 Qualification of Testing Agency: perform painting and decorating inspection using an inspector acceptable to the Engineer and in accordance with Chapter 7 of the Architectural Spec. Manual of the CPCA/HPDA of B.C.

1.5 SUBMITTALS

.1 Approvals: submit a written request to the Engineer for his approval of equivalent or alternative products. List each of the materials proposed, surfaces to be covered, manufacturer’s name and brand name of material.

.2 Colours: paint colours as selected by Engineer. Before starting work, obtain from the Engineer a schedule showing where the various colours and finishes are to be applied.

.3 General Colour Requirements: refer to the Contract Documents for type and extent of finishes and as specified under this Section. Paint exterior and interior steel and wood sash, frames, trim and door frames and trim generally same colours but a different colour than adjacent walls. Piping shall be colour coded in accordance with the type of service.

.4 Inspection and Guaranty: furnish a Canadian Painting Contractors (Provincial Association) Two-Year Guaranty, or the alternative 100% Two-Year Maintenance Bond, on completion of this Section's work. The Guaranty or alternative Maintenance Bond shall warrant the work and ensure that it has been performed in accordance with the standards and requirements incorporated in the Canadian Painting Contractors Architectural (CPCA) Specification Manual, (latest edition). The work performed by the Painting and Decorating Subcontractor shall be inspected by an independent inspector acceptable to the Engineer and to the appropriate Provincial Painting and Decorating Contractors Association. The cost of this inspection and the Guaranty or alternative Maintenance Bond shall be included in the tender price.

Painting and Decorating Subcontractors using the Maintenance Bond alternative must supply with their tenders, a facsimile of the bond, together with written proof of their ability to furnish same, at no additional cost to the Corporation. The proposed bond form must include wording which reflects that the Guaranty refers to work undertaken in Canada.

1.6 MOCK UP

.1 Sample Panels: before proceeding with painting work, and when requested by the Engineer, furnish one complete sample area or item of each colour scheme required, show selected colours, finish texture, materials and workmanship. Once approved, the samples shall serve as the standard for like work throughout the project.

1.7 PRODUCT STORAGE AND HANDLING

.1 Delivery of Materials: deliver paint materials to the site in sealed, original labeled containers; bearing manufacturer's name, type of paint, brand name, colour designation and instructions for mixing and/or reducing.

.2 Storage of Materials: Store paint materials at a minimum ambient temperature of 7°C in a well ventilated and heated single designated area, provided by others.

.3 Fire Hazard and Safety: take necessary precautionary measures to prevent fire hazards and spontaneous combustion.

.4 Toxic Materials: where toxic and explosive solvents and materials are used, take appropriate precautions and do not smoke in the area.

1.8 ENVIRONMENTAL CONDITIONS

.1 Temperature, Humidity, and Moisture Control conform to the following:

- Temperatures - do not perform painting when temperatures on the surfaces, or the air in the vicinity of the painting work are below 5°C. the minimum temperatures allowed for Latex paints shall be 7°C (interior work) and 10°C (exterior work) UNLESS specifically approved by the Engineer.
- Relative humidity - do no painting when it is higher than 85%.
- Moisture of surfaces - use electronic “Moisture Meter” testing method.
- Concrete block - maximum moisture content allowed is 12% for solvent type paint.
- Wood - maximum moisture content allowed is 15%.
- Masonry surfaces must be tested for alkalinity.

.2 Note: Concrete shall have cured, and concrete blocks shall be installed at least 28 days prior to painting and ensure surfaces are visually dry on both sides before painting work starts. This is not be to construed as including a “wetting down” process for Latex.

.3 Lighting: do not proceed with painting and decorating work unless a minimum of 15 candle power/sq.ft. lighting is provided on the surfaces to be painted, as per Chapter 10, CPCA/MPDA Manual (latest edition).

.4 Ventilation: areas where painting and decorating work is proceeding require adequate continuous ventilation and sufficient heating facilities to maintain temperatures above 7°C for 24 hours before and after paint application. Provide heating and ventilation as required for the faithful performance of this Section’s work, as per Chapter 10, CPCA/MPDA Manual (latest edition).

1.9 NAME PLATES

.1 All equipment name plates shall be left clean and free of paint.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Provide paint, varnish, stain, enamel, lacquer, and fillers of a type and brand herein specified and listed under “Paint Product Recommendations” described in the Association Manual, latest edition, for specific purposes intended.

.2 Provide paint materials such as linseed oil, shellac, turpentine, etc., and any of the above materials not specifically mentioned herein but required for first class work with the finish specified, of the highest quality product of an approved manufacturer. Ensure coating materials are compatible.

2.2 MIXING

.1 Use ready-mixed paints unless otherwise specified, except field mix any coating in paste or powder form, or to field-catalysed in accordance with the directions of its approved manufacturer. Fully grind pigments and maintain a soft paste consistency in the vehicle during storage which can be dispersed readily and uniformly by paddle to become a complete homogeneous mixture.

.2 Ensure paint has good flowing and brushing properties and is able to dry or cure free of sags, etc. to yield the finish specified.

PART 3 EXECUTION

3.1 INSPECTION OF SURFACES

.1 Surface Examinations: prior to commencement of work of this section, thoroughly examine surfaces scheduled to be painted. Report in writing to the Engineer any condition adversely affecting this work. Do not proceed with painting work until defects have been corrected and surfaces are acceptable to the Painting Inspector.

.2 Surface Acceptance: commencement of work shall not be held to imply acceptance of surfaces expect as qualified herein. For surface preparation of structural steel and miscellaneous metal surfaces, refer to the appropriate Section’s work and Chapter 10 of CPCA/MPDA Manual (latest edition).

3.2 PREPARATION OF SURFACES

.1 Mildew Removal: scrub with solution of TSP and bleach, rinse with clear water and allow surface to dry completely.

.2 Galvanized Steel: remove surface contamination, wash metal with xylene solvent and apply coat of an approved etching type primer. (For doors, frames, ducts, piping, eaves troughs and flashing).

.3 Zinc Coated Steel: remove surface contamination and prepare surface to material manufacturer's instructions for priming.

.4 Masonry and Cement Type Surfaces (brick, concrete, concrete block, stucco, cement render, etc.): remove dirt, loose mortar, scale, powder and other foreign matter. Remove oil and grease using a solution containing TSP, then rinse and let dry. This is NOT to be construed to include cleaning, chipping or grinding of protrusions or filling of "honeycomb" holes, etc. which is to be carried out under Division 3.

Treat surfaces which are very smooth or have traces of form oil or parting compounds with acid-detergent treatment and wash with water. Remove powder, chalking, and oxidizing.

Remove concrete stains caused by weathering of corroding metals using a solution of sodium metasilicate after being thoroughly wetted with water. Let dry.

.5 Structural and Miscellaneous Steel (Factory Primed): ensure surfaces are in a proper condition to receive paint finish with grease, rust, scale, dirt and dust removed. Where steel and iron have a heavy coating of scale, remove by wire brushing, sandblasting, etc., as necessary. Ensure steel surfaces are satisfactory before proceeding with painting finishing. Touch up primer where necessary.

.6 Piping, Plumbing and Duct Work: treat galvanized surfaces with acetic acid, sal soda or other approved solution, wash with clear water. Scrape, wire-brush the surfaces to remove mill scale, rust; clean with solvent to remove dirt, oil, grease; where solder flux has been used, clean with benzine. After installation and before final painting of equipment and accessories which are factory primed, clean surfaces and touch up bared or marred spots with same finish as primer.

.7 Stainless Steel: clean pipe with acid pickling solution as recommended by pipe manufacturer.

.8 Steel Pipe: prepare surfaces to SSPC-6.

3.3 APPLICATION

.1 General

.1 Use method of paint application by the accepted trade method.

- Painting coats specified are intended to cover surfaces satisfactorily when applied in strict accordance to manufacturer's recommendations.
- Apply each coat at the proper consistency.
- Ensure each coat of paint is slightly darker than preceding coat, unless otherwise approved.
- Sand lightly between coats to achieve an anchor for the required finish.
- Do not apply finishes on surfaces that are not sufficiently dry.
- Ensure each coat of finish is dry and hard before a following coat is applied unless the manufacturer's directions state otherwise (e.g. see polyurethane coatings).
- Tint filler to match wood when clear finishes are specified; work filler well into the grain and before it has set, wipe the excess from the surface.
- On exterior work, do not paint during temperatures under 5°C or immediately following rain, frost or dew; on interiors do not paint during temperatures under 5°C or on surfaces where condensation has formed or is likely to form (unless specially formulated paints are used). The minimum temperatures allowed for Latex paints shall be 7°C (interior work) and 10°C (exterior work) UNLESS specifically approved by the Engineer.

.2 Priming and Backpriming

.1 Backprime exterior woodwork which is to receive a paint finish upon arrival at the job site with exterior primer paint, stain or varnish, depending on the finish.

.2 Backprime interior woodwork which is to receive a paint or enamel finish upon arrival at the job site with enamel undercoating paint.

.3 Reduce stain, or gloss varnish as per manufacturer's directions.

.4 Prime top and bottom edges of wood and metal doors with under coating, stain or varnish, depending on the finish specified.

3.4 FIELD QUALITY CONTROL

.1 Provide alkali content tests. Use pink litmus paper for testing surfaces for alkalinity. Where extreme alkali conditions occur, neutralize surfaces by washing. Wash will consist of a 4% solution of Zinc Sulphate (NOT ON SURFACES THAT ARE TO RECEIVE LATEX PAINTS).

3.5 CLEANING

.1 Promptly as the work proceeds and on completion of the work, remove paint where spilled, splashed or spattered; during the progress of the work, keep the premises free from any unnecessary accumulation of tools, equipment, surplus materials and debris; at the conclusion of the work, leave the premises neat and clean to the satisfaction of the Paint Inspector and the Engineer.

3.6 PROTECTION

.1 General: adequately protect surfaces from paint and damage and make good any damage caused by this Section by failure to provide suitable protection.

.2 Drop Cloths: furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling completed or existing surfaces and in particular, surfaces within the paint storage and preparation area.

.3 Removal of Flammable Rubbish: place cotton waste, cloths and material which may constitute a fire hazard, in closed metal containers and remove from the site daily.

.4 Protection of hardware: remove electrical plates, surface hardware, fittings and fastenings, prior to painting operations. Carefully store, clean, and replace these items on completion of work in each area. Do not use solvent to clean hardware which will remove the permanent lacquer finish on some of these items.

3.7 PAINTING AND FINISHING SCHEDULE

.1 The following titles and code numbers refer to the Canadian Painting Contractors Architectural (CPCA) (or MPDA) Painting Specification Manual, latest edition, unless otherwise indicated for type of coating, grade, named products and manufacturers.

.2 Exterior painting and finishing schedule - Reference CPCA - Chapter 4A.

a) Galvanized Metal (flashing, doors and frames,
NOTE: other galvanized metal work to remain uncoated)

Premium Grade Ex. 12-A Alkyd Finish

Touch up with galvanizing primer where shown on drawings - Zinga or Galvacon.

b) Steel O/H doors Premium Grade Ex. 12-D acrylic finish.

.3 Interior painting and finishing schedule - Reference CPCA - Chapter 4B.

a) Wood Doors INT. 1-E stain and clear lacquer custom grade.

b) Cabinets INT 1-A Alkyd finish custom grade.

c) Plaster and drywall INT. 4-A Alkyd Finish

d) Concrete, Concrete Block (Note: Applies to walls and ceilings. Not floors.)

- Premium Grade INT. 7-B Alkyd Finish

e) Structural and Miscellaneous Metal (Factory Primed) (structural steel, crane beams, louvres, air handling units)

- Premium Grade INT. 13-A Alkyd Finish

f) Galvanized Metal Zinc Coated Steel (ducts, pipes, doors, frames, louvres)

- Premium Grade INT. 13-A Alkyd Finish

g) Plumbing and ducts

- For concealed non-insulated ferrous metal piping and ducts, hangers, supports, grilles, registers, other ferrous metal work, except that which is galvanized, apply one coat asphalt paint; coat parts which will be inaccessible for painting before installing them. (Note: major piping 75 mm diameter and larger is scheduled separately below.)

h) Major Piping, Valves, Pumps, Fittings, Couplings, Adapters and Associated Appurtenances

i) Touch Up of Existing Coatings

- This shall apply to all manufactured valves, couplings, pumps and mechanical equipment which are supplied with manufacturer's coatings which are unknown or do not conform to the pipe coating specification herein.

- Clean all specified surfaces to SSPC-SP-2 (hand tool cleaning).
- Apply two coats of industrial enamel as described below.

ii) Top Coats

- Ensure that all surfaces to be coated are clean and grease free.
- Touch up any damage to the zinc chromate primer.
- Spray apply two complete coats (5 mils minimum dry film thickness) of alkyd resin base BAPCO 39-000 Industrial Enamel or approved equal.
- Submit colour chips for selection by the Corporation.

.4 Concrete Block

.1 Apply one coat of thinned two component epoxy designed for priming of masonry surfaces, dry film thickness of 1 - 2 mils.

a) Intergard high gloss finish E H series/EHA000 thinned 30% by volume (International Paint).

b) Amerlock 400 high solids epoxy thinned 25% by volume (General Paint) or approved equal.

.2 Apply one coat of high build mastic to a minimum dry film thickness of 6 mils.

a) Intergard high build mastic E X series/EXA208 (International Paint).

b) Amerlock 400 high solids epoxy (General Paint) or approved equal.

.5 Touch up of manufacturer's coatings (over running crane, air supply and exhaust units, motors, electrical cabinets and all other equipment supplied with manufacturer's coatings and not otherwise requiring coating under this section).

.1 Touch up to repair all damage during shipping and construction.

.2 Protect all tags, signs and nameplates and ensure that paint is not applied to any uncoated surfaces.

.6 Piping Systems

.1 Piping systems shall be painted in accordance with the specified colour code.

.2 All items including valves, couplings, and fittings in a piping system shall be painted.

3. Pipe that has surface preparation and priming in a shop, shall be touched up, shall have welds cleaned and shall be painted in accordance with the applicable item in the schedule of painting systems.

.4 Valves, couplings and other items in a piping system may be supplied primed or shop finished. Such items shall be touched up as necessary and finish coated to match the piping system.

.5 Where the factory prime or finish coat consists of a material or materials not known, the surfaces shall first be prepared in accordance with SSPC-SP-6; and reprimed with a primer that is compatible with the finish coat.

.6 Where carbon steel, cast iron or ductile iron valves, couplings or fittings are installed in plastic, fibreglass or stainless steel piping systems, the metal items shall be painted in accordance with the applicable items in the schedule of painting systems to match the colour code.

.7 Apply one coat of primer, Valspar 13-Y-602 Epoxy Esler Valchem Phenolic primer, or approve equivalent.

.8 Apply two coats of finish, Vaspar 28 Series Chlorinated Valchem Rubber Brand, or approved equivalent.

.9 Apply paint to manufacturer's recommendations.

3.8 PAINTING AND COLOUR CODE

.1 Definitions

a) Piping systems shall include pipes of any kind, fittings, valves and pipe coverings.

b) Hazardous materials are materials which are flammable, explosive, corrosive, chemically active, toxic, productive of poisonous gases, or at high temperatures or pressures.

c) Fire quenching materials include CO_2 chemical foam, sprinkler systems and all other fire fighting and related equipment.

d) Safe materials shall include materials that hold little or no hazard to personnel or property.

e) protective materials shall include all materials used to prevent or minimize the hazards of dangerous materials by excluding fire quenching materials.

.2 Identification

a) All piping systems shall be identified by colour and by legend. Where colour bands are used instead of continuous colour for identification, the legend shall be placed on the coloured bands.

b) Piping identification shall be positioned every 10 metres on straight runs of pipe, at all changes of direction, and on both sides of equipment, valves, junctions, walls, floors, or ceilings.

c) The legend shall consist of stenciled letters giving the name of the contents in full or in abbreviated form. Temperature, pressure, an arrow indicating direction of flow, and similar information should be included when pertinent. The legend letters shall be positioned upright and normal to the operators viewing point whenever possible. Letters shall be stenciled in an approved, easily readable style of lettering.

d) The size of legend letters and colour bands shall be as outlined in Table 1 below or as directly by the Engineer. For smaller diameter pipes use a permanently legible tag. Under special conditions the Engineer may approve wall markings or alternative means of identification. Stainless steel piping shall be identified by letters identifying contacts and flow direction arrows.

TABLE 1 - SIZE OF LEGEND LETTERS

Outside Diameter of Pipe or Covering	Length of Colour Field	Size of Letters
mm	mm	mm
19 to 32	200	10
38 to 51	200	20
64 to 190	300	30
200 to 250	600	60
over 250	800	90

e) The colours for identification of piping systems shall be as outlined in Table 2 below and Section 01080.

TABLE 2 - CLASSIFICATION OF MATERIALS AND DESIGNATION OF COLOURS

Classification	**Colour of Filed (Valspar Numbers)**	**Colour of Legend Letters**
Hazardous Materials	Yellow 505-101 and/or Orange	Black
Fire Quenching Materials	Red 509-102	White
Safe Materials	Green 503-107	Black
Protective Materials	Blue 202-101	White

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 Exterior, surface mounted signs as indicated on the drawings.

.2 Letters are each individually mounted and secured.

1.2 SUBMITTALS

.1 Samples: submit sample of sign letter complete with specified finish and fastening device.

.2 Shop Drawing: submit shop drawings in accordance with Section 01300. Show letter types, anchorage, finish, spacing and dimensions.

1.3 QUALITY GUIDELINES

.1 Use of experienced designers, production staff, and installers familiar with the requirements of this work.

1.4 PRODUCT HANDLING

.1 Use all means necessary to protect signage materials in all phases of handling, storage and installation.

.2 Protect installed work and work of others.

.3 In the event of damage to this work, or work of others, make all replacements immediately at no cost to the Owner.

PART 2 PRODUCTS

2.1 SIGNS AND MATERIALS

.1 Install 50 mm lamacoids on all interior doors.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install units plumb and level to locations shown on drawings. Securely attached with concealed fasteners in accordance with approved shop drawings and manufacturer's instructions. Finish each unit with threaded stud hardware.

.2 Upon completion leave sign letter in wipe clean conditions.

3.2 CLEAN-UP

.1 Clean up any accumulated debris and remove from the site.

.2 Clean any building surfaces which have been marred by the work of this section.

END OF SECTION

PART 1 GENERAL

1.1 WORK INCLUDED

.1 The General Conditions, Supplements and Amendments shall govern this Division (read in conjunction with Instructions to Tenderers / Bidders). This section covers items common to all sections of Division 15 (Mechanical, Plumbing and Fire Protection) and is intended to supplement the requirements of other divisions.

.2 The word "Provide" shall mean "Supply and Install" the products and services specified. "As Indicated" means that the item(s) specified are shown on the drawings.

.3 Provide materials, equipment and plant, of specified design, performance and quality; and, current models with published certified ratings for which replacement parts are readily available. Provide project management and on-site supervision to undertake administration, meet schedules, ensure timely performance, ensure coordination, and establish orderly completion and the delivery of a fully commissioned installation.

.4 The most stringent requirements of this and other sections shall govern.

.5 All work shall be in accordance with the Drawings and Specifications and their intent, complete with all necessary components, including those not normally shown or specified, but required for a complete installation.

.6 "Consultant" shall mean Stantec Consulting Ltd.

1.2 STANDARD OF ACCEPTANCE

.1 Standard of acceptance shall mean that item named and specified by manufacturer and/or catalogue number forms part of specification and sets standard regarding performance, quality of material and workmanship and when used in conjunction with a referenced standard, shall be deemed to supplement the standard.

.2 Where two or more manufacturers are listed, the manufacturer's name shown underlined or shown with a model name (and / or number) was used in preparing the design. Tenders may be based on any one of those named, provided that they meet every aspect of the drawings and specifications.

.3 Where other than the underlined manufacturer or named manufacturer is selected or approved, include for the cost of any resulting work (both under this Division and other Divisions) and any consultant fees necessary for the redesign of equipment, 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.

.4 Where two or more items of equipment and/or material, of the same type, are required, provide products of a single manufacturer.

.5 Install and test all equipment and material, in accordance with the detailed recommendations of the manufacturer.

.6 A visible manufacturer's nameplate shall indicate manufacturer's name, model number, serial number, capacity data, electrical characteristics, and approval stamps.

1.3 ADDITION OF ACCEPTABLE MANUFACTURERS

.1 Material/products considered to satisfy the specification, but of a manufacturer other than those named in the Equipment Supplier Schedule may be submitted to the Consultant for consideration not later than five (5) working days prior to closing of tender or of bid depository subtrade tender whichever is earlier.

.2 Addition of manufacturer's names to the specifications will be by addendum only.

1.4 TENDER INQUIRIES

.1 All contractor queries during the tender period shall be made **in writing** to the consultant. Contractor queries will be collected and suitable addenda will be issued for clarification. No verbal information will be issued by the consultant's office during tender. All tender queries may be faxed, mailed or couriered to the consultant's office. No telephone questions will be answered or considered to be part of the project (unless answered in writing via addendum).

1.5 EQUIPMENT LIST

.1 Submit a completed Equipment List, showing the make of equipment and material included in the Tender, including the names of the sub trades, 10 days after the award of the Contract.

.2 The equipment list shall be a full list of materials intended for installation.

1.6 SCHEDULING

.1 Coordinate with Division 1, Construction Schedule.

.2 Incorporate within the Construction Schedule, a complete and realistic schedule, integrated with, and recognizing the reliance on, other divisions of the work. Take into account the lead time for the review of operating and maintenance manuals, commissioning, verification of system operation by the Consultant and the demonstration and instruction to the Owner. The schedule shall include but not limited to the following items:

a) Installation and testing of piping systems and equipment
b) Installation and cleaning of duct systems and equipment
c) Chemical cleaning and treatment of piping
d) Control system installation
e) Air and Water balancing
f) Air measurements of existing systems prior to any renovation work (foul Air System)
g) Connection of electrical services to equipment by electrical contractor
h) Start-up of mechanical equipment and systems
i) Check-out of control systems
j) Commissioning of mechanical systems
k) Demonstration of systems and equipment to Consultant
l) Demonstration of systems and equipment to Owner
m) Preparation of maintenance manuals and as-built drawings
n) Submission of the various documents required prior to substantial performance

1.7 RESPONSIBILITIES

.1 Visit the site before tendering. Examine all local and existing conditions on which the work is dependent.

.2 No consideration will be granted for any misunderstanding, of work to be done, resulting from failure to visit the site.

.3 Ensure that equipment does not transmit noise and/or vibration to other parts of the building, as a result of poor installation practice.

.4 Where the Contract Documents do not contain sufficient information for the proper selection of equipment for bidding, notify the Consultant during the tendering period. If clarification is not obtainable, allow for the most expensive arrangement. Failure to do this shall not relieve the Contractor of responsibility to provide the intended equipment.

1.8 COORDINATION

.1 Check drawings of all trades to verify space and headroom limitations for work to be installed. Coordinate work with all trades and make changes to facilitate a satisfactory installation. Make no deviations to the design intent involving extra cost to the Owner, without the Consultant's 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 only shown diagrammatically, the pipes and ductwork shall be installed in such a way as to conserve head room and interfere as little as possible with the free use of space through which they pass. Service lines shall run parallel to building lines. All 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 in the ceiling or structural space provided unless detailed otherwise on drawings.

.3 Work out jointly all interference problems on the site and coordinate all work before fabricating, or installing any material or equipment. Where necessary produce interference 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 Consultant of space problems before fabricating, or installing any material or equipment. Demonstrate to the Consultant on completion of the work that all equipment installed can be properly, safely serviced and replaced, if and when required.

1.9 PERMITS

.1 Obtain all required permits and pay all fees therefore and comply with all Provincial, Municipal (District of Summerland) 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.

1.10 CODES, REGULATIONS AND STANDARDS

.1 Division 15 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 latest revision of each code and standard shall apply unless otherwise specified in the contract documents:

- a) Bylaws
  - i) Local Building Bylaws
- b) Canadian Standards Association
  - i) CSA Standard C22.1, Canadian Electrical Code.
- c) National Fire Codes
  - i) N.F.P.A. 10 Portable Fire Extinguishers
- d) Province of British Columbia
  - i) B.C. Building Code.
  - ii) B.C. Amendment to Canadian Electrical Code.
  - iii) B.C. Electrical Safety Branch Bulletins.
  - iv) B.C. Code Amendments, Gas Safety Act & Regulations
  - v) B.C. Industrial Health & Safety Regulations, Workers' Compensation Board of British Columbia
  - vi) B.C. Fire Code
- e) SMACNA Publications
  - i) H.V.A.C. Duct Construction Standards
  - ii) Guidelines for seismic restraints of mechanical systems

.2 Where these specifications specifically indicate requirements more onerous than the aforementioned codes, these specifically indicated requirements shall be incorporated into the work.

1.11 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 any extended warranties specified.

.3 Refer to Section 15900 for Control System warranty requirements.

1.12 ENERGY CONSUMPTION

.1 Consultant may reject equipment submitted for approval or review on basis of performance or energy consumed or demanded.

1.13 ASBESTOS

.1 All material / products installed shall be free of asbestos.

1.14 WORKMANSHIP

.1 Workmanship shall be in accordance with well established practice and standards accepted and recognized by the Consultant and the Trade.

.2 The Consultant shall have the right to reject any item of work that does not conform to the Contract Documents and accepted standards of performance, quietness of operation, finish and appearance.

.3 Employ only tradesmen holding valid Provincial Trade Qualification Certificates. Tradesmen shall perform only work that their certificate permits. Certificates shall be available for inspection by the Consultant.

1.15 DRAWINGS AND MEASUREMENTS

.1 Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of work and are not detailed installation drawings. Do not scale the drawings. Obtain accurate dimensions from the Architectural and Structural drawings.

.2 Consult the architectural drawings and details for exact locations of fixtures and equipment. Obtain this information from the Consultant where definite locations are not indicated.

.3 Take field measurements, where equipment and material dimensions are dependent upon building dimensions.

.4 Where imperial units have been indicated in brackets [ ] following the requirements in SI units, the conversion is approximate and provided for convenience. The SI units shall govern.

1.16 ACCESSIBILITY

.1 Install all work so as to be readily accessible for adjustment, operation and maintenance. Furnish access doors where required in building surfaces for installation by building trades.

1.17 PROTECTION OF WORK

.1 Protect equipment and materials, stored or in place, from the weather, moisture, dust and physical damage.

.2 Mask machined surfaces. Secure covers over equipment openings and open ends of piping, ductwork and conduits, as installation work progresses.

.3 Equipment having operating parts, bearings or machined surfaces, showing signs of rusting, pitting or physical damage will be rejected.

.4 Refinish damaged or marred factory finish.

.5 Air systems to have air filters installed before fans are operated. Install new air filters before system acceptance.

1.18 SHOP DRAWINGS/PRODUCT DATA

.1 Process

a) Shop drawings/product data shall be submitted as listed in Section 15965, H.V.A.C. Equipment Suppliers Schedule and as specified in Plumbing Sections 15400 and 15500.

b) Shop drawings/product data shall be reviewed, signed and processed as described in the General Conditions, in Division 1.

.2 Content

a) Shop drawings submitted title sheet.
b) Data shall be specific and technical.
c) Identify each piece of equipment.
d) Information shall include all scheduled data.
e) Advertising literature will be rejected.
f) The project shall be identified on each document.
g) Information shall be given in S.I. units.
h) The shop drawings/product data shall include:
    i) Dimensioned construction drawings with plans and sections showing size, arrangement and necessary clearances, with all equipment weight's and mounting point loads.
    ii) Mounting arrangements
    iii) Capacity and performance characteristics indicated on performance curves for fans and pumps
    iv) Sound Power Data
    v) Motor efficiencies on motors 1H.P. and larger
    vi) List of the manufacturers and figure numbers for all valves, traps and strainers
    vii) Detailed drawings of bases, supports and anchor bolts
    viii) Control explanation and internal wiring diagrams for packaged equipment.
    ix) Control system drawings
    x) Interlock wiring diagrams including details of all component parts in order that the function of each is displayed
    xi) A written description of control sequences relating to the schematic diagrams

.3 Format
a) Electronic Shop Drawings that generally conform to Black line prints (216 mm x 280 mm [8-1/2" x 11"] or 280 mm x 430 mm [11" x 17"])
b) Larger drawings may be submitted electronically space for stamps and signatures
c) 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.
d) A brochure for plumbing fixtures between covers with the contents named with model numbers listed on the front cover with item identification numbers.

.4 Format
a) Provide electronic shop drawings and other copies as indicated in division 01.

.5 Coordination
a) 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 Consultants.

.6 Keep one [1] physical copy of shop drawings and product data, on site, available for reference.

1.19 EQUIPMENT RESTRAINT

.1 It is the entire responsibility of equipment manufacturers to design their equipment so that the strength and anchorage of internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.

1.20 EQUIPMENT INSTALLATION

.1 Provide unions and flanges to permit equipment maintenance and disassembly and to minimize disturbance to piping and duct systems and without interfering with building structure or other equipment.

.2 Provide means of access for servicing equipment including permanently lubricated bearings.

.3 Pipe equipment drains to floor drains.

.4 Line up equipment, rectangular cleanouts and similar items with building walls wherever possible.

1.21 ANCHOR BOLTS AND TEMPLATES

.1 Supply anchor bolts and templates for installation by other divisions.

1.22 ACCESS DOORS

.1 Unless otherwise noted, access doors shall be minimum: 450mmx450mm [18"x18"] for body entry; 300mmx300mm [12"x12"] for hand entry; 200mmx200mm [8"x8"] for cleanout access. Access doors in building surfaces shall be at least as large as duct access panels accessed through them and shall be oversized when necessary.

.2 Locate access doors so that all concealed items are readily accessible for adjustment, operation and maintenance. Locate in service and storage areas wherever possible. Do not locate in panelled, feature or special finish walls, without prior approval of the Consultant.

.3 Minimum Requirements:

a) 180 degree door swing, mitred rounded safety corners flush welded, concealed hinges, screwdriver latches, and anchor straps or lugs to suit construction, all steel prime coated.

.4 Standard of Acceptance : Zurn, Wade, Acudor, Can-Aqua, Milcor, Maxam, Van-Met.

1.23 CUTTING, PATCHING AND DIGGING

.1 Lay out all cutting, patching and digging 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 Division 15, including pipe sleeves and duct openings. Allow oversized openings for fire dampers and pipe penetrations where insulation is specified.

.2 Verify the location of existing service runs and structural components within existing concrete floor and walls prior to core drilling and/or cutting. Repairs to existing services and structural components damaged as a result of core drilling and cutting is included in this section of the work.

.3 Openings through structural members of the building shall not be made without the approval of the Structural Engineer and Consultant.

1.24 CUTTING, CORING AND PATCHING

.1 Openings in building surfaces other than concrete:
- a) Lay out all openings required.
- b) The performance of the actual cutting and patching will be done by the appropriate building trade.

.2 Openings through structural members of the building shall not be made without the approval of the Consultant.

1.25 FASTENING TO BUILDING STRUCTURE

.1 General:
- a) Do not use inserts in base material with a compressive strength less than 13.79 MPa [2000 psi] [refer to structural drawings].
- b) All inserts supporting piping shall have a factor of safety of 5. All other inserts shall have a factor of safety of 4.

.2 Types:
- a) Cast-in-place type:
  - i) Channel type - Burndy, Canadian Strut, Unistrut, Cantruss or Hilti Channel.
  - ii) Wedge type galvanized steel concrete insert, Grinnell Fig. 281 for up to 200 mm [8"] pipe size.
  - iii) Universal type malleable iron body insert, Grinnell Fig. 282 for up to 200 mm [8"] pipe size.
  - iv) Screw concrete insert, Grinnell Fig. 152 for up to 300 mm [12"] pipe size.
- b) Drilled, mechanical expansion type:
  - i) Hilti HSL or UCAN LHL heavy duty anchor for use in concrete with compressive strength not less than 19.6 MPa [2840 psi].
  - ii) Hilti Kwik-Bolt or UCAN WED stud anchor for concrete. (Do not use in seismic restraint applications).
  - iii) Hilti HDI or UCAN IPA drop-in anchor for concrete.
  - iv) Hilti or UCAN Sleeve Anchor (medium and light duty) for concrete and masonry.
  - v) Hilti ZBP or UCAN Zamac pin bolt (light duty) for concrete and masonry.
- c) Drilled, adhesive type:
  - i) Hilti HVA or UCAN Adhesive Anchor consisting of anchor rod assembly with a capsule containing a two-component adhesive, resin and hardener.
  - ii) Hilti HY150 consisting of anchor rod with a 2 part adhesive system.
  - iii) 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.
  - iv) Rod assemblies shall extend a minimum of 50 mm [2"] into the concrete slab below the housekeeping bases.

.3 Note:

a) 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.
b) Refer to manufacturer's recommendations for tightening torques to be applied to inserts.
c) Where specifically called for, drills shall include a dust vacuum system, Hilti SAV Dust Vacuum System.

1.26 MISCELLANEOUS METAL

.1 Be responsible for all miscellaneous steel work relative to Division 15 of the Specifications, including but not limited to:
a) Support of equipment
b) Hanging, support, anchoring, guiding and relative work as it applies to piping, ductwork, fans and mechanical equipment.
c) Earthquake restraint devices
d) Pipe anchor and/or support posts
e) Ceiling ring bolts - secure to structure or steel supports.

.2 All steel work shall be prime and undercoat painted ready for finish under Division 9. Refer to drawings for details.

1.27 PIPE SLEEVES

.1 Pipes and ducts passing through fire rated separations that have no fire resistance (non-rated separations) do not require a sleeve, but the insulation at the separation should be wrapped with 0.61 [24 ga] thick galvanized sheet steel band to which to apply the flexible caulking compound to.

.2 Pipe sleeves for perimeter walls and foundation walls shall be cast iron sleeve or Schedule 40 steel pipe with annular fin continuously welded at midpoint. Annular fin shall be embedded into centre of wall.

.3 Pipe sleeves for wet or waste water treatment areas and equipment rooms shall be Schedule 40 steel pipe.

.4 Pipe sleeves shall extend 25 mm [1"] on each side of walls in unfinished areas.

.5 Pipe sleeves shall extend 25mm [1"] beyond exterior face of building. Caulk with flexible caulking compound.

.6 Sleeve Size: 12 mm [1/2"] clearance all around, between sleeve and pipe or between sleeve and pipe insulation.

.7 Paint exterior surfaces of ferrous sleeves with heavy application of rust inhibiting primer.

.8 Packing of Sleeves:
a) Where sleeves pass through foundation walls and perimeter walls the space between sleeve and pipe or between sleeve and pipe insulation shall be caulked with waterproof fire retardant non-hardening mastic.

1.28 DUCT AND PIPE MOUNTED CONTROL EQUIPMENT

.1 The following automatic control equipment will be supplied under Section 15900 but installed by the appropriate trade sections of Division 15:

a) Automatic control valves
b) Temperature control wells
c) Pressure tappings
d) Flow switches
e) Automatic control dampers
f) Static pressure sensors

1.29 ELECTRIC MOTORS

.1 Provide motors for mechanical equipment as specified.

.2 Unless noted otherwise, provide open drip-proof, ball bearing, continuous duty motors of EEMAC class B, suitable for 40 deg. C. ambient, for all mechanical equipment.

.3 Motors powered by variable speed drive controllers shall be manufactured by Baldor, General Electric, Reliance, Siemens, Toshiba, U.S. Electric Motors or Westinghouse. They shall be EEMAC class B with Type F "inverter duty" insulation, shall have a 1.15 service factor on sine wave power, 1.0 service factor on PWM power and meet NEMA Code MG-1, 1993 Part 31.

.4 Motors shall have standard voltage ratings consistent with the project distribution voltages. Motors less than 1/2 H.P. to be 120 volt, 60 cycle, single phase power. Motors 1/2 H.P. and larger to be 3 phase power and for the scheduled voltage.

.5 Provide motors with efficiencies measured by IEEE Standard 112 (1978) Method B:
a) Dynamometer, or CAN/CSA Standard - C390-93.
b) For all equipment requiring 1 H.P. motors and larger.
c) Motor efficiencies shall meet or exceed the efficiencies indicated below:

HP	**Minimum Efficiency (%)**		
	3600 RPM 2 Pole	**1800 RPM 4 Pole**	**1200 RPM 6 Pole**
1	75.5	82.5	80.0
1.5	**82.5**	84.0	85.5
2	84.0	84.0	86.5
3	85.5	87.5	87.5
5	87.5	87.5	87.5
7.5	88.5	89.5	89.5
10	89.5	89.5	89.5
15	90.2	91.0	90.2
20	90.2	91.0	90.2
25	91.0	92.4	91.7

.6 All motors to be standard 1800 RPM unless specifically scheduled otherwise.

.7 Provide all motors with terminal boxes, suitable for power connections.

.8 Provide screw adjustable bases on all belt connected motors.

.9 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.

.10 Motors exposed to outdoor temperature to be lubricated with lubricants suitable for operation at 6 deg. C. below the lowest temperature recorded by ASHRAE or the Climatic Information (Supplement to the National Building Code), for the location in which they are installed.

.11 Submit data of test method used, with shop drawings, when motor efficiencies are called for.

.12 Unless otherwise noted starters and protection devices will be included under the Electrical Division of the Specification.

.13 Assist Division 16 to ensure proper connection, correct thermal overload protection and correct motor controls.

.14 Where starters are included in this Division as an integral part of packaged equipment, they shall contain thermal overload protection in all ungrounded lines.

.15 Equipment, which has more than one voltage rating, shall be fed from a single power source through a disconnect switch.

.16 If delivery of specified motor will delay delivery or installation of any equipment, install an acceptable motor for temporary use. Final acceptance of equipment will not be given until specified motor is installed.

1.30 BELT DRIVES

.1 Provide belt drives to the following requirements:

a) Provide steel, cast iron or aluminum sheaves for motors less than 3/4 H.P.

b) Provide steel or cast iron sheaves keyed to shafts, for motors 3/4 H.P. and larger.

c) For motors less than 10 H.P. provide standard adjustable pitch drive sheaves having +/-10% range. Use mid-position of range for specified RPM.

d) For motors 10 H.P. and larger, provide fixed pitch drive sheaves with split tapered bushing and keyway. Provide final drive sheaves of size to suit final balancing.

.2 Match drive and driven sheaves.

.3 V-belts shall conform with the American Belt Manufacturers standards. Multiple belts shall be matched sets.

.4 Not less than a 2-belt configuration is required for each drive for motors 3/4 H.P. and larger.

.5 Minimum drive rating shall be 150% of nameplate rating of motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.

.6 Motor slide rail adjustment baseplate with double draw bolt, shall allow for centre line adjustment.

.7 Tension belts to manufacturers recommendations before start up and after 100 hours of operation using calibrated belt tensioning gauge.

.8 Provide one spare set of belts for each piece of equipment with each belt separately identified for the equipment item to be served.

1.31 SHAFT COUPLINGS

.1 Shaft couplings shall be of the pin or jaw neoprene insert type, gear type, or flexing steel insert type and shall allow coupling inserts to be easily removed without disassembly of the equipment.

1.32 SETTING AND ALIGNMENT

.1 Employ a journeyman millwright to align all V-belt drives and/or shaft coupling drives prior to initial start up. The millwright shall also check that centrifugal fan wheels are properly centred on fan shafts.

.2 Align shaft couplings, using a dial indicator, to within +/-0.051 mm [0.002"] after grouting is complete and the piping system is operational.

.3 Align V-belt drives using a straight edge.

.4 Submit a certificate from the millwright employed, certifying that all shaft couplings and V-belt drives have been aligned and centrifugal fan wheels centred prior to initial start up and checked again after final system balance adjustment.

1.33 GUARDS

.1 Provide removable protective guards on all exposed V-belt drives and shaft couplings in accordance with Worker's Compensation Board requirements.

.2 Guards for drives shall have:
a) 1 mm [18 ga.] expanded metal screen welded to 25 mm [1"] steel angle frame.
b) 1.5 mm [16 ga.] thick galvanized sheet metal tops and bottoms.
c) Removable side[s] for servicing.
d) 38 mm [1-1/2"] dia. holes on both shaft centres for insertion of tachometer.
e) Sectionalize if necessary so one man can handle removal.

.3 Provide means to permit lubrication and use of test instruments with guards in place.

.4 Fabricate and install belt guards for V-belt drives to permit movement of motors for adjusting belt tension and for belt slap.

.5 Provide removable "U" shaped guards for flexible couplings with 2.5 mm [12 ga.] thick galvanized frame and 1.2 mm [18 ga.] thick expanded mesh face.

.6 Provide guards on all unprotected fan inlets and outlets. Guards to be provided by fan manufacturer.

.7 Prime coat guards and finish paint to match equipment.

.8 Secure guards to equipment allowing for ease of removal.

1.34 EQUIPMENT SUPPORTS

.1 Provide stands and supports for equipment and materials supplied.

.2 Lay out concrete bases and curbs required under Division 15. Coordinate with Division 3. All concrete work is under Division 3.

.3 Concrete bases shall be a minimum of 100 mm [4"] thick, or as noted and shall project at least 150 mm [6"] outside the bedplate, unless otherwise directed. Bases and curbs shall be keyed to the floor and incorporate reinforcing bars and/or steel mesh. Chamfer edges of bases at 45 degrees.

.4 Equipment with bedplates shall have metal wedges placed under the edges of the bedplates to raise them 25 [1"] above the base after levelling. The wedges shall be left permanently in place. Fill the space between the bedplate and the base with non-shrink grout - Embeco or In-Pakt.

.5 Construct equipment supports of structural steel or steel pipe. Securely brace. Employ only welded construction. Bolt mounting plates to the structure.

.6 Support ceiling hung equipment with rod hangers and/or structural steel.

1.35 LUBRICATION OF EQUIPMENT

.1 Lubricate all new equipment prior to being operated, except sealed bearings, which shall be checked.

.2 Use the lubricant recommended by the manufacturer for the service for which the equipment is specified.

.3 Extend lubricating connections and sight glasses to the outside of housings, where lubricating positions are not readily accessible.

.4 Submit a check list, showing that all operated equipment has been lubricated prior to and during any temporary heating period and the demonstration and instruction period.

1.36 PAINTING

.1 Clean exposed bare metal surfaces supplied under Division 15 removing all dirt, dust, grease and millscale. Apply at least one coat of corrosion resistant primer paint to all supports and equipment fabricated from ferrous metal.

.2 Paint all pipe hangers and exposed sleeves, in exposed areas, with a rust inhibiting primer, as they are installed.

.3 Repaint all marred factory finished equipment supplied under Division 15, to match the original factory finish.

.4 Coordinate with Division 9.

.5 Painting of all equipment and materials, supplied under Division 15, installed in mechanical equipment areas and inside finished areas of the building or exposed outside the building, is included under Division 9 of the Specification.

.6 Painting by Division 9 shall be in accordance with the following Colour Schedule for Mechanical Equipment Areas:

Item	**Colour Finish**
Ductwork, Plenums and Miscellaneous Steel	
• not galvanized	Grey
• galvanized	White
• plenum access doors and 200 mm around doors	Grey
Fan Casings and Bases	Grey

Item	Colour Finish
Guards – Belt and Coupling	To match associated equipment
Insulation Covering (on piping, tanks, heat exchangers, breeching, etc.)	White
Motors (electric)	To match associated equipment
Piping (uninsulated)	White

1.37 START-UP

.1 Before starting the plant, provide a certificate stating that the plant is ready for start-up and the following conditions have been met. (See forms in Section 15955).

a) All safety controls installed and fully operational
b) Permanent electrical connections made to all equipment.
c) All air filters installed.
d) Pump and fan drives properly aligned by a journeyman millwright.
e) All mechanical equipment rooms are vacuum cleaned.

1.38 TEMPORARY HEATING

.1 The main air handling supply units shall not be used for temporary heat.

1.39 SPARE PARTS

.1 Provide spare parts as follows:

a) One set of V-belts for each piece of machinery.
b) One set of filter media for each filter or filter bank installed (pre and final filters).

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

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

1.2 REGULATORY REQUIREMENTS

.1 Restraints shall meet the requirements of the British Columbia Building Code.

1.3 SEISMIC RESTRAINT DESIGN AND INSPECTION

.1 Arrange and pay for the services of a B.C. registered professional structural engineer who specializes in the restraint of building elements. This structural engineer, herein referred to as the seismic engineer shall provide all required engineering services related to seismic restraints of non-vibration isolated equipment, ductwork and piping as indicated below.

.2 The seismic engineer shall provide assistance to the contractor as necessary during the course of restraint of equipment, ductwork and piping.

.3 The seismic engineer shall inspect the completed seismic installation and shall submit a statutory declaration to the consultant stating that the complete seismic installation is installed in accordance with his drawings and instructions and it complies with the regulatory requirements.

1.4 SUBMITTALS

.1 Submit shop drawings of all restraining devices, not covered in the SMACNA Guidelines, including details of attachment to the structure, either tested in an independent testing laboratory or approved by a B.C. registered professional engineer.

.2 Proposed inserts or connections to structure to follow directions of project structural consultant.

1.5 APPLICATION

.1 Provide cable restraints on all isolated equipment and seismic restraint on all other equipment, piping and ductwork, all in general accordance with SMACNA Guidelines (see Products).

.2 Generally, the seismic restraint requirements apply to suspended equipment, ductwork or piping that may sway during a seismic occurrence and to base mounted equipment that may topple or shift position during a seismic occurrence.

1.6 SCOPE OF WORK

.1 Provide restraint on all piping, ductwork, equipment and machinery which is part of the building mechanical service systems to prevent injury or hazard to persons and equipment and to retain equipment in its normal position in the event of an earthquake. This specification covers equipment which is not specifically covered in SMACNA.

.2 Provide all seismic restraint related hardware, (including bolts and anchors) from point of attachment to equipment through to and including attachment to structure.

.3 When equipment is mounted on concrete housekeeping pads, and / or concrete curbs the anchor bolts shall extend through the pad into the structure.

.4 It is the entire responsibility of equipment manufacturers to design their equipment so that the strength and anchorage of internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.

.5 Seismic restraints may only be omitted where permitted by SMACNA.

PART 2 PRODUCTS

2.1 GENERAL

.1 Mason Type SCB (Seismic Cable Brace) slack cable restraints supplied by Vibra-Sonic Control.

.2 Restraint systems as indicated in 1998 SMACNA "Seismic Restraint Manual Guidelines for Mechanical Systems" (second edition), Seismic Hazard Level SHL A. If lesser restraint than recommended by SMACNA SHL A is proposed to meet local Code seismic requirements, provide shop drawings of details certified by a B.C. registered structural consultant.

PART 3 EXECUTION

3.1 GENERAL

.1 It is the responsibility of the contractor to ascertain that an appropriate size device be selected for each individual piece of equipment.

.2 The following are guidelines for some items not covered in SMACNA but certified shop drawings should still be submitted. Note that this list is not intended to cover all equipment requiring restraints.

.3 All resiliently mounted equipment, including piping and ductwork, shall be provided with seismic restraining devices (snubbers).

3.2 AIR TERMINALS

.1 Air terminals installed in grid ceilings on rigid duct shall have at least two screws securing the air terminal to the duct.

.2 Attach security bridles at opposite corners of each air terminal and in such a manner that the air terminal cannot fall.

.3 Provide all necessary brackets for attachment of security bridles to the air terminals.

3.3 ISOLATED EQUIPMENT

.1 Install cables using appropriate grommets, shackles, and other hardware to ensure alignment of the restraints and to avoid bending the cables at connecting points.

.2 Connect slack cable restraints to ceiling hung equipment in such a way that the axial projection of the wires passes through the centre of gravity of the equipment.

.3 Vary adjacent spacing of restraints on a piping run by 10% to 30% to avoid coincident resonances.

.4 Install restraints at least 50 mm [2"] clear of all other equipment and services.

.5 Adjust restraint cables such that they are not visibly slack, or such that the flexibility is approximately 40 mm [1-1/2"] under thumb pressure for a 1.5 m [5 ft] cable length (equivalent ratio for other cable lengths). Adjust the clearance at cable strap/spacer piece restraints to not exceed 6 mm [1/4"].

.6 Provide transverse and axial restraints as close as practical to a vertical bend.

.7 At steel trusses, connect to top chords and follow truss manufacturer's instructions.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

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

1.2 SUBMITTALS

.1 Fan shop drawings shall include sound rating data and fan curves showing operating point plotted on curves.

.2 Fan shop drawings shall include motor efficiencies. Refer to Section 15010 for minimum motor efficiencies.

1.3 CERTIFICATION OF RATINGS

.1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

PART 2 PRODUCTS

2.1 AIR TERMINALS

.1 General:

a) Grilles, registers and diffusers shall be product of one manufacturer.

b) Refer to drawings for sizes and air quantities.

c) Refer to schedules on drawings for specifics.

d) The manufacturer (other than the design listed) shall match performance data and indicate a specific comparison for each item, with the shop drawing submission.

e) All ceiling mounted air terminals shall be provided with means for attachment of two (2) 12 ASWG seismic security wires at opposite corners of each air terminal.

f) Provide concealed baffles, where necessary, to direct air away from walls, columns or other obstructions within the radius of air terminal operation.

g) Provide full perimeter sponge rubber gaskets.

2.2 FANS - GENERAL

.1 Provide fans selected for maximum efficiency and generating noise levels on site not exceeding the level calculated from the ASHRAE Guide (1987* Systems, Ch. 52, Table 5). If fans are not specified at maximum efficiency, advise mechanical consultant before tendering and submit alternate price for maximum efficiency fans. If approval to supply noisier fans is not obtained prior to tendering, provide equipment meeting ASHRAE levels on site without loss in efficiency.

.2 Submit fan sound power levels with shop drawings measured to applicable AMCA standards, or other data acceptable to the engineer. Provide test data, if requested. Indicate on shop drawings the test configuration, including ductwork, and any end reflection corrections applied to the data and / or if such corrections have been omitted.

.3 Provide location of similar existing fan installation when requested and co-ordinate with engineer to obtain access.

.4 Fans: statically and dynamically balanced, constructed in conformity with AMCA-99-83. Dynamically balance fans to 1.5-mm/s vibration amplitude, maximum measured on bearing housings. Provide fan shafts with critical speed at least 1.5-times operational speed.

.5 Ratings: based on tests performed in accordance with AMCA 210, and ASHRAE 51-85. Units shall bear AMCA certified rating seal.

.6 Refer to Section 15010 for high efficiency motor requirements.

.7 Ratings: based on tests performed in accordance with AMCA 210, and ASHRAE 51-85. Units shall bear AMCA certified rating seal.

.8 Refer to Section 15010 for high efficiency motor requirements.

.9 Refer to drawings for motor position, rotation and discharge arrangements.

2.3 FANS - MOTORS AND VARIABLE SPEED DRIVES

.1 Provide motors and variable frequency drive / motor assemblies generating noise levels which are imperceptible in the occupied space, and outside building, relative to fan noise. Provide acoustical data confirming required performance prior to tendering. If approval is not obtained prior to tendering, provide equipment meeting specified imperceptible requirement without loss in efficiency.

.2 Provide location of similar existing installation when requested and coordinate with engineer to obtain access.

2.4 FANS - AXIAL (CONSTANT VOLUME)

.1 Minimum Requirements:

a) Steel tubular casing, long type, with flanged ends and stationary guide vanes where scheduled.

b) Mounting feet.

c) Aluminum air-foil blade impeller with adjustable pitch angle.

d) Rotating parts factory statically and dynamically balanced.

e) Totally enclosed motor, direct drive.

f) Casing with externally mounted junction box.

g) Galvanized or prime and factory enamel coating over all interior of casing, including steel accessories. Galvanized or prime coating over all exterior parts of casing and steel components.

h) Provide extended lubricators for fan bearings 19 mm [3/4"] diameter and larger.

.2 Accessories:

a) The acoustic centre pod (where specified) in the discharge cone shall be constructed from 23% open area perforated galvanized steel packed with inorganic fibre under compression. Dimensions of pod as follows: length of pod to match length of discharge cone (with extension, if applicable, to reach the downstream side of the fan motor), diameter to match diameter of fan motor.

b) Inlet bell and screen where scheduled or when not directly connected to ductwork on inlet side.

c) Inlet and outlet cones where scheduled and/or shown on drawings.

d) Matching flanges.

e) Fans to be supplied adjusted for duty scheduled.

2.5 FANS - CABINET

.1 Minimum Requirements:

a) Steel cabinet arranged for ducted inlet and outlet connections c/w duct collars (where shown) or ceiling exhaust opening c/w exhaust grille (where shown).

b) Acoustically insulated cabinet.

c) Centrifugal fan on rubber isolators.

d) Backdraft damper.

e) Access panel.

f) Integral motor thermal overload protection.

g) Motor disconnect plug and integral receptacle.

.2 Accessories:

a) Solid state speed control - where scheduled.

2.6 FANS - CEILING EXHAUST

.1 Minimum Requirements:

a) Centrifugal blower, motor vibration isolated.

b) Built-in backdraft damper.

c) White plastic exhaust grille.

d) Adjustable hanger bracket.

e) Pre-wired outlet box, plug-in receptacle.

.2 Accessories:

a) Solid state speed control - where scheduled.

2.7 FANS - CENTRIFUGAL

.1 Minimum Requirements:

a) Welded steel fan wheel with backward inclined blades, unless otherwise specified.

b) Bearings: Heavy duty pillow-block grease lubricated ball or roller self aligning type and a minimum rated life of 80,000 hours in accordance with AFBMA L-10 life standard.

c) Gasketted scroll access panel, secured with quick release fasteners.

d) 20 mm [3/4"] scroll drain and brass plug.

e) Enamel painted steel fan wheels and inside scrolls.

f) Prime coat painted outside scroll including supports and steel accessories.

g) Rust preventative coating on fan shafts.

h) Drip proof motor.

i) On single inlet fans provide extended lubricators on inlet side bearings.

.2 Accessories:

a) Belt drives.

b) Belt guards c/w tachometer holes.

c) Coupling guards.

d) Fan inlet safety screens.

e) Steel frame base and motor slide rails (refer to section 15241).

f) Variable Volume Devices:

i) Variable speed drives:

.3 Notes:

a) Variable volume control devices to be capable of controlling the fan capacity from 100% of the maximum scheduled operating condition to 30% of the maximum scheduled operating condition.

b) Fans to be supplied adjusted for the "initial" duty.

2.8 FANS - UTILITY

.1 Minimum Requirements:

a) Steel wheel and reinforced scroll on integral supports.

b) Gasketted scroll access panel, secured with quick release fasteners.

c) 20 mm [3/4"] scroll drain and brass plug.

d) Rust preventative coating on shaft.

e) Enamel painted fan wheels and scrolls.

f) Weatherproof enamelled cover for motor drive.

g) Belt driven sets with adjustable motor bed plate and variable pitch drive sheave.

2.9 FILTERS - GENERAL

.1 Filter media shall be UL listed, Class I or Class II.

.2 Filters: suitable for air at 100% RH and air temperatures between 3ºC [37ºF] and 50ºC [122ºF].

.3 Efficiency: based on ASHRAE 52-76, atmospheric dust spot efficiency. "Absolute filter" efficiency shall be tested with 0.3 micrometre dioctyl phthalate (DOP) smoke.

.4 Dust holding capacity: Air Filter Institute (AFI) Test.

.5 Representative filters shall have been tested by an independent test laboratory and test results shall be made available on request.

.6 Filter identification shall be clearly marked on each filter.

.7 Provide two (2) sets of filter media (for each filter) - one for installation and one for handover to the owner as a spare. Obtain signed receipt.

.8 All panel filter media used during "temporary heating" shall be replaced by new media on substantial completion.

.9 Refer to mechanical schedules for specific filtration requirements.

2.10 FILTERS - PANEL TYPE

.1 Minimum Requirements:

a) 50 mm [2"] thick disposable pleated cotton media.

b) Enclosing frame shall be constructed from rigid, heavy duty high wet strength beverage board with diagonal support members bonded to both sides of each pleat.

c) Efficiency: 25% to 30%.

.2 Standard of Acceptance:

a) AAF AM-AIR 300, Farr 30/30.

PART 3 EXECUTION

3.1 AIR TERMINALS

.1 Install with cadmium plated screws in countersunk holes where fastenings are visible.

.2 Install ductwork as high as practical, using offsets where required to obtain maximum duct neck lengths for diffusers.

.3 Refer to Architectural Reflected Ceiling plans for exact locations of air terminals.

.4 Paint ductwork behind grilles with matte black paint where duct or insulation surfaces are visible.

.5 Attach registers and grilles to branch ducts with duct necks having minimum length to prevent grille or register damper from protruding into branch duct.

.6 Hand over door grilles to the General Contractor for installation.

3.2 FANS

.1 Install fans as indicated, complete with vibration isolators and seismic restraints as specified in Sections 15241 and 15242.

.2 Install fans with flexible connections on inlet ductwork and on discharge ductwork. Ensure metal bands of connectors are parallel with minimum 25 mm [1"] flex between ductwork and fan during running.

.3 Install connectors such that connectors are clear of the air stream. Provide flange extensions as necessary. Ensure accurate alignment of duct to fan.

.4 Provide safety screens where fan inlet or outlet is exposed.

.5 Provide belt guards on belt driven fans.

.6 Provide and install sheaves and belts required for final air balance.

.7 Assist the Balancing Agency in altering blade pitch angles as required for final air balance. Provide access to fan wheel for blade adjustment.

.8 Mount floor mounted fans on 100 mm [4"] thick concrete housekeeping bases (bases under Division 3).

.9 Mount roof mounted fans on curbs 200 mm [8"] minimum above roof.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

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

1.2 QUALITY ASSURANCE

.2 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

1.3 SUBMITTALS

.3 Fan shop drawings shall include sound rating data and fan curves showing operating point plotted on curves.

.4 Fan shop drawings shall include motor efficiencies. Refer to Section 15010 for minimum motor efficiencies.

PART 2 PRODUCTS

2.1 FANS - GENERAL

.1 Provide fans selected for maximum efficiency and generating noise levels on site not exceeding the level calculated from the ASHRAE Guide. If fans are not specified at maximum efficiency, advise mechanical consultant before tendering and submit alternate price for maximum efficiency fans. If approval to supply noisier fans is not obtained prior to tendering, provide equipment meeting ASHRAE levels on site without loss in efficiency.

.2 Submit fan sound power levels with shop drawings measured to applicable AMCA standards, or other data acceptable to the engineer. Provide test data, if requested. Indicate on shop drawings the test configuration, including ductwork, and any end reflection corrections applied to the data and / or if such corrections have been omitted.

.3 Fans: statically and dynamically balanced, constructed in conformity with AMCA-99-83. Dynamically balance fans to 1.5-mm/s vibration amplitude, maximum measured on bearing housings. Provide fan shafts with critical speed at least 1.5-times operational speed.

.4 Ratings: based on tests performed in accordance with AMCA 210, and ASHRAE 51-85. Units shall bear AMCA certified rating seal.

.5 Refer to Section 15010 for high efficiency motor requirements.

.6 Refer to drawings for motor position, rotation and discharge arrangements.

.7 For motors less than 10 H.P. provide standard adjustable pitch drive sheaves having +/- 10% range. Use mid-position of range for specified RPM.

.8 For motors 10 H.P. and larger, provide fixed pitch drive sheaves with split tapered bushing and keyway. Provide final drive sheaves of size to suit final balancing.

.9 Match drive and driven sheaves.

.10 V-belts shall conform with the American Belt Manufacturers standards. Multiple belts shall be matched sets.

.11 Minimum drive rating shall be 150% of nameplate rating of motor

.12 Not less than a 2-belt configuration is required for each drive for motors 3/4 H.P. and larger.

.13 Provide belt guard with tachometer ports for all belt drive fans.

.14 Bearings shall have a minimum L-10 life of 100,000 hours based on the maximum safe speed of the fan class.

.15 Fans shall be treated to suit the airstream in which they are used.

.16 Provide secure attachment points for seismic restraints. Mounting brackets shall be suitable for seismic loading.

2.2 FANS - CABINET

.17 Minimum Requirements:
- .1 Steel cabinet arranged for ducted inlet and outlet connections c/w duct collars (where shown) or ceiling exhaust opening c/w exhaust grille (where shown).
- .2 Acoustically insulated cabinet.
- .3 Centrifugal fan on rubber isolators.
- .4 Backdraft damper.
- .5 Access panel.
- .6 Integral motor thermal overload protection.
- .7 Motor disconnect plug and integral receptacle.

.18 Accessories:
- .1 Solid state speed control - where scheduled.

2.3 FANS - CEILING EXHAUST

.19 Minimum Requirements:
- .1 Centrifugal blower, motor vibration isolated.
- .2 Built-in backdraft damper.
- .3 White plastic exhaust grille.
- .4 Adjustable hanger bracket.
- .5 Pre-wired outlet box, plug-in receptacle.

.20 Accessories:
- .1 Solid state speed control - where scheduled.

2.4 FANS - CEILING VENTILATORS

.21 Minimum Requirements:
- .1 Large diameter propeller blades, all metal construction.
- .2 Baked enamel white finish.
- .3 Totally enclosed, permanently lubricated ball-bearing motors.
- .4 Arranged for downward blowing.

.22 Accessories:
- .1 Manual, infinitely variable on/off speed control switch (one control for each fan).
- .2 "Down-rod" suitable for suspension height.

2.5 FANS - CENTRIFUGAL

.23 Minimum Requirements:
- .1 Welded steel fan wheel with airfoil or backward inclined blades, as otherwise specified.
- .2 Bearings: Heavy-duty pillow-block grease lubricated ball or roller self aligning type.
- .3 Gasketted scroll access panel, secured with quick release fasteners.
- .4 20 mm [3/4"] scroll drain and brass plug.
- .5 Enamel painted steel fan wheels and inside scrolls.
- .6 Prime coat painted outside scroll including supports and steel accessories.

.7 Rust preventative coating on fan shafts.
.8 Drip proof motor.
.9 On single inlet fans provide extended lubricators on inlet side bearings.

.24 Accessories:
.1 Belt drives.
.2 Belt guards c/w tachometer holes.
.3 Coupling guards.
.4 Fan inlet safety screens.
.5 Steel frame base and motor slide rails (refer to section 15242).

2.6 FANS - UTILITY

.25 Minimum Requirements:
.1 Steel wheel and reinforced scroll on integral supports.
.2 Gasketted scroll access panel, secured with quick release fasteners.
.3 20 mm [3/4"] scroll drain and brass plug.
.4 Rust preventative coating on shaft.
.5 Enamel painted fan wheels and scrolls.
.6 Weatherproof enamelled cover for motor drive.
.7 Belt driven sets with adjustable motor bed plate and variable pitch drive sheave.

2.7 FANS - PROPELLER

.26 Minimum Requirements:
.1 Formed steel or aluminum propeller blades.
.2 Spun steel venturi.
.3 Grease lubricated ball bearings suitable for operating in any position.
.4 Belt driven with adjustable drive sheave and belt guard or direct driven as scheduled.
.5 Motor mounting brackets.
.6 Totally enclosed motor.

.27 Accessories:
.1 Fan guard as scheduled.
.2 Automatic backdraft dampers with gasketted edges as scheduled.

PART 3 EXECUTION

3.1 FANS

.28 Install fans as indicated, complete with vibration isolators and seismic restraints as specified in Section 15242.

.29 Install fans with flexible connections on inlet ductwork and on discharge ductwork. Ensure metal bands of connectors are parallel with minimum 25 mm [1"] flex between ductwork and fan during running.

.30 Install connectors such that connectors are clear of the air stream. Provide flange extensions as necessary. Ensure accurate alignment of duct to fan.

.31 Provide safety screens where fan inlet or outlet is exposed.

.32 Provide belt guards on belt driven fans.

.33 Provide and install sheaves and belts required for final air balance.

.34 Assist the Balancing Agency in altering blade pitch angles as required for final air balance. Provide access to fan wheel for blade adjustment.

.35 Mount floor mounted fans on 100 mm [4"] thick concrete housekeeping bases (bases under Division 3).

.36 Mount roof mounted fans on curbs 200 mm [8"] minimum above roof.

3.2 GAUGES - AIR PRESSURE

.37 Mount gauges for easy visual inspection.

.38 All piping to be neatly formed in true vertical/horizontal lines free from kinks.

.39 Seal all penetrations of plenums or ducts.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

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

1.2 QUALITY ASSURANCE

.2 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards

PART 2 PRODUCTS

2.1 AIR TERMINALS

.1 General:
- .1 Grilles shall be product of one manufacturer.
- .2 Refer to drawings for sizes and air quantities.
- .3 Base air outlet application on space noise level of NC 30 maximum
- .4 The manufacturer (other than the design listed) shall match performance data and indicate a specific comparison for each item, with the shop drawing submission.
- .5 All air terminals shall be provided with means for attachment of two seismic security wires at opposite corners of each air terminal.
- .6 Provide concealed baffles, where necessary, to direct air away from walls, columns or other obstructions within the radius of air terminal operation.
- .7 Provide auxiliary frames for diffusers located in drywall ceilings and grilles mounted in gyproc walls in public areas. In other areas the grilles should be attached to the ductwork, flanged to the outside of the wall opening.

PART 3 EXECUTION

3.1 AIR TERMINALS

.1 Install with cadmium plated screws in countersunk holes where fastenings are visible.

.2 Install ductwork as high as practical, using offsets where required to obtain maximum duct neck lengths for diffusers.

.3 Paint ductwork behind grilles with matte black paint where duct or insulation surfaces are visible.

.4 Attach registers and grilles to branch ducts with duct necks having minimum length to prevent grille or register damper from protruding into branch duct.

.5 Where air terminals are installed in mechanical grid ceilings, provide at least two 12 ASWG galvanized steel wire seismic security bridles per air terminal tied either to the building structure or to ceiling hanger wires. Attach security bridles at opposite corners of each air terminal and in such a manner that the air terminal cannot fall.

.6 Hand over door grilles to the General Contractor for installation.

END OF SECTION