

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises general construction of public washrooms, located at 4403 Chemin Waverley Road, La Barriere Park; and further identified as New La Barriere Park Washroom Project. Work shall include connection to, and mechanization of, an existing well for non-potable water.

1.2 CONTRACT METHOD

- .1 Construct Work under single stipulated price contract.

1.3 WORK BY OTHERS

- .1 Not Applicable.

1.4 CONTRACTOR USE OF PREMISES

- .1 Unrestricted use of immediate site until Substantial Performance.
- .2 Co-ordinate use of site under direction of Project Manager.

1.5 OWNER FURNISHED ITEMS

- .1 Not Applicable.

1.6 EXISTING SERVICES

- .1 Notify, Project Manager and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Contract Administrator 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian and vehicular traffic.
- .3 Establish location and extent of service lines in area of work before starting Work. Notify Contract Administrator of findings.
- .4 Submit schedule to and obtain approval from Contract Administrator for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .5 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .6 Where unknown services are encountered, immediately advise Contract Administrator and confirm findings in writing.
- .7 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .8 Record locations of maintained, re-routed and abandoned service lines.
- .9 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.7 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.
 - .11 Other documents as specified.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

End of Section

PART 1 - GENERAL

1.1 ACCESS AND EGRESS

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

1.2 USE OF SITE AND FACILITIES

- .1 Closures: protect work temporarily until permanent enclosures are completed.

1.3 EXISTING SERVICES

- .1 Notify Contract Administrator and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Contract Administrator 48 hours of notice for necessary interruption of mechanical or electrical service that may interfere with Tenant occupants after Interim Occupancy. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3 Provide for personnel and vehicular traffic.
- .4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.4 SPECIAL REQUIREMENTS

- .1 Carry out noise generating Work Monday to Friday and weekends & statutory holidays within provisions of applicable municipal by-laws.
- .2 Ensure that Contractor personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .3 Keep within limits of work and avenues of ingress and egress.
- .4 Ingress and egress of Contractor vehicles at site is limited to existing curb cuts.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

End of Section

PART 1 - GENERAL

1.1 ADMINISTRATIVE

- .1 Submit to Contract Administrator submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in units to match construction documents.
- .4 Review submittals prior to submission to Contract Administrator. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .5 Notify Contract Administrator, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .6 Verify field measurements and affected adjacent Work are coordinated.
- .7 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator's review of submittals.
- .8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator review.
- .9 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .3 Allow 10 working days for Contract Administrator's review of each submission.
- .4 Adjustments made on shop drawings by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.
- .5 Make changes in shop drawings as Contract Administrator may require, consistent with Contract Documents. When resubmitting, notify Contract Administrator in writing of revisions other than those requested.
- .6 Accompany submissions with transmittal letter, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .7 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:

- .1 Subcontractor.
- .2 Supplier.
- .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .8 After Contract Administrator's review, distribute copies.
- .9 Submit one electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Contract Administrator where shop drawings will not be prepared due to standardized manufacture of product.
- .10 Submit one electronic copy of test reports for requirements requested in specification Sections and as requested by Contract Administrator.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .11 Submit one electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Contract Administrator.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .12 Delete information not applicable to project.
- .13 Supplement standard information to provide details applicable to project.
- .14 If upon review by Contract Administrator, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.3 SAMPLES

- .1 Submit for review samples in as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Contract Administrator's business address.
- .3 Notify Contract Administrator in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.
- .6 Make changes in samples which Contract Administrator may require, consistent with Contract Documents.

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

1.4 MOCK-UPS

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

1.5 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

1.6 PROGRESS PHOTOGRAPHS

- .1 Progress photographs taken weekly shall be provided by the General Contractor and submitted to the Project Administrator. Photos are to be submitted in high resolution digital format.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

End of Section

PART 1 - GENERAL

1.1 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Contract Administrator for purpose of inspecting and/or testing portions of Work. Cost for such services will be borne by the City.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Contract Administrator at no cost to City. Pay costs for re-testing and re-inspection.

1.2 ACCESS TO WORK

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

1.3 PROCEDURES

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

1.4 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Contract Administrator as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other contractor's work damaged by such removals or replacements promptly.
- .3 If, in opinion of Contract Administrator, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, City may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Contract Administrator.

1.5 REPORTS

- .1 Submit 3 copies of inspection and test reports to Contract Administrator.
- .2 Provide copies to subcontractor of work being inspected or tested.

1.6 TESTS AND MIX DESIGNS

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

1.7 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Contract Administrator.
- .3 Prepare mock-ups for Contract Administrator's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, Contract Administrator will assist in preparing schedule fixing dates for preparation.

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

1.8 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical and electrical systems.
.2 Refer to relevant specification sections for definitive requirements.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

End of Section

PART 1 - GENERAL

1.1 INSTALLATION AND REMOVAL

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

1.2 DEWATERING

- .1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.3 WATER SUPPLY

- .1 Contractor will provide continuous supply of potable water for construction use.
- .2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
- .3 Contractor is to pay for utility charges at prevailing rates.

1.4 TEMPORARY HEATING AND VENTILATION

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.
- .3 Provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .4 Maintain temperatures of minimum 10° C in areas where construction is in progress.
- .5 Ventilating:
 - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.
 - .5 Ventilate temporary sanitary facilities.
 - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .6 Permanent heating system of building, not to be used when available. Contractor is responsible for damage to heating system if use is permitted.
- .7 Ensure Date of Substantial Performance and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Contract Administrator.
- .8 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform with applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct-fired combustion units to outside.

- .9 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.5 TEMPORARY POWER AND LIGHT

- .1 Contractor to provide and pay for temporary power during construction for temporary lighting and operating of power tools and required equipment.
- .2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
- .3 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.

1.6 TEMPORARY COMMUNICATION FACILITIES

- .1 Contractor to provide and pay for temporary telephone and fax equipment and hook up necessary for own use and use of Contract Administrator.

1.7 FIRE PROTECTION

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

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

End of Section

PART 1 - GENERAL

1.1 INSTALLATION AND REMOVAL

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

1.2 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA- S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, temporary stairs as required to perform work.

1.3 HOISTING

- .1 Provide, operate and maintain hoists required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
- .2 Hoists to be operated by qualified operator.

1.4 SITE STORAGE/LOADING

- .1 Confine work and operations by Contract Documents. Do not unreasonably encumber premises with products and materials.
- .2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.5 CONSTRUCTION PARKING

- .1 Parking will be permitted on site provided it does not disrupt public access to the park.
- .2 Provide and maintain adequate access to project site.

1.6 OFFICES

- .1 Provide office heated to 22° C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing layout table.
- .2 Provide clearly marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

1.7 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.8 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.9 CONSTRUCTION SIGNAGE

- .1 Provide and erect project sign, within three weeks of signing Contract, of a design and in a location acceptable to City
- .2 Install sign supplied by Contract Administrator on framing for project sign.
- .3 No other signs or advertisements, other than warning signs, are permitted on site.
- .4 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Contract Administrator.

1.10 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.

- .2 Maintain and protect traffic on affected roads during construction period.
- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor responsible for repair of damage to roads caused by construction operations.
- .7 Construct access and haul roads necessary.
- .8 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

1.11 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Stack stored new or salvaged material not in construction facilities.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

End of Section

PART 1 - GENERAL

1.1 INSTALLATION AND REMOVAL

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

1.2 HOARDING

- .1 Erect temporary site enclosure using 2.4 m high metal mesh fence. Provide one lockable truck gate. Maintain fence in good repair.
- .2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.3 GUARD RAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations, open edges of floors and roofs.
- .2 Provide as required by governing authorities.

1.4 WEATHER ENCLOSURES

- .1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3 Design enclosures to withstand wind pressure and snow loading.

1.5 DUST TIGHT SCREENS

- .1 Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.

1.6 ACCESS TO SITE

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

1.7 FIRE ROUTES

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

1.8 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

1.9 PROTECTION OF BUILDING FINISHES

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Be responsible for damage incurred due to lack of or improper protection.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

End of Section

PART 1 - GENERAL

1.1 QUALITY

- .1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of Products provided.
- .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Contract Administrator based upon requirements of Contract Documents.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacturer for any particular or like item throughout project.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.2 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Contract Administrator of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Contract Administrator at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Contract Administrator reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.3 STORAGE, HANDLING AND PROTECTION

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

1.4 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.

1.5 MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Contract Administrator in writing, of conflicts between specifications and manufacturer's instructions, so that Contract Administrator will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Contract Administrator to require removal and re-installation at no increase in Contract Price or Contract Time.

1.6 QUALITY OF WORK

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Contract Administrator if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Contract Administrator reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Contract Administrator, whose decision is final.

1.6 CO-ORDINATION

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.7 CONCEALMENT

- .1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- .2 Before installation inform Contract Administrator if there is interference. Install as directed by Contract Administrator.

1.8 REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.9 LOCATION OF FIXTURES

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
- .2 Inform Contract Administrator of conflicting installation. Install as directed.

1.10 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.11 FASTENINGS - EQUIPMENT

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.12 PROTECTION OF WORK IN PROGRESS

- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Contract Administrator.

1.13 EXISTING UTILITIES

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

End of Section

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Field engineering survey services to measure and stake site.
- .2 Survey services to establish inverts for Work.
- .3 Recording of subsurface conditions found.

1.2 REFERENCES

- .1 City's identification of existing survey control points and property limits.

1.3 QUALIFICATIONS OF SURVEYOR

- .1 Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Contract Administrator.

1.4 SURVEY REFERENCE POINTS

- .1 Existing base horizontal and vertical control points are designated on drawings.
- .2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to Contract Administrator.
- .4 Report to Contract Administrator when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5 Require surveyor to replace control points in accordance with original survey control.

1.5 SURVEY REQUIREMENTS

- .1 Establish two permanent benchmarks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
- .2 Establish lines and levels, locate and lay out, by instrumentation.
- .3 Stake for grading, fill and topsoil placement and landscaping features.
- .4 Stake slopes, swales and berms.
- .5 Establish pipe invert elevations.
- .6 Stake batter boards for foundations.
- .7 Establish lines and levels for mechanical and electrical work.

1.6 EXISTING SERVICES

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Contract Administrator of findings.
- .2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Contract Administrator.

1.7 LOCATION OF EQUIPMENT AND FIXTURES

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Contract Administrator of impending installation and obtain approval for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by Contract Administrator.

1.8 RECORDS

- .1 Prior to engaging in any demolition or excavation, conduct a condition survey including an annotated photographic record of existing structures adjacent to project extents. Investigate foundations to determine underpinning, and related works required.
- .2 Prior to engaging in any demolition or excavation, record elevations, in relation to project geodetic, for existing structures adjacent to project extents.
- .3 Maintain a complete, accurate log of control and survey work as it progresses.
- .4 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.
- .5 Record locations of maintained, re-routed and abandoned service lines.

1.9 SUBMITTALS

- .1 Submit name and address of Surveyor to Contract Administrator.
- .2 On request of Contract Administrator, submit documentation to verify accuracy of field engineering work.
- .3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform with Contract Documents. The signed certificate will also note any elevations and locations that do not conform to Contract Documents.
- .4 Provide the City with a Building Location Certificate prepared by a legal surveyor to document the location of the building and major features on the site.

1.10 SUBSURFACE CONDITIONS

- .1 Promptly notify Contract Administrator in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.
- .2 After prompt investigation, should Contract Administrator determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders and Change Directives.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

End of Section

PART 1 - GENERAL

1.1 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit written request in advance of cutting or alteration which affects:
 - .1 Structural integrity of elements of project.
 - .2 Integrity of weather-exposed or moisture-resistant elements.
 - .3 Efficiency, maintenance, or safety of operational elements.
 - .4 Visual qualities of sight-exposed elements.
 - .5 Work of City or separate contractor.
- .3 Include in request:
 - .1 Identification of project.
 - .2 Location and description of affected Work.
 - .3 Statement on necessity for cutting or alteration.
 - .4 Description of proposed Work, and products to be used.
 - .5 Alternatives to cutting and patching.
 - .6 Effect on Work of City or separate contractor.
 - .7 Written permission of affected separate contractor.
 - .8 Date and time work will be executed.

1.2 MATERIALS

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

1.3 PREPARATION

- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION

- .1 Execute cutting, fitting, and patching, including excavation and fill, to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .9 Restore work with new products in accordance with requirements of Contract Documents.

- .10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material in accordance with Section 07 84 00 - Firestopping, full thickness of the construction element.
- .12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
- .13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

End of Section

PART 1 - GENERAL

1.1 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by City or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Contract Administrator. Do not burn waste materials on site.
- .3 Clear snow and ice from access to building.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site refuse containers for collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling.
- .7 Dispose of waste materials and debris off site.
- .8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.2 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris other than that caused by City or other General Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Contract Administrator. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
- .9 Clean lighting reflectors, lenses, and other lighting surfaces.
- .10 Vacuum clean and dust building interiors, behind grilles, louvers and screens.
- .11 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

- .13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .14 Remove dirt and other disfiguration from exterior surfaces.
- .15 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .16 Sweep and wash clean paved areas.
- .17 Clean equipment and fixtures to sanitary condition.
- .18 Clean or replace filters of mechanical equipment.
- .19 Clean roofs, downspouts, and drainage systems.
- .20 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .21 Remove snow and ice from access to building.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

End of Section

PART 1 - GENERAL

1.1 INSPECTION AND DECLARATION

- .1 Contractor's Inspection: Contractor and Subcontractors: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Contract Administrator in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
 - .2 Request Contract Administrator's Inspection.
- .2 Contract Administrator's Inspection: Contract Administrator and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.
- .3 Completion: submit written certificate that following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
 - .4 Certificates required by Utility companies have been submitted.
 - .5 Operation of systems have been demonstrated to City's personnel.
 - .6 Work is complete and ready for final inspection.
- .4 Final Inspection: when items noted above are completed, request final inspection of Work by Contract Administrator and Contractor. If Work is deemed incomplete by Contract Administrator, complete outstanding items and request re-inspection.
- .5 Declaration of Substantial Performance: when Contract Administrator considers deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance. Refer to City Agreement for specifics to application.
- .6 Commencement of Lien and Warranty Periods: date of City's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
- .7 Final Payment: when Contract Administrator considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. If Work is deemed incomplete by Contract Administrator, complete outstanding items and request re-inspection.
- .8 Payment of Holdback: after issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount in accordance with City agreement.

1.2 CLEANING

- .1 In accordance with Section 01 74 11 - Cleaning.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

End of Section

PART 1 - GENERAL

1.1 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .3 Copy will be returned after final inspection with Contract Administrator's comments.
- .4 Revise content of documents as required prior to final submittal.
- .5 Two weeks prior to Substantial Performance of the Work, submit to the Contract Administrator, three final copies of operating and maintenance manuals in English.
- .6 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
- .7 Furnish evidence, if requested, for type, source and quality of products provided.
- .8 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .9 Pay costs of transportation.

1.2 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings. Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- .9 All information within binders shall also be submitted in electronic 'PDF' format.

1.3 CONTENTS - EACH VOLUME

- .1 Table of Contents: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Contract Administrator and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data. Provide logical sequence of

instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

- .6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.4 AS-BUILTS AND SAMPLES

- .1 Maintain, at site for Contract Administrator, one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Contract Administrator.

1.5 RECORDING ACTUAL SITE CONDITIONS

- .1 Record information on set of black line opaque drawings.
- .2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.

1.6 FINAL SURVEY

- .1 Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.7 EQUIPMENT AND SYSTEMS

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

- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control.
- .15 Additional requirements: as specified in individual specification sections.

1.8 MATERIALS AND FINISHES

- .1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-Protection and Weather-Exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional Requirements: as specified in individual specifications sections.

1.9 SPARE PARTS

- .1 Provide spare parts, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to site; place and store.
- .4 Receive and catalogue items. Submit inventory listing to Contract Administrator. Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

1.10 MAINTENANCE MATERIALS

- .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.

- .3 Deliver to location as directed; place and store.
- .4 Receive and catalogue items. Submit inventory listing to Contract Administrator. Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

1.11 SPECIAL TOOLS

- .1 Provide special tools, in quantities specified in individual specification section.
- .2 Provide items with tags identifying their associated function and equipment.
- .3 Deliver to location as directed; place and store.
- .4 Receive and catalogue items. Submit inventory listing to Contract Administrator. Include approved listings in Maintenance Manual.

1.12 STORAGE, HANDLING AND PROTECTION

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and to satisfaction of Contract Administrator.

1.13 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Contract Administrator for approval.
- .3 Warranty management plan to include required actions and documents to assure that City receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Contract Administrator for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder and submit upon acceptance of work. Organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with City's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Include information contained in warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractor, subcontractors, manufacturers or suppliers involved.
 - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to

- include roofs, pumps, motors, transformers, and commissioned systems such as fire protection systems.
- .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of manufacturers or suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.
 - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
 - .7 Cross-reference to warranty certificates as applicable.
 - .8 Starting point and duration of warranty period.
 - .9 Summary of maintenance procedures required to continue warranty in force.
 - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
 - .11 Organization, names and phone numbers of persons to call for warranty service.
 - .12 Typical response time and repair time expected for various warranted equipment.
 - .4 Procedure and status of tagging of equipment covered by extended warranties.
 - .5 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .9 Respond in a timely manner to oral or written notification of required construction warranty repair work.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

End of Section

PART 1 - GENERAL

1.1 DESCRIPTION

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to City's personnel two weeks prior to date of final inspection.
- .2 City will provide list of personnel to receive instructions, and will co-ordinate their attendance at agreed-upon times.

1.2 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for City's approval.
- .3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .4 Give time and date of each demonstration, with list of persons present.

1.3 CONDITIONS FOR DEMONSTRATIONS

- .1 Equipment has been inspected and put into operation.
- .2 Testing, adjusting, and balancing has been performed.
- .3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.4 PREPARATION

- .1 Verify that conditions for demonstration and instructions comply with requirements.
- .2 Verify that designated personnel are present.

1.5 DEMONSTRATION AND INSTRUCTIONS

- .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the designated location.
- .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
- .3 Review contents of manual in detail to explain aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instructions.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Common Work Results – Mechanical.
- .2 Common Work Results - Electrical.

1.2 QUALITY ASSURANCE

- .1 Provide testing organization services under provisions specified in Section 01 45 00 – Quality Control.
- .2 Testing organization: current member in good standing certified to perform specified services.
- .3 Comply with applicable procedures and standards of the certification sponsoring association.
- .4 Perform services under discretion of supervisor qualified under certification requirements of sponsoring association.

1.3 REFERENCES

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

1.4 SUBMITTALS

- .1 Prior to the start of Work, submit name of organization proposed to perform services. Designate who has managerial responsibilities for coordination of entire testing, adjusting and balancing.
- .2 Submit documentation to confirm organization compliance with quality assurance provision.
- .3 Submit three (3) preliminary specimen copies of each report form proposed for use.
- .4 Fifteen (15) days prior to Substantial Performance, submit three (3) copies of final reports on applicable forms.
- .5 Submit reports of testing, adjusting and balancing postponed due to seasonal, climatic, occupancy, or other reasons beyond Contractor's control, promptly after execution of those services.

1.5 PROCEDURES - GENERAL

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

1.6 FINAL REPORTS

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

1.7 CONTRACTOR RESPONSIBILITIES

- .1 Prepare each system for testing and balancing.
- .2 Cooperate with testing organization and provide access to equipment and systems.
- .3 Provide personnel and operate systems at designated times, and under conditions required for proper testing, adjusting and balancing.
- .4 Perform services under discretion of supervisor qualified under certification requirements of sponsoring association.

1.8 PREPARATION

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

1.9 EXECUTION

- .1 Test equipment, balance distribution systems, and adjust devices for HVAC systems.
- .2 Test hydronic systems, adjust and record liquid flow at each piece of equipment.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 07 92 10 - Joint Sealing.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
 - .2 CAN/CSA-O86.1, Engineering Design in Wood (Limit States Design).
 - .3 CSA O121, Douglas Fir Plywood.
 - .4 CSA O151, Canadian Softwood Plywood.
 - .5 CSA O437, Standards for OSB and Waferboard.
 - .6 CSA S269.1, Falsework for Construction Purposes.
 - .7 CAN/CSA-S269.3, Concrete Formwork.
- .2 Council of Forest Industries of British Columbia (COFI)
 - .1 COFI Exterior Plywood for Concrete Formwork.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Formwork materials:
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CAN/CSA-O86.1.
 - .2 For concrete with special architectural features, use formwork materials to CAN/CSA-A23.1.
- .2 Form ties:
 - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface.
 - .2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.
- .3 Form release agent: non-toxic, low VOC.
- .4 Falsework materials: to CSA-S269.1.
- .5 Sealant: to Section 07 92 10 - Joint Sealing.

PART 3 - EXECUTION

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Obtain Contract Administrator's approval for use of earth forms framing openings not indicated on drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CSA S269.1 and COFI Exterior Plywood for Concrete Formwork.
- .5 Refer to architectural drawings for concrete members requiring architectural exposed finishes.
- .6 Do not place shores and mud sills on frozen ground.
- .7 Provide site drainage to prevent washout of soil supporting mud sills and shores.

- .8 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.
- .9 Align form joints and make watertight. Keep form joints to minimum.
- .10 Locate horizontal form joints for exposed columns 2400 mm above finished floor elevation.
- .11 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners , joints, unless specified otherwise.
- .12 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .13 Construct forms for architectural concrete, and place ties as indicated and/or as directed. Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
- .14 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .15 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.

3.2 REMOVAL AND RESHORING

- .1 Leave formwork in place for following minimum periods of time after placing concrete.
 - .1 3 days for walls and sides of beams.
 - .2 3 days for footings and abutments.
- .2 Remove formwork when concrete has reached 75 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .3 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .4 Space reshoring in each principal direction at not more than 3000 mm apart.
- .5 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Concrete Institute (ACI)
 - .1 ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.
- .2 American National Standards Institute/American Concrete Institute (ANSI/ACI)
 - .1 ANSI/ACI 315, Details and Detailing of Concrete Reinforcement.
- .3 Canadian Standards Association (CSA)
 - .1 CAN3-A23.3, Design of Concrete Structures for Buildings.
 - .2 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement.
 - .3 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings including placing of reinforcement in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacing's, locations of reinforcement and mechanical splices if approved by Contract Administrator, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacing's and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada.
- .3 Detail lap lengths and bar development lengths to CAN3-A23.3.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Substitute different size bars only if permitted in writing by Contract Administrator.
- .2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
- .3 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-30.18.
- .4 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.
- .5 Mechanical splices: subject to approval of Contract Administrator.
- .6 Plain round bars: to CAN/CSA-G40.21.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain Contract Administrator 's approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Contract Administrator, weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

PART 3 - EXECUTION

3.1 FIELD BENDING

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

3.2 PLACING REINFORCEMENT

- .1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.
- .2 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.
- .3 Prior to placing concrete, obtain Contract Administrator 's approval of reinforcing material and placement.
- .4 Ensure cover to reinforcement is maintained during concrete pour.
- .5 Protect epoxy and paint coated portions of bars with covering during transportation and handling.

3.3 FIELD TOUCH-UP

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 10 00 - Concrete Forming and Accessories.
- .2 Section 03 20 00 - Concrete Reinforcing.
- .3 Section 03 35 00 - Concrete Finishing.
- .4 Section 05 50 00 - Metal Fabrications.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 109/C109M, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50-mm Cube Specimens).
 - .2 ASTM C 260, Specification for Air-Entraining Admixtures for Concrete.
 - .3 ASTM C 309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .4 ASTM C 332, Specification for Lightweight Aggregates for Insulating Concrete.
 - .5 ASTM C 494, Specification for Chemical Admixtures for Concrete.
 - .6 ASTM C 827, Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
 - .7 ASTM C 939, Test Method for Flow of Grout for Preplaced-Aggregate Concrete.
 - .8 ASTM D 412, Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
 - .9 ASTM D 624, Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
 - .10 ASTM D 1751, Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - .11 ASTM D 1752, Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.2, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
 - .2 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .3 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A5, Portland Cement.
 - .2 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
 - .3 CAN/CSA-A23.2, Methods of Test for Concrete.
 - .4 CAN/CSA-A23.5, Supplementary Cementing Materials.
 - .5 CAN/CSA A363, Cementitious Hydraulic Slag.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Use trigger operated spray nozzles for water hoses.
- .2 Designate a cleaning area for tools to limit water use and runoff.
- .3 Carefully coordinate the specified concrete work with weather conditions.
- .4 Ensure emptied containers are sealed and stored safely for disposal away from children.
- .5 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.
- .6 Choose least harmful, appropriate cleaning method, which will perform adequately.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Portland cement: to CAN/CSA-A5.
- .2 Supplementary cementing materials: to CAN/CSA-A23.5.
- .3 Cementitious hydraulic slag: to CAN/CSA-A363.
- .4 Water: to CAN/CSA-A23.1.
- .5 Aggregates: to CAN/CSA-A23.1.
- .6 Air entraining admixture: to ASTM C 260.
- .7 Chemical admixtures: to ASTM C 494. Contract Administrator to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .8 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.
 - .1 Compressive strength: 35 MPa at 28 days.
 - .2 Consistency:
 - .1 Fluid: to ASTM C 827. Time of efflux through flow cone (ASTM C 939), under 30s.
 - .2 Flowable: to ASTM C 827. Flow table, 5 drops in 3s, (ASTM C 109, applicable portion) 125 to 145%.
 - .3 Plastic: to ASTM C 827. Flow table, 5 drops in 3 s, (ASTM C 109, applicable portions) 100 to 125 %.
 - .4 Dry pack to manufacturer's requirements.
 - .3 Net shrinkage at 28 days: maximum 0 %.
- .9 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compressive strength of 35 MPa at 28 days.
- .10 Curing compound: to CAN/CSA-A23.1 white and to ASTM C 309, Type 1-chlorinated rubber.
- .11 Cushion pads: tough, resilient, weather, moisture, and oil resistant material that will not corrode or cause corrosion, consisting of either layers of approved cotton duck saturated and bound together by approved rubber or synthetic compounds, or made from specially compounded synthetic materials.
- .12 Premoulded joint fillers:
 - .1 Bituminous impregnated fiber board: to ASTM D 1751.
 - .2 Sponge rubber: to ASTM D 1752, Type I, flexible grade.
- .13 Polyethylene film: 0.254 mm thickness to CAN/CGSB-51.34.

2.2 MIXES

- .1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, as indicated on the drawings.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Obtain Contract Administrator's approval before placing concrete. Provide 24 hours notice prior to placing of concrete.
- .2 Pumping of concrete is permitted only after approval of equipment and mix.
- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4 Prior to placing of concrete obtain Contract Administrator's approval of proposed method for protection of concrete during placing and curing.

- .5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .6 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
- .7 Do not place load upon new concrete until authorized by Contract Administrator.

3.2 CONSTRUCTION

- .1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.
- .2 Sleeves and inserts.
 - .1 No sleeves, ducts, pipes or other openings shall pass through joists, beams, column capitals or columns, except where indicated or approved by Contract Administrator.
 - .2 Where approved by Contract Administrator, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100 x 100 mm not indicated, must be approved by Contract Administrator.
 - .3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Contract Administrator before placing of concrete.
 - .4 Check locations and sizes of sleeves and openings shown on drawings.
- .3 Anchor bolts.
 - .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
 - .2 With approval of Contract Administrator, grout anchor bolts in preformed holes or holes drilled after concrete has set. Formed holes to be minimum 100 mm diameter. Drilled holes to be to manufacturer's recommendations.
 - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
 - .4 Set bolts and fill holes with epoxy grout.
 - .5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.
- .4 Drainage holes and weep holes:
 - .1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.
 - .2 Install weep hole tubes and drains as indicated.
- .5 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.
- .6 Finishing.
 - .1 Finish concrete in accordance with CAN/CSA-A23.1.
 - .2 Use procedures acceptable to Contract Administrator to remove excess bleed water. Ensure surface is not damaged.
 - .3 Provide smooth trowel finish on interior slabs unless otherwise indicated.
 - .4 Provide broom finish on exterior slabs unless otherwise indicated.
 - .5 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.
- .7 Joint fillers.
 - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Contract Administrator. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
 - .2 Locate and form joints as indicated. Install joint filler.
 - .3 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

3.3 SITE TOLERANCE

- .1 Concrete tolerance in accordance with CAN/CSA-A23.1.

3.4 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Contract Administrator in accordance with CAN/CSA-A23.1 and Section 01 45 00 - Quality Control.
- .2 Inspection or testing by Contract Administrator will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

End of Section

PART 1 – GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-25.20, Surface Sealer for Floors.

1.3 PERFORMANCE REQUIREMENTS

- .1 Product quality and quality of work in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Place materials defined as hazardous or toxic waste in designated containers.
- .2 Dispose of surplus chemical and finishing materials in accordance with federal, provincial and municipal regulations.
- .3 Dispose of waste from stripping of floors in a manner that will not have unfavourable effects on the environment.

1.5 ENVIRONMENTAL REQUIREMENTS

- .1 Temporary lighting: Minimum 1200 W light source, placed 2.5 m above floor surface, for each 40 sq m of floor being treated.
- .2 Electrical power: Provide sufficient electrical power to operate equipment normally used during construction.
- .3 Work area: Make the work area water tight protected against rain and detrimental weather conditions.
- .4 Temperature: Maintain ambient temperature of not less than 10 °C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.
- .5 Moisture: Ensure concrete substrate is within moisture limits prescribed by manufacturer.
- .6 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.
- .7 Ventilation:
 - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
 - .2 Provide continuous ventilation during and after coating application.

PART 2 - PRODUCTS

2.1 SEALING COMPOUNDS

- .1 Surface sealer: to CAN/CGSB-25.20, as recommended by stain manufacturer.

2.2 CURING COMPOUNDS

- .1 Select water-based curing compounds.

2.3 CONCRETE STAINS

- .1 Select solvent free concrete stains. Primers, thinners, fillers, cleaning agents and equipment as per Niagara Protective Coatings. Colour, concentration and finish to be selected by Contract Administrator.

Standard of Acceptance: Epoxal Stain - Series 4000 as manufactured by Niagara Protective Coatings. CS1=2k Acrylic Clear, CS2=2k Acrylic Clear.

2.4 MIXES

- .1 Mixing, ratios and application in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verify that slab surfaces are ready to receive work and elevations are as instructed by manufacturer.

3.2 PREPARATION OF SLAB

- .1 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radiused edges unless otherwise indicated.
- .2 Saw cut control joints to CSA-A23.1, 24 hours maximum after placing of concrete as indicated on drawings.
- .3 Remove chlorinated rubber or existing surface coatings.
- .4 Use protective clothing, eye protection and respiratory equipment during stripping of chlorinated rubber or existing surface coatings.

3.3 APPLICATION

- .1 Prepare and mix materials and apply each component of coating system in accordance with manufacturer's directions to produce a uniform monolithic surface. Minimum of 2 coats required. Total dry film thickness to be 32 mils.
 - .1 Prime Coat: Apply epoxy stain over prepared substrate at a spread rate of 6 mils. Allow coating to cure.
 - .2 Finish Coat: Apply epoxy finish coat over the primed substrate at a spread rate of 14 mils. Allow coating to cure.
 - .3 Anti Skid Top Coat: Apply epoxy topcoat over the entire floor at a spread rate of 6 mils. Broadcast #55 quartz aggregate into the wet coating and back roll. Allow coating to cure.
 - .4 Satin Finish Top Coat: Apply two coats of 2K Satin Urethane topcoat over entire floor at a spread rate of 6 mils. Allow coating to cure.
 - .5 Finished colour and texture to meet approval of Contract Administrator.

3.4 PROTECTION

- .1 Protect finished installation in accordance with manufacturer's instructions.

End of Section

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Materials and installation non-load bearing, plant-precast architectural concrete.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 03 30 00 - Cast-in-Place Concrete.

1.3 PERFORMANCE REQUIREMENTS

- .1 Tolerance of precast elements to CAN/CSA-A23.4/A251.
- .2 Length of precast elements not to vary from design length by more than plus or minus 3 mm.
- .3 Cross sectional dimensions of precast elements not to vary from design dimensions by more than plus or minus 3 mm.
- .4 Deviations from straight lines not to exceed 3mm in 3m.
- .5 Precast elements not to vary by more than plus or minus 3mm from true overall cross sectional shape as measured by difference in diagonal dimensions.

1.4 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings to CAN/CSA-A23.4/A251 and CSA-A23.3. Include the following items:
 - .1 Design calculations for items designated by manufacturer.
 - .2 Finishing schedules.
 - .3 Methods of handling and erection.
 - .4 Openings, sleeves, inserts and related reinforcement.

PART 2 - PRODUCTS

2.1 PRECAST CONCRETE SPLASH PADS

- 1 Precast Concrete Splashpad.
 - .1 36"x12"x2 1/2" for downspouts, Natural Pebblestone finish as manufactured by Barkman or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install splashpads as indicated on drawings.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 04 05 12 - Masonry Mortar and Grout.
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .4 Section 04 05 23 - Masonry Accessories.
- .5 Section 04 22 00 - Concrete Unit Masonry.
- .6 Section 05 50 00 - Metal Fabrications.
- .7 Section 07 21 13 - Board Insulation.
- .8 Section 07 92 10 - Joint Sealing.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Canadian Standards Association (CSA International).
 - .1 CSA-A165, Standards on Concrete Masonry Units.
 - .2 CSA A179, Mortar and Grout for Unit Masonry.
 - .3 CSA-A371, Masonry Construction for Buildings.

1.3 SUBMITTALS

- .1 Product Data.
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples.
 - .1 If requested, submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit samples.
 - .1 Two of each type of masonry unit specified.
 - .2 One of each type of masonry accessory specified.
 - .3 One of each type of masonry reinforcement, tie and connector proposed for use.
- .3 Manufacturer's Instructions.
 - .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

- .1 Mock-ups.
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct mock-up panel of exterior masonry wall construction 1200 x 1800 mm showing masonry colours and textures, use of reinforcement, flashing, jointing, coursing, mortar and workmanship.
 - .3 Mock-up will be used:
 - .1 To judge workmanship, substrate preparation, operation of equipment and material application.
 - .4 Construct mock-up where approved.
 - .5 Allow 24 hours for inspection of mock-up by Contract Administrator before proceeding with work.
 - .6 When accepted by Contract Administrator, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.
- .2 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

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

- .2 Deliver materials to job site in dry condition.
- .3 Storage and Protection.
 - .1 Keep materials dry until use.
 - .2 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

1.6 SITE CONDITIONS

- .1 Site Environmental Requirements.
 - .1 Cold weather requirements.
 - .1 Supplement Clause 5.15.2 of CSA-A371 with following requirements.
 - .1 Maintain temperature of mortar between 5 degrees C and 50 degrees C until batch is used or becomes stable.
 - .2 Maintain ambient temperature between 5 degrees C and 50 degrees C and protect site from wind chill.
 - .2 Hot weather requirements.
 - .1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
 - .2 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Masonry materials are specified in Related Sections.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

- .1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

3.3 INSTALLATION

- .1 Do masonry work in accordance with CSA-A371 except where specified otherwise.
- .2 Build masonry plumb, level, and true to line, with vertical joints in alignment.
- .3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.4 CONSTRUCTION

- .1 Exposed masonry.
 - .1 Remove chipped, cracked, and otherwise damaged units, in accordance with CSA A-165, Clause 82.1, in exposed masonry and replace with undamaged units.
- .2 Jointing.
 - .1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints where concave joints are indicated.
 - .2 Provide clean, fully flush joints where flush joints are indicated.

- .3 Cutting.
 - .1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.
 - .2 Make cuts straight, clean, and free from uneven edges.
- .4 Building-In.
 - .1 Build in items required to be built into masonry.
 - .2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
 - .3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.
- .5 Wetting of bricks.
 - .1 Except in cold weather, wet bricks having an initial rate of absorption exceeding 1 g/minute/1000 mm²: wet to uniform degree of saturation, 3 to 24 hours before laying, and do not lay until surface dry.
 - .2 Wet tops of walls built of bricks qualifying for wetting, when recommencing work on such walls.
- .6 Support of loads.
 - .1 Use 35 MPa concrete to Section 03 30 00 - Cast-in-Place Concrete, where concrete fill is used in lieu of solid units.
 - .2 Use grout to CSA A179 where grout is used in lieu of solid units.
 - .3 Install building paper below voids to be filled with concrete or grout; keep paper 25 mm back from faces of units.
- .7 Provision for movement.
 - .1 Leave 3 mm space below shelf angles.
 - .2 Leave 6 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
 - .3 Built masonry to tie in with stabilizers, with provision for vertical movement.
- .8 Control joints.
 - .1 Construct continuous control joints as indicated.
- .9 Expansion joints.
 - .1 Build-in continuous expansion joints as indicated.
- .10 Interface with other work.
 - .1 Cut openings in existing work as indicated.
 - .2 Openings in walls: approved by Contract Administrator.
 - .3 Make good existing work. Use materials to match existing.
- 11 Sealant.
 - .1 Seal masonry and joints as per Section 09 91 23 – Interior Painting.

3.5 SITE TOLERANCES

- .1 Tolerances in notes to Clause 5.3 of CSA-A371 apply.

3.6 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.7 PROTECTION

- .1 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 04 05 10 - Common Work Results for Masonry.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Canadian Standards Association (CSA International).
 - .1 CSA A179, Mortar and Grout for Unit Masonry.

1.3 QUALITY ASSURANCE

- .1 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Use same brands of materials and source of aggregate for entire project.
- .2 Mortar: CSA A179.
- .3 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.
- .4 Colour: ground coloured natural aggregates or metallic oxide pigments.
- .5 Mortar for exterior masonry above grade:
 - .1 Loadbearing: type N based on Proportion specifications.
 - .2 Non-Loadbearing: type N based on Proportion specifications.
- .6 Following applies regardless of mortar types and uses specified above:
 - .1 Mortar for calcium silicate brick and concrete brick: type O based on Proportion specifications.
 - .2 Mortar for grouted reinforced masonry: type S based on Proportion specifications.
- .7 Coloured mortar: use colouring admixture not exceeding 10% of cement content by mass, or integrally coloured masonry cement, to produce coloured mortar to match approved sample.
- .8 Non-Staining mortar: use non-staining masonry cement for cementitious portion of specified mortar type.
- .9 Grout: to CSA A179, Table 3.

2.2 MIXES

- .1 Colour: mix grout to semi-fluid consistency.
- .2 Coloured mortars: incorporate colour into mixes in accordance with manufacturer's instructions. Refer to drawings for mortar colours and locations.
 - .1 Use clean mixer for coloured mortar.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 CONSTRUCTION

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

3.3 CLEANING

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

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 04 05 10 - Common Work Results for Masonry.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Canadian Standards Association (CSA International).
 - .1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
 - .2 CSA-A370, Connectors for Masonry.
 - .3 CSA-A371, Masonry Construction for Buildings.
 - .4 CSA-S304.1, Masonry Design for Buildings.
 - .5 CSA A179, Mortar and Grout For Unit Masonry.

1.3 SUBMITTALS

- .1 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Shop drawings consist of bar bending details, lists and placing drawings.
 - .3 On placing drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.
- .2 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Bar reinforcement: to CSA-A371 and CAN/CSA G30.18, Grade 300 for bars 10M or smaller, and Grade 400 for bars larger than 10M.
- .2 Connectors: to CSA-A370 and CSA-S304.
- .3 Corrosion protection: to CSA-S304, galvanized to CSA-S304 and CSA-A370.

2.2 FABRICATION

- .1 Fabricate reinforcing in accordance with CAN/CSA-A23.1.
- .2 Fabricate connectors in accordance with CSA-A370.
- .3 Obtain Contract Administrator's approval for locations of reinforcement splices other than shown on placing drawings.
- .4 Upon approval of Contract Administrator, weld reinforcement in accordance with CSA W186.
- .5 Ship reinforcement and connectors, clearly identified in accordance with drawings.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

- .1 Supply and install masonry connectors and reinforcement in accordance with CSA-A370, CSA-

A371, CAN/CSA-A23.1 and CSA-S304.1 unless indicated otherwise.

3.3 BONDING AND TYING

- .1 Bond walls of two or more wythes using metal connectors in accordance with CSA-S304, CSA-A371 and as indicated.
- .2 Tie masonry veneer to backing in accordance with NBC, CSA-S304.1, CSA-A371.

3.4 REINFORCED LINTELS AND BOND BEAMS

- .1 Reinforce masonry lintels and bond beams as indicated.
- .2 Place and grout reinforcement in accordance with CSA-S304.1, CSA-A371, and CSA-A179.

3.5 GROUTING

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

3.6 ANCHORS

- .1 Supply and install metal anchors as indicated.

3.7 LATERAL SUPPORT AND ANCHORAGE

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

3.8 MOVEMENT JOINTS

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

3.9 FIELD BENDING

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

3.10 FIELD TOUCH-UP

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

3.11 CLEANING

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

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 04 05 10 - Common Work Results for Masonry.
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcing.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Canadian Standards Association (CSA International).
 - .1 CSA-A371, Masonry Construction for Buildings.

1.3 SUBMITTALS

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

1.4 WASTE MANAGEMENT AND DISPOSAL

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

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Control joint filler: purpose-made elastomer 80 durometer hardness to ASTM D 2240 of size and shape indicated.
- .2 Lap adhesive: recommended by masonry flashing manufacturer.
- .3 Copper flashings.
 - .1 Copper sheet, 300 g/m², asphalt laminated to two layers of creped kraft paper, reinforced with 12.7 x 12.7 mm fibreglass scrim.
- .4 Aluminum flashings.
 - .1 Aluminum foil, .004 mm thick, asphalt laminated between two sheets of creped kraft paper with one exposed paper surface coated with asphalt-wax treatment.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install continuous control joint fillers in control joints at locations indicated on drawings.
- .2 Install weep hole vents in vertical joints immediately over flashings, in exterior wythes of cavity wall and masonry veneer wall construction, at maximum horizontal spacing of 600 mm on centre.

3.3 CONSTRUCTION

- .1 Build in flashings in masonry in accordance with CSA-A371.
 - .1 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings. Install flashings under weep hole courses and as indicated.
 - .2 In cavity walls and veneered walls, carry flashings from front edge of masonry, under outer wythe, then up backing not less than 150 mm, and as follows:
 - .1 For wood frame backing, staple flashing to walls behind sheathing paper.

- .2 For gypsum board backing, bond to wall using manufacturer's recommended adhesive.
- .3 Lap joints 150 mm and seal with adhesive.

3.4 CLEANING

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

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 04 05 10 - Common Work Results for Masonry.
- .2 Section 04 05 12 - Masonry Mortar and Grout.
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcements.
- .4 Section 04 05 23 - Masonry Accessories.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA A165 Series, Standards on Concrete Masonry Units

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Standard concrete block units: to CAN3-A165 Series (CAN3-A165.1), 1 Hour Fire Resistance Rating.
 - .1 Classification: H / 15 / A / O.
 - .2 Size: Depth 190mm x Height 190mm x Width 390mm.
 - .3 Special shapes: Provide purpose-made shapes for lintels and bond beams.
 - .4 Colour: to match Pietra Antica.
 - .5 Finish: Smooth Face.
 - .6 Standard of Acceptance: Expocrete.
- .2 Standard concrete block units: to CAN3-A165 Series (CAN3-A165.1), 1 Hour Fire Resistance Rating.
 - .1 Classification: H / 15 / A / O.
 - .2 Size: Depth 188mm x Height 190mm x Width 390mm.
 - .3 Special shapes: Provide purpose-made shapes for lintels and bond beams.
 - .4 Colour: Granito.
 - .5 Finish: Terrazzo. Refer to drawings for terrazzo finished faces and locations.
 - .6 Standard of Acceptance: Terazzo Block as manufactured by Expocrete.
- .3 Standard concrete block units: to CAN3-A165 Series (CAN3-A165.1), 1 Hour Fire Resistance Rating.
 - .1 Classification: H / 15 / A / O.
 - .2 Size: Depth 188mm x Height 190mm x Width 390mm.
 - .3 Special shapes: Provide purpose-made shapes for lintels and bond beams.
 - .4 Colour: Pietra Antica.
 - .5 Finish: Terrazzo. Refer to drawings for terrazzo finished faces and locations.
 - .6 Standard of Acceptance: Terazzo Block as manufactured by Expocrete.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Concrete block units.
 - .1 Bond: running.
 - .2 Coursing height: 200 mm for one block and one joint unless noted otherwise.
 - .3 Jointing: concave where exposed or where paint or other finish coating is specified.
- .2 Concrete block lintels.
 - .1 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.
 - .2 End bearing: not less than 200 mm.

3.2 CLEANING

- .1 Standard and Decorative block: Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block and finally by brushing.

3.2 COLOUR SCHEDULE

- .1 Masonry Colour 1 – Pietra Antica.
- .2 Masonry Colour 2 – Granito.

End of Section

PART 1 - GENERAL

1.1 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A 36/A36M, Specification for Structural Steel.
 - .2 ASTM A 193/A193M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
 - .3 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - .4 ASTM A 325, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - .5 ASTM A 325M, Specification for High-Strength Bolts for Structural Steel Joints.
 - .6 ASTM A 490M, Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric).
- .2 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).
 - .1 CISC/CPMA 1-73b, Quick-Drying, One-Coat Paint for Use on Structural Steel.
 - .2 CISC/CPMA 2-75, Quick-Drying, Primer for use on Structural Steel.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA-S16, Limit States Design of Steel Structures.
 - .4 CAN/CSA-S136, Cold Formed Steel Structural Members.
 - .5 CSA-S136.1, Commentary on CSA Standard S136.
 - .6 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
 - .7 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.
 - .8 CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .9 CSA W59, Welded Steel Construction (Metal Arc Welding).

1.2 DESIGN REQUIREMENTS

- .1 Design details and connections in accordance with requirements of CAN/CSA-S16 and CAN/CSA-S136 to resist forces, moments, shears and allow for movements indicated.
- .2 Shear connections:
 - .1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.
 - .2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.
- .3 Submit sketches and design calculations stamped and signed by qualified professional engineer licensed in Provinces of Manitoba, Canada for non standard connections.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings including fabrication and erection documents and materials list in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Erection drawings: indicate details and information necessary for assembly and erection purposes including:
 - .1 Description of methods.
 - .2 Sequence of erection.
 - .3 Type of equipment used in erection.
 - .4 Temporary bracings.
- .3 Ensure Fabricator drawings showing designed assemblies, components and connections are stamped and signed by qualified professional engineer licensed in the province of Manitoba.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Structural steel: to CAN/CSA-G40.20/G40.21 Grade as indicated or CAN/CSA-S136.
- .2 Anchor bolts: to ASTM A 36/A36M.
- .3 High strength anchor bolts: to ASTM A 193/A 93M.
- .4 Bolts, nuts and washers: to ASTM A 325 or ASTM A 325M.
- .5 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.
- .6 Shop paint primer: to CISC/CPMA 2.
- .7 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600 g/m².
- .8 Shear studs: to CSA W59, Appendix H.

2.2 FABRICATION

- .1 Fabricate structural steel in accordance with CAN/CSA-S16 and in accordance with reviewed shop drawings.
- .2 Install shear studs in accordance with CSA W59.
- .3 Continuously seal members by continuous welds where indicated. Grind smooth.
- .4 Provide holes in flanges for attachment of wood nailers.

2.3 SHOP PAINTING

- .1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16 except where members to be encased in concrete.
- .2 Clean members, remove loose mill scale, rust, oil, dirt and other foreign matter. Prepare surface according to SSPC-SP-6.
- .3 Apply one coat of primer in shop to steel surfaces to achieve minimum dry film thickness of 1.5 to 2.0 mils, except:
 - .1 Surfaces to be encased in concrete.
 - .2 Surfaces to receive field installed stud shear connections.
 - .3 Surfaces and edges to be field welded.
 - .4 Faying surfaces of friction-type connections.
 - .5 Below grade surfaces in contact with soil.
- .4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.
- .5 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.
- .6 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

PART 3 - EXECUTION

3.1 GENERAL

- .1 Structural steel work: in accordance with CAN/CSA-S16.
- .2 Welding: in accordance with CSA W59.
- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.2 MARKING

- .1 Mark materials in accordance with CAN/CSA G40.20/G40.21. Do not use die stamping. If steel is

to be left in unpainted condition, place marking at locations not visible from exterior after erection.

- .2 Match marking: shop mark for fit and match.

3.3 ERECTION

- .1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 and in accordance with reviewed erection drawings.
- .2 Field cutting or altering structural members: to approval of Contract Administrator.
- .3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.
- .4 Continuously seal members by continuous welds where indicated. Grind smooth.

3.4 FIELD PAINTING

- .1 Paint in accordance with Section 09 91 23 – Interior Painting.
 - .1 Touch up damaged surfaces and surfaces without shop coat with primer to SSPC-SP-6 except as specified otherwise. Apply in accordance with CAN/CGSB 85.10.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 04 05 10 - Common Work Results for Masonry.
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcements.
- .4 Section 05 12 23 - Structural Steel for Buildings.
- .5 Section 09 91 13 - Exterior Painting.
- .6 Section 09 91 23 - Interior Painting.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A-53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A-269, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A-307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel.
 - .2 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA-W59, Welded Steel Construction (Metal Arc Welding) (Imperial Version).

1.3 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:
 - .1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Storage and Protection:
 - .1 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.
 - .2 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W.
- .2 Steel pipe: to ASTM A 53/A53M standard weight, galvanized finish.
- .3 Welding materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.

- .5 Bolts and anchor bolts: to ASTM A 307.
- .6 Stainless steel tubing: to ASTM A 269, Type 302 Seamless welded with AISI No. 4 finish.
- .7 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Use self-tapping shake-proof headed screws on items requiring assembly by screws or as indicated.
- .3 Where possible, fit and shop assemble work, ready for erection.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.
- .2 Chromium plating: chrome on steel with plating sequence of 0.009 mm thickness of copper, 0.010 mm thickness of nickel and 0.0025 mm thickness of chromium.
- .3 Shop coat primer: to CAN/CGSB-1.40.
- .4 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.4 ISOLATION COATING

- .1 Isolate aluminum from following components, by means of bituminous paint:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 - .2 Concrete, mortar and masonry.
 - .3 Wood.

2.5 SHOP PAINTING

- .1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .3 Clean surfaces to be field welded; do not paint.

2.6 BOLLARDS

- .1 HSS pipe: nominal dimensions as indicated on drawings, formed to shape and sizes as indicated.
- .2 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

PART 3 - EXECUTION

3.1 ERECTION

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

- .5 Provide components for building by other sections in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CAN/CSA-S16.1, or weld.
- .7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
- .8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 BOLLARDS

- .1 Install bollards in locations as indicated.

3.4 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 07 21 13 – Board Insulation.
- .2 Section 07 27 10 – Air Barriers.
- .3 Section 07 27 13 – Self-Adhered Vapour Retarders.
- .4 Section 09 21 16 – Gypsum Board Assemblies.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM A 653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
 - .2 ASTM C 36/C36M, Specification for Gypsum Wallboard.
- .2 Canadian Standards Association (CSA)
 - .1 CSA B111, Wire Nails, Spikes and Staples.
 - .2 CSA O121, Douglas Fir Plywood.
 - .3 CAN/CSA-O141, Softwood Lumber.
 - .4 CSA O151, Canadian Softwood Plywood.
- .3 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber.

1.3 QUALITY ASSURANCE

- .1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Set aside damaged wood and dimensional lumber off-cuts for approved alternative uses (e.g. bracing, blocking, cripples, bridging). Store this separated reusable wood waste convenient to cutting station and area of work.
- .2 Do not burn scrap at the project site.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

- .1 Plywood, OSB and wood based composite panels: to CAN/CSA-O325.0.
- .2 Douglas fir plywood (DFP): to CSA O121, standard construction.

2.2 ACCESSORIES

- .1 Exterior wall sheathing paper: to CAN/CGSB-51.32 spunbonded olefin type as indicated. Standard of Acceptance: Tyvek® CommercialWrap®
- .2 Sealants: as per Section 07 92 10 - Joint Sealing.
- .3 General purpose adhesive: to CSA O112 Series.
- .4 Nails, spikes and staples: to CSA B111.
- .5 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

2.3 FASTENER FINISHES

- .1 Galvanizing: to CAN/CSA-G164, use galvanized fasteners for interior highly humid areas.
- .2 Stainless steel: use stainless steel fasteners for pressure treated lumber and exterior work.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Store wood products such that they are not exposed to rainfall and ground moisture.

3.2 INSTALLATION

- .1 Comply with requirements of Manitoba Building Code supplemented by following paragraphs.
- .2 Install members true to line, levels and elevations, square and plumb.
- .3 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding, electrical equipment mounting boards, and other work as required.
- .4 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

3.3 ERECTION

- .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.

3.4 SCHEDULES

- .1 Electrical equipment mounting boards:
 - .1 Plywood, DFP or CSP, G1S grade, square edge 19 mm thick, painted grey.

End of Section

PART 1 - GENERAL

1.1 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C165, Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
 - .2 ASTM C303, Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
 - .3 ASTM C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- .3 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .1 CAN/ULC-S702, Standard for Thermal Insulation, Mineral Fibre, for Buildings.

1.2 WASTE MANAGEMENT AND DISPOSAL

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

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

- .1 Board insulation for continuous insulation systems: To ASTM C612, Type IVB.
 - .1 Fire performance:
 - .1 Non-combustibility: To CAN/ULC S114.
 - .2 Surface Burning Characteristics: To CAN/ULC S102.
 - .1 Flame spread: 0.
 - .2 Smoke developed: 0.
 - .2 Thermal resistance (RSI value/25.4 mm at 24 ° C: [0.70] m²K/W to ASTM C518.
 - .3 Moisture resistance:
 - .1 Moisture sorption: 0.28 % maximum to ASTM C1104/C1104M.
 - .2 Water vapour transmission: 2160 ng/Pa·s·m² to ASTM E96, Desiccant Method.
 - .3 Water absorption: 1.2 % to ASTM C209.
 - .4 Dimensional stability: 0.38 % maximum linear shrinkage at 650 °C to ASTM C356.
 - .5 Corrosive resistance:
 - .1 Steel to ASTM C665: Non-corrosive.
 - .2 Stainless steel to ASTM C795: Non-corrosive.
 - .6 Density: 176 kg/m³ to ASTM C303.
 - .7 Compressive strength: To ASTM C165.
 - .1 58 kPa at 10 %.
 - .2 90 kPa at 25 %.
 - .8 Recycled content: 16% minimum.
 - .9 Fungi resistance: To ASTM C1338.
- .2 Extruded polystyrene (XPS): to CAN/ULC-S701.
 - .1 Type: 4.
 - .2 Compressive strength: 30psi (207 kPa).
 - .3 Thickness: to meet indicated insulating value.
 - .4 Size: 610 x 2440.
 - .5 Edges: shiplapped.
 - .6 Acceptable material: SM Board by Dow Chemical, Celfort 300 by Owens Corning, or approved equal in accordance with B7.

2.2 MATERIALS

- .1 Non-combustible, rigid, water repellent, mineral wool insulation board to ASTM C612, Type-IVB.
 - .1 Size: 610 x 1219 mm.
 - .2 Thickness: to meet specified RSI values indicated on drawings.
 - .3 Acceptable Material: ROXUL Inc., COMFORTBOARD™ 110 or approved equal in accordance with B7.

2.3 ACCESSORIES

- .1 Mechanical fasteners in accordance with insulation manufacturer's written recommendations.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 WORKMANSHIP

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
- .4 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .5 Offset both vertical and horizontal joints in multiple layer applications.
- .6 Do not enclose insulation until it has been inspected and approved by Contract Administrator.

3.3 EXAMINATION

- .1 Examine substrates and immediately inform Contract Administrator in writing of defects.
- .2 Prior to commencement of work ensure:
 - .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

3.4 PERIMETER FOUNDATION INSULATION

- .1 Exterior application: extend boards as indicated. Install on exterior face of perimeter foundation wall with metal channels as indicated.

3.5 RIGID INSULATION

- .1 Mechanically secure insulation for the building facade prior to installation of the air barrier. Install on exterior face of perimeter foundation wall with metal channels as indicated.

3.6 CLEANING

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

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 45 00 - Quality Control.
- .2 Section 01 51 00 - Temporary Utilities.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Canadian Urethane Foam Contractors' Association Inc. (CUFCA)
- .2 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S101, Fire Endurance Tests of Building Construction and Materials.
 - .2 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
 - .3 CAN/ULC-S705.1, Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Material Specification.
 - .4 CAN/ULC-S705.2, Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Installer's Responsibilities-Specification.

1.3 TEST REPORTS

- .1 Submit test reports in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.

1.4 QUALITY ASSURANCE

- .1 Applicators to conform to CUFCA Quality Assurance Program.

1.5 MOCK-UP

- .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
- .2 Construct mock-up 10 m² minimum, of spray in place urethane foam insulation including one inside corner and one outside corner. Mock-up may be part of finished work.
- .3 Allow 24 hours for inspection of mock-up by Contract Administrator.

1.6 SAFETY REQUIREMENTS

- .1 Protect workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations:
 - .1 Workers must wear gloves, respirators, dust masks, eye protection and protective clothing when applying foam insulation.
 - .2 Workers must not eat, drink or smoke while applying foam insulation.

1.7 PROTECTION

- .1 Ventilate area in accordance with Section 01 51 00 - Temporary Utilities.
- .2 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hour after application to maintain non-toxic, unpolluted, safe working conditions.
- .3 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.
- .4 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

1.8 ENVIRONMENTAL REQUIREMENTS

- .1 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Insulation: spray polyurethane to CAN/ULC-S705.1. Minimum RSI 1 per 25mm (R6 per 1").
Acceptable manufacturers:
 - .1 Owens Corning.
 - .2 Dow.
 - .3 Polyurethane Foam Systems Inc. (PFSI).
 - .4 Foam-Lok as supplied by Lapolla Canada Industries.
 - .5 Icynene Inc.
- .2 Primers: in accordance with manufacturer's recommendations for surface conditions.

PART 3 - EXECUTION

3.1 APPLICATION

- .1 Apply insulation to clean surfaces in accordance with CAN/ULC-S705.2 and manufacturer's printed instructions. Use primer where recommended by manufacturer.
- .2 Apply sprayed foam insulation in thickness or insulation value as indicated.

End of Section

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Materials and installation methods providing primary air/vapour barrier materials and assemblies.
- .2 Air/vapour barrier materials to provide continuous seal between components of building envelope and building penetrations.

1.2 RELATED SECTIONS

- .1 Section 06 10 10 - Rough Carpentry.
- .2 Section 07 21 16 - Blanket Insulation.
- .3 Section 07 92 10 - Joint Sealing.

1.3 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-19.13M, Sealing Compound, One Component, Elastomeric Chemical Curing.
- .2 Manitoba Building Code, Part 5 - Environmental Separation
- .3 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

1.4 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Provide drawings of special joint conditions.
- .2 Submit manufacturer's product data sheets in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Submit manufacturer's installation instructions in accordance with Section 01 33 00 - Submittal Procedures.

1.5 QUALITY ASSURANCE

- .1 Perform Work in accordance with Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification requirements for materials and installation.
- .2 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.
- .3 Maintain one copy of documents on site.

1.6 MOCK-UP

- .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
- .2 Construct typical exterior wall 3 m long by 3 m wide, incorporating window and door frame, insulation and building corner condition; illustrating materials interface and seals.
- .3 Allow 72 h for inspection of mock-up by Contract Administrator before proceeding with air/vapour barrier Work.

1.7 DELIVERY, STORAGE AND HANDLING

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

1.8 SEQUENCING

- .1 Sequence work to permit installation of materials in conjunction with related materials and seals.

1.9 WARRANTY

- .1 Warranty: Include coverage of installed sealant and sheet materials which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 - PRODUCTS

2.1 SHEET MATERIALS

- .1 Non-woven, spunbonded polyolefin sheet.
 - .1 Standard of Acceptance: Tyvek® CommercialWrap®.

2.2 SEAM SEALS

- .1 Joint sealing tape: air resistant pressure sensitive adhesive tape, type recommended by air barrier manufacturer, 50 mm wide for lap joints and perimeter seals.

2.3 ACCESSORIES

- .1 As recommended by sheet material manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verify that surfaces and conditions are ready to accept the Work of this section.
- .2 Ensure all surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.
- .3 Report any unsatisfactory conditions to the Contract Administrator in writing.
- .4 Do not start work until deficiencies have been corrected. Commencement of Work implies acceptance of conditions.

3.2 PREPARATION

- .1 Remove loose or foreign matter which might impair adhesion of materials.
- .2 Ensure all substrates are clean of oil or excess dust; all masonry joints struck flush, and open joints filled; and all concrete surfaces free of large voids, spalled areas or sharp protrusions.
- .3 Ensure metal closures are free of sharp edges and burrs.

3.3 INSTALLATION

- .1 Install materials in accordance with manufacturer's instructions.

3.4 PROTECTION OF WORK

- .1 Protect finished Work in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Do not permit adjacent work to damage work of this section.
- .3 Ensure finished Work is protected from climatic conditions.

3.5 SCHEDULES

- .1 Sheet Seal Type 1 (Commercial Wrap): to be applied to exterior wall assemblies.

End of Section

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Materials, preparation and application to complete the Work as shown on the drawings and as specified herein to bridge and seal the following air leakage pathways and gaps:
 1. Connections of the walls to the roof air barrier.
 2. Connections of the walls to the foundations.
 3. Seismic and expansion joints.
 4. Openings and penetrations of window and door frames, store front, curtain wall.
 5. Piping, conduit, duct and similar penetrations.
 6. Masonry ties, screws, bolts and similar penetrations.
 7. All other air leakage pathways in the building envelope.
- .2 Materials and installation methods of the primary air/vapor barrier membrane system and accessories.
- .3 Materials and installation methods of through-wall flashing membranes.

1.2 RELATED SECTIONS

- .1 Section 01 45 00 - Quality Control.
- .2 Section 03 30 00 - Cast-in-Place Concrete.
- .3 Section 04 05 10 - Common Work Results for Masonry.
- .4 Section 07 62 00 - Sheet Metal Flashing and Trim.

1.3 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials International (ASTM)
 1. ASTM E2357, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
 2. ASTM E2178, Standard Test Method for Air Permeance of Building Materials.
 3. ASTM E283, Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 4. E1677, Specification for Air Retarder (AR) Material or System for Low-Rise Framed Building Walls
 5. ASTM E330, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 6. ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
 5. ASTM E96, Water Vapor Transmission of Materials.
- .1 Canadian General Standards Board (CGSB)
 - .1 CGSB 37-GP-56M: Membrane, Modified, Bituminous, Prefabricated, and Reinforced.
 - .2 CAN/CGSB-51.33, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

1.4 QUALITY ASSURANCE

- .1 Mock-Ups:
 - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
 - .2 Where directed by Contract Administrator, construct typical exterior wall panel, 6 foot long by 6 foot wide, incorporating substrate, window frame, attachment of insulation and showing air barrier membrane application details.
 - .3 Mock-up will be used to judge workmanship, substrate preparation, and material application.
 - .4 Locate where directed.
 - .5 Allow 48 hours for inspection of mock-up by Contract Administrator before proceeding with vapour barrier work.

- .2 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.
- .3 Allow access to Work site by the air barrier membrane manufacturer's representative.
- .4 Components used shall be sourced from one manufacturer, including sheet membrane, air barrier sealants, primers, mastics, and adhesives

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Refer to current Product MSDS for proper storage and handling.
- .2 Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.
- .3 Store role materials on end in original packaging. Protect rolls from direct sunlight until use.
- .4 Store air barrier membranes, adhesives and primers at temperatures of 5° C minimum.
- .5 Keep solvent away from open flame or excessive heat.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Collect and separate for disposal paper and plastic, packaging material for recycling.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Self-adhered, SBS Rubberized Asphalt sheet to CAN/CGSB-51.33, Type I Water Vapor Permeance.
 - .1 Vapor permeance: 0.03 perms to ASTM E96.
 - .2 Primers and adhesives: as per manufacturer's written instructions.
 - .3 Acceptable material: Blueskin SA and Blueskin SA LT by Henry.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verify that surfaces and conditions are ready to accept the Work of this section. Notify Contract Administrator in writing of any discrepancies. Commencement of the work or any parts thereof shall mean acceptance of the prepared substrates.
- .2 All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants. Fill spalled areas in substrate to provide an even plane. Strike masonry joints flush.
- .3 Where curing compounds are used they must be clear resin based without oil, wax or pigments.
- .4 Do not proceed with application of membrane when rain is expected within 24 hours.
- .5 Condition materials to room temperature prior to application to facilitate handling.

3.2 SURFACE PREPARATION

- .1 Surfaces must be sound, clean and free of oil, grease, dirt, excess mortar or other contaminants. Fill spalled areas in substrate to provide an even plane.
- .2 New concrete should be cured for a minimum of 14 days and must be dry before air/vapor barrier membranes are applied.
- .3 Ensure all preparatory Work is complete prior to applying primary air/vapor barrier membrane.
- .4 Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing and fastened into solid backing.

- .5 Apply primer at rate recommended by manufacturer to all areas to receive self-adhering sheet air/vapor barrier membrane and or through-wall flashing membrane as indicated on drawings by roller or spray and allow minimum 30 minute open time. Primed surfaces not covered by self-adhering membrane or self-adhering through-wall flashing membrane during the same working day must be re-primed.

3.3 INSTALLATION

- .1 Perform Work in accordance with manufacturer's written instructions and this specification.
- .2 Use sheets of largest practical size to minimize joints.
- .3 Seal inside and outside corners with a strip of self-adhering air/vapour barrier membrane extending a minimum of 3 inches on either side of the corner detail.
 1. Prime surfaces as per manufacturers' instructions and allow to dry.
 2. Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all end and side laps of membrane.
 3. Roll all laps and membrane with a counter top roller to ensure seal.
- .4 Transition areas: Tie-in to structural beams, columns, floor slabs and intermittent floors, parapet curbs, foundation walls, roofing systems and at the interface of dissimilar materials as indicated in drawings with self-adhering air/vapor barrier membrane.
 1. Prime surfaces as per manufacturers' instructions and allow to dry.
 2. Align and position self-adhering transition membrane, remove protective film and press firmly into place. Provide minimum 3 inch lap to all substrates.
 3. Ensure minimum 2 inch overlap at all end and side laps of membrane.
 4. Roll all laps and membrane with a counter top roller to ensure seal.
- .5 Wrap rough openings with self-adhered air/vapor barrier membrane as detailed.
 1. Prime surfaces as per manufacturers' instructions and allow to dry.
 2. Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all end and side laps of membrane.
 3. Roll all laps and membrane with a counter top roller to ensure seal.
- .6 Main areas: Apply self-adhering air/vapor barrier membrane complete and continuous to prepared and primed substrate in an overlapping shingle fashion and in accordance with manufacturer's recommendations and written instructions. Stagger all vertical joints.
 1. Prime surfaces as per manufacturers' instructions and allow to dry.
 2. Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inch overlap at all end and side laps of membrane.
 3. Roll all laps and membrane with a counter top roller to ensure seal.
 4. At the end of each days work, seal the top edge of the membrane where it meets the substrate with termination sealant.

3.4 FIELD QUALITY CONTROL

- .1 Notify Contract Administrator when sections of Work are complete to allow review prior to covering air/vapor barrier system.

3.5 PROTECTION

- .1 Damp substrates must not be inhibited from drying out. Do not expose the backside of the substrate to moisture or rain.
- .2 Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane.
- .3 Air/vapor barrier membrane is not designed for permanent exposure. Good practice calls for covering as soon as possible.

3.6 CLEANING

- .1 Upon completion and verification of performance of installation, remove surplus materials,

excess materials, rubbish, tools and equipment.

3.7 SCHEDULES

- .1 Sheet Seal Type 1 (Bakor Blueskin SA): to be applied to exterior masonry wall assemblies.
- .2 Sheet Seal Type 2 (Bakor Blueskin SA): to be applied to roof membrane below standing seam roof system.

End of Section

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Requirements for the installation of preformed metal cladding/siding.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 07 92 10 - Joint Sealing.

1.3 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American National Standards Institute (ANSI).
 - .1 ANSI B18.6.4, Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws.
- .2 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM D 2369, Test Method for Volatile Content of Coatings.
 - .2 ASTM D 2832, Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
 - .3 ASTM D 5116, Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
- .3 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-51.32, Sheathing, Membrane, Breather Type.
 - .2 CAN/CGSB-93.2, Prefinished Aluminum Siding, Soffits and Fascia, for Residential Use.
 - .3 CAN/CGSB-93.3, Prefinished Galvanized and Aluminum-Zinc Alloy Steel Sheet for Residential Use.
 - .4 CAN/CGSB-93.4, Galvanized and Aluminum-Zinc Alloy Coated Steel Siding Soffits and Fascia, Prefinished, Residential.
 - .5 CGSB 93.5, Installation of Metal Residential Siding, Soffits and Fascia.
- .4 Canadian Standards Association (CSA International).
 - .1 CSA B111, Wire Nails, Spikes and Staples.
- .5 Environmental Choice Program (ECP).
 - .1 CCD-045, Sealants and Caulking Compounds.

1.4 SUBMITTALS

- .1 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, soffits, fascia, metal furring, and related work.
- .2 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit duplicate 300mm x 300 mm samples of siding material, of colour and profile specified.
- .3 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused caulking, sealants, and adhesive materials from landfill through disposal at hazardous material depot.

PART 2 - PRODUCTS

2.1 ALUMINUM CLADDING COMPONENTS

- .1 Fascia and exposed trim: to CAN/CGSB-93.2, Type C, Class 1
 - .1 Colour: to match roof finish
 - .2 Gloss: medium.
 - .3 Profile: flat sheet 'V' crimped for stiffness.
 - .4 Pattern: plain surface.
 - .5 Thickness: .635mm.

2.2 STEEL CLADDING AND COMPONENTS

- .1 Prefinished Metal Cladding: to CAN/CGSB-93.2.

2.3 ACCESSORIES

- .1 Exposed trim: inside corners, outside corners, cap strip, drip cap, undersill trim, starter strip and window/door trim of same material, colour and gloss as cladding, with fastener holes pre-punched.

2.4 FASTENERS

- .1 Screws: ANSI B18.6.4. Self tapping, nylon coated head screws with neoprene washer. Colour to match metal colour.

2.5 CAULKING

- .1 Sealants: See Section 07 92 10 - Joint Sealing.

2.6 SHEATHING PAPER

- .1 Exterior wall sheathing paper: to CAN2-51.32 spunbound olefin type as indicated. See Section 07 27 10 Air Barriers.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install cladding in accordance with CGSB 93.5, and manufacturer's written instructions
- .2 Install one layer exterior wall sheathing paper horizontally by stapling and lapping edges 150mm.
- .3 Install continuous starter strips, inside and outside corners, edgings, soffit, drip, cap, sill and window/door opening flashings as indicated.
- .4 Install outside corners, fillers and closure strips with carefully formed and profiled work.
- .5 Install fascia cladding as indicated.
- .6 Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.
- .7 Attach components in manner not restricting thermal movement.
- .8 Caulk junctions with adjoining work in accordance with Section 07 92 10 - Joint Sealing.

3.3 CLEANING

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

End of Section

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Materials and installation methods providing primary air/vapour barrier materials and assemblies.
- .2 Air/vapour barrier materials to provide continuous seal between components of building envelope and building penetrations.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .3 Section 07 92 10 - Joint Sealing.
- .4 Section 09 91 13 - Exterior Painting.

1.3 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM D 5116, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-11.3, Hardboard.
 - .2 CAN/CGSB-51.32, Sheathing, Membrane, Breather Type.
- .3 Canadian Standards Association (CSA International).
 - .1 CSA B111, Wire Nails, Spikes and Staples.
 - .2 CSA O121, Douglas Fir Plywood.
 - .3 CSA O151, Canadian Softwood Plywood.
 - .4 CAN/CSA-Z808, A Sustainable Forest Management System: Guidance Document.
- .4 Environmental Choice Program (ECP).
 - .1 CCD-045, Sealants and Caulking Compounds.
- .5 National Lumber Grades Authority (NLGA).
 - .1 NLGA Standard Grading Rules for Canadian Lumber.

1.4 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit duplicate 300 x 300 mm size profile specified.
- .3 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 MOCK-UP

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

- .2 Construct typical exterior wall 3 m long by 3 m wide, incorporating window frame, insulation and building corner condition; illustrating materials interface and seals.
- .3 Allow 72 h for inspection of mock-up by Contract Administrator before proceeding with air/vapour barrier Work.

1.7 DELIVERY, STORAGE AND HANDLING

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

1.8 SEQUENCING

- .1 Sequence work to permit installation of materials in conjunction with related materials and seals.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Lumber siding:
 - .1 Boards: Ipe species #1 grade, 19mm thickness, 140mm width, c/w concealed fastening system.
- .2 Accessories: exposed trim, closures, cap pieces of manufacturer's standard, matching finish.
- .3 Exterior wall sheathing paper: to CAN/CGSB-51.32 spunbonded olefin, as indicated.
- .4 Fasteners: "Ipe Clip Extreme" concealed fastener c/w 2.38mm gap spacing as manufactured by Ipe Clip Fastener Company or approved equal.
- .5 Sealants: see Section 07 92 10.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verify that surfaces and conditions are ready to accept the Work of this section.
- .2 Report any unsatisfactory conditions to the Contract Administrator in writing.
- .3 Do not start work until deficiencies have been corrected. Commencement of Work implies acceptance of conditions.

3.2 MANUFACTURER'S INSTRUCTIONS

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

3.3 INSTALLATION

- .1 Install one layer sheathing paper horizontally, lapping edges 100 mm.
- .2 Install sill flashings, starter strips, inside corner flashings, edgings and flashings over openings.
- .3 Fasten wood siding in straight, aligned lengths to channels at 610 mm on centre maximum using concealed fastener at each fixing location. Stagger butt joints not less than 800 mm and distribute evenly over wall faces. Cut butt joints at 45 degrees and for vertical siding slope to outside.

3.4 CLEANING

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

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 45 00 - Quality Control.
- .3 Section 07 92 10 - Joint Sealing.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM A 167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM A 653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-37.5, Cutback Asphalt Plastic Cement.
 - .2 CAN/CGSB-37.29, Rubber-Asphalt Sealing Compound.
 - .3 CAN/CGSB-51.32, Sheathing, Membrane, Breather Type.

1.3 SUBMITTALS

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate arrangements of sheets and joints, types and locations of fasteners and special shapes and relationship of panels to structural frame.
- .3 If requested, submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Submit 300 x 300 mm samples of each sheet metal material.

PART 2 – PRODUCTS

2.1 PREFINISHED STEEL SHEET

- .1 Prefinished steel roof panels.
Standing seam, 0.635mm (24ga) thickness, 400mm panel width. Finish to be Galvalume Plus AZ180 finish. Acceptable systems:
 - .1 Tradition 150 system as manufactured by Vicwest.
 - .2 AR-38 system as manufactured by Agway Metals.
- .2 Flashing, Trim And Closures: Same material, gauge and finish as adjacent wall and roof panels. Fastenings shall be as specified for wall and roof panels. Form or mold closure strips to match configuration of the roofing or siding. Install closures wherever necessary to insure weather tight construction.

2.2 ACCESSORIES

- .1 Except as indicated as work of another specification section, provide components required for a complete roof system, including trim, copings, fascias, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets and closure strips. Match materials and finishes of roof.
- .2 Isolation coating: alkali resistant bituminous paint.
- .3 Plastic cement: to CAN/CGSB-37.5.
- .4 Underlay: self adhered modified bituminous membrane.
Standard of Acceptance: Blueskin® RF200.
- .5 Sealant: asbestos-free sealant, compatible with systems materials, recommended by system manufacturer.

- .6 Rubber-asphalt sealing compound: to CAN/CGSB-37.29.
- .7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Use concealed fastenings except where approved by Contract Administrator before installation.
- .2 Provide underlay under sheet metal roofing. Secure in place and lap joints 100 mm minimum.
- .3 Install sheet metal roof panels as per manufacturers requirements.
- .4 Flash roof penetrations, and adjacent walls with material matching roof panels, and make watertight.
- .5 Form seams in direction of water-flow and make watertight.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 The Aluminum Association Inc. (AA)
 - .1 Aluminum Sheet Metal Work in Building Construction.
 - .2 AA DAF45, Designation System for Aluminum Finishes.
- .2 American Society for Testing and Materials (ASTM International)
 - .1 ASTM A 167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM A 653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .3 ASTM A 792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .3 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual.
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.5, Cutback Asphalt Plastic Cement.
 - .2 CAN/CGSB-51.32, Sheathing, Membrane, Breather Type.
 - .3 CAN/CGSB-93.1, Sheet Aluminum Alloy, Prefinished, Residential.
- .5 Canadian Standards Association (CSA International)
 - .1 CSA A123.3, Asphalt Saturated Organic Roofing Felt.
 - .2 CSA B111, Wire Nails, Spikes and Staples.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- .1 Zinc coated steel sheet: .635mm (24 ga) thickness, commercial quality to ASTM A 653/A653M, with Z275 designation zinc coating.

2.2 PREFINISHED STEEL SHEET

- .1 Prefinished steel with factory applied polyvinylidene fluoride.
 - .1 Class F1S.
 - .2 colour selected by Contract Administrator from manufacturer's standard range.
 - .3 Coating thickness: not less than 22 micrometres.
 - .4 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20% to ASTM D 822 as follows:
 - .1 Outdoor exposure period 2500 hours.
 - .2 Humidity resistance exposure period 5000 hours.
- .2 Prefinished steel with factory applied galvalume finish.
 - .1 Thickness and finish to match roof system.

2.3 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Plastic cement: to CAN/CGSB 37.5.
- .3 Underlay for metal flashing: No. 15 perforated asphalt felt to CSA A123.3.
- .4 Sealants: as per Section 07 92 10 - Joint Sealing.
- .5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

- .6 Fasteners: of same material as sheet metal, to CSA B111, flat head roofing nails of length and thickness suitable for metal flashing application.
- .7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .8 Touch-up paint: as recommended by prefinished material manufacturer.

2.4 FABRICATION

- .1 Fabricate metal flashings and other sheet metal work as indicated.
- .2 Fabricate aluminum flashings and other sheet aluminum work in accordance with AA-Aluminum Sheet Metal Work in Building Construction.
- .3 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.
- .4 Hem exposed edges on underside 12 mm. Mitre and seal corners with sealant.
- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 METAL FLASHINGS

- .1 Form flashings, copings and fascias to profiles indicated of .635mm (24 ga) thick prefinished steel.

2.6 PANS

- .1 Form pans to receive roofing plastic from .635mm (24 ga) thick galvanized steel sheet metal with minimum 75 mm upstand above finished roof and 100 mm continuous flanges with no open corners. Solder joints. Make pans minimum 50 mm wider than member passing through roof membrane.

2.7 CAP FLASHINGS

- .1 Form metal cap flashing of 0.61 mm thick sheet metal for base flashings as detailed. Provide slotted fixing holes and steel/plastic washer fasteners. Cover face and ends with plastic tape.

2.8 EAVESTROUGHS AND DOWNPIPES

- .1 Form scuppers and upper downpipes from .635mm (24 ga) thick prefinished steel sheet metal to match roofing material.
- .2 Sizes and profiles as indicated.
- .3 Provide goosenecks, outlets, strainer baskets and necessary fastenings.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install sheet metal work as detailed.
- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal. Secure in place and lap joints 100 mm.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints as detailed.
- .5 Lock end joints and caulk with sealant.
- .6 Install pans, where shown around items projecting through roof membrane.

3.2 EAVESTROUGHS AND DOWNPIPES

- .1 Install eaves troughs and secure to building at 610 mm on centre with eaves trough spikes through spacer ferrules. Slope eaves troughs to downpipes as indicated. Seal joints watertight.

- .2 Install upper downpipes and provide goosenecks back to wall. Secure downpipes to wall with straps and connect to miscellaneous steel downpipes.
- .3 Install splash pans as indicated.

End of Section

PART 1 - GENERAL

1.1 RELATED WORK

- .1 Fire stopping and smoke seals within mechanical assemblies (ie. inside ducts, dampers) and electrical assemblies (ie. inside cable trays) are specified in those sections respectively.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Underwriter's Laboratories of Canada (ULC)
 - .1 ULC-S115, Fire Tests of Firestop Systems.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings (commonly called ULC Design Sheets) of each penetration type to show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details must accurately reflect actual job conditions.

1.4 PRODUCT DATA

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Fire stopping and smoke seal systems: in accordance with ULC-S115.
 - .1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of ULC-S115 and not to exceed opening sizes for which they are intended [and conforming to special requirements specified in 3.5.
 - .2 Firestop system rating: to match wall for floor assembly requirements.
- .2 Service penetration assemblies: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40 U19.
- .3 Service penetration firestop components: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40 U19.13 and ULC Guide No.40 U19.15 under the Label Service of ULC.
- .4 Fire-resistance rating of installed firestopping assembly in accordance with NBC.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .10 Sealants for vertical joints: non-sagging.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2 INSTALLATION

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

3.3 INSPECTION

- .1 Notify Contract Administrator when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.4 SCHEDULE

- .1 Firestop and smoke seal at:
 - .1 Penetrations through fire-resistance rated masonry and concrete partitions and walls.
 - .2 Top of fire-resistance rated masonry partitions.
 - .3 Intersection of fire-resistance rated masonry partitions.
 - .4 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
 - .5 Openings and sleeves installed for future use through fire separations.
 - .6 Around mechanical and electrical assemblies penetrating fire separations.
 - .7 Rigid ducts: greater than 129 cm²: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

3.5 CLEAN UP

- .1 Remove excess materials and debris and clean adjacent surfaces immediately after application.
- .2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 45 00 - Quality Control.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C 919, Standard Practice for Use of Sealants in Acoustical Applications.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 19-GP-5M, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
 - .2 CAN/CGSB-19.13, Sealing Compound, One-component, Elastomeric, Chemical Curing.
 - .3 CGSB 19-GP-14M, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
 - .4 CAN/CGSB-19.17, One-Component Acrylic Emulsion Base Sealing Compound.
 - .5 CAN/CGSB-19.24, Multi-component, Chemical Curing Sealing Compound.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.3 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.4 PROJECT CONDITIONS

- .1 Environmental Limitations:
 - .1 Do not proceed with installation of joint sealants under following conditions:
 - .1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.
 - .2 When joint substrates are wet.
- .2 Joint-Width Conditions:
 - .1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
 - .1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

- .1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
- .2 When low toxicity caulks are not possible, confine usage to areas which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.
- .3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

- .1 Urethanes Two Part.
 - .1 Self-Leveling to CAN/CGSB-19.24, Type 1, Class B, colour as selected.
 - .2 Acceptable material: Tremco THC 900, Vulkem 245
- .2 Urethanes Two Part.
 - .1 Non-Sag to CAN/CGSB-19.24, Type 2, Class B, colour as selected
 - .2 Acceptable material: Tremco Dymeric 240, Vulkem 227
- .3 Urethanes One Part.
 - .1 Self-Leveling to CAN/CGSB-19.13, Type 1, colour as selected
 - .2 Acceptable material: Vulkem 45
- .4 Urethanes One Part.
 - .1 Non-Sag to CAN/CGSB-19.13, Type 2, colour as selected
 - .2 Acceptable material: Tremco Dymonic, Vulkem 116, Vulkem 431
- .5 Silicones One Part.
 - .1 To CAN/CGSB-19.13.
 - .1 Acceptable material: Tremco Spectrum 2 or 3, GE Silpruf 2000
 - .2 To CAN/CGSB-19.22 (Mildew resistant).
 - .1 Acceptable material: Tremco Tremsil 200, GE SCS 1700 Sanitary
- .6 Acrylics One Part.
 - .1 To CGSB 19-GP-5M.
 - .2 Acceptable material: Tremco 555
- .7 Acrylic Latex One Part.
 - .1 To CAN/CGSB-19.17.
 - .2 Acceptable material: Tremflex 834
- .8 Acoustical Sealant.
 - .1 To CAN/CGSB-19.21.
 - .2 Acceptable material: Tremco Acoustic Sealant
- .9 Butyl.
 - .1 To CGSB 19-GP-14M.
 - .2 Acceptable material: Tremco Butyl
- .10 Preformed Compressible and Non-Compressible back-up materials.
 - .1 Polyethylene, Urethane, Neoprene or Vinyl Foam.
 - .1 Extruded closed cell foam backer rod.
 - .2 Size: oversize 30 to 50 %.
 - .2 Neoprene or Butyl Rubber.
 - .1 Round solid rod, Shore A hardness 70.
 - .3 High Density Foam.
 - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m density, or neoprene foam backer, size as recommended by manufacturer.
 - .4 Bond Breaker Tape.
 - .1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

- .1 Perimeters of exterior openings where frames meet exterior facade of building (ie. brick, block, precast masonry): Sealant type: 2.2.4
- .2 Cornice and wash (or horizontal surface joints): Sealant type: 2.2.4
- .3 Exterior joints in horizontal wearing surfaces: Sealant type: 2.2.4
- .4 Seal interior perimeters of exterior openings as detailed on drawings: Sealant type: 2.2.7
- .5 Perimeters of interior frames, as detailed and itemized: Sealant type: 2.2.4

- .6 Interior masonry vertical control joints (block-to-block, block-to-concrete, and intersecting masonry walls): Sealant type: 2.2.4
- .7 Perimeter of bath fixtures (e.g. sinks, tubs, urinals, stools, waterclosets, basins, vanities): Sealant type: 2.2.5.2
- .8 Exposed interior control joints in drywall: Sealant type: 2.2.4

2.4 JOINT CLEANER

- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.
- .2 Primer: as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PROTECTION

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

3.2 SURFACE PREPARATION

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.
- .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- .4 Ensure joint surfaces are dry and frost free.
- .5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

- .1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
- .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

- .1 Apply bond breaker tape where required to manufacturer's instructions.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

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

3.6 APPLICATION

- .1 Sealant.
 - .1 Apply sealant in accordance with manufacturer's written instructions.
 - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
 - .3 Apply sealant in continuous beads.
 - .4 Apply sealant using gun with proper size nozzle.
 - .5 Use sufficient pressure to fill voids and joints solid.
 - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
 - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
 - .8 Remove excess compound promptly as work progresses and upon completion.

- .2 Curing.
 - .1 Cure sealants in accordance with sealant manufacturer's instructions.
 - .2 Do not cover up sealants until proper curing has taken place.

- .3 Cleanup.
 - .1 Clean adjacent surfaces immediately and leave Work neat and clean.
 - .2 Remove excess and droppings, using recommended cleaners as work progresses.
 - .3 Remove masking tape after initial set of sealant.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 07 92 10 - Joint Sealing
- .2 Section 08 71 10 - Door Hardware
- .3 Section 09 91 13 - Exterior Painting.
- .4 Section 09 91 23 - Interior Painting.
- .5 Section 16 Wiring for electronic hardware.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials (ASTM International)
 - .1 ASTM A 653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM B 29, Specification for Refined Lead.
 - .3 ASTM B 749, Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.
 - .2 CGSB 41-GP-19Ma, Rigid Vinyl Extrusions for Windows and Doors.
- .3 Canadian Standards Association (CSA International)
 - .1 G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W59, Welded Steel Construction (Metal Arc Welding) (Metric Version).
- .4 Canadian Steel Door Manufacturers' Association, (CSDMA).
 - .1 CSDMA, Specifications for Commercial Steel Doors and Frames.
 - .2 CSDMA, Recommended Selection and Usage Guide for Commercial Steel Doors.
- .5 National Fire Protection Association (NFPA)
 - .1 NFPA 80, Standard for Fire Doors and Fire Windows.
 - .2 NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
- .6 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN4-S104, Fire Tests of Door Assemblies.
 - .2 CAN4-S105, Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.3 DESIGN REQUIREMENTS

- .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35° C to 35° C.
- .2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.

1.4 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, arrangement of hardware and fire rating and finishes.
- .3 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings fire rating finishes.
- .4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

1.5 REQUIREMENTS

- .1 Steel fire rated doors and frames: labeled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104M NFPA 252 for ratings specified or indicated.
- .2 Provide fire labeled frame products for those openings requiring fire protection ratings, as scheduled. Test products in strict conformance with CAN4-S104, ASTM E 152 or NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

1.6 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 If requested, submit one 300 x 300 mm top butt corner sample of each type door.
- .3 If requested, submit one 300 x 300 mm corner sample of each type of frame.
 - .1 Show butt cutout glazing stops 300 mm long removable mullion connection snap-on trim with clips.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Divert unused paint and sealant materials from landfill to official hazardous material collections site.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Hot dipped galvanized steel sheet: to ASTM A 653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.
- .2 Reinforcement: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A 653M, ZF75.
- .3 Composites: balance of core materials used in conjunction with lead: in accordance with manufacturers' proprietary design.

2.2 DOOR CORE MATERIALS

- .1 Honeycomb construction:
 - .1 Structural small cell, 24.5 mm maximum kraft paper 'honeycomb', weight: 36.3 kg per ream minimum, density: 16.5 kg/m³ minimum sanded to required thickness.
- .2 Stiffened: face sheets, honeycomb or insulated core as indicated.
 - .1 Expanded polystyrene: CAN/ULC-S701, density 16 to 32 kg/m³.
- .3 Temperature rise rated (TRR): core composition to limit temperature rise on unexposed side of door to 250° C at 60 minutes. Core to be tested as part of a complete door assembly, in accordance with CAN4-S104, ASTM E 152 or NFPA 252, covering Standard Method of Tests of Door Assemblies and listed by nationally recognized testing agency having factory inspection service.
- .4 Thermal insulation material must:
 - .1 not require being labeled as poisonous, corrosive, flammable or explosive under the Consumer Chemical and Container Regulations of the Hazardous Products Act;
 - .2 be manufactured using a process that uses chemical compounds with the minimum ozone depletion potential (ODP) available.

2.3 ADHESIVES

- .1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
- .2 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.

- .3 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

2.4 PRIMER

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

2.5 PAINT

- .1 Field paint steel doors and frames in accordance with Sections 09 91 23 - Interior Painting and 09 91 13 - Exterior Painting. Protect weatherstrips from paint. Provide final finish shall be free of scratches or other blemishes.

2.6 ACCESSORIES

- .1 Door silencers: single stud rubber/neoprene type.
- .2 Exterior and interior top and bottom caps: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.
- .3 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
- .4 Metallic paste filler: to manufacturer's standard.
- .5 Fire labels.
- .6 Sealant: as per Section 07 92 10 - Joint Sealing.

2.7 FRAMES FABRICATION GENERAL

- .1 Fabricate frames in accordance with CSDMA specifications.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Interior frames: 1.6 mm (16 gauge), construction as indicated.
- .4 Blank, reinforce, drill and tap frames for mortised, templated hardware, using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
- .5 Protect mortised cutouts with steel guard boxes.
- .6 Prepare frame for door silencers, 3 for single door.
- .7 Manufacturer's nameplates on frames and screens are not permitted.
- .8 Conceal fastenings except where exposed fastenings are indicated.
- .9 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

2.8 FRAME ANCHORAGE

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

2.9 FRAMES: WELDED TYPE

- .1 Welding in accordance with CSA W59.
- .2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.
- .3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.

- .4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
- .5 Securely attach floor anchors to inside of each jamb profile.
- .6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.
- .7 Fabricate frame products for openings in sections, splice joints for field assembly.
- .8 Securely attach lead to inside of frame profile from return to jamb soffit (inclusive) on door side of frame only.

2.10 DOOR FABRICATION GENERAL

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

2.11 DOORS: HONEYCOMB CORE CONSTRUCTION

- .1 Form each face sheet for interior doors from 1.6 mm sheet steel with honeycomb core laminated under pressure to face sheets.

2.12 HOLLOW STEEL CONSTRUCTION

- .1 Form each face sheet for interior doors from 1.6 mm sheet steel.
- .2 Reinforce doors with vertical stiffeners, securely fastened to each face sheet at 150 mm on centre maximum.
- .3 Fill voids between stiffeners of interior doors with fiberglass core.
- .4 Fill voids between stiffeners of interior doors with fiberglass honeycomb temperature rise rated core.

PART 3 - EXECUTION

3.1 INSTALLATION GENERAL

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

3.2 FRAME INSTALLATION

- .1 Set frames plumb, square, 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.
- .5 Caulk perimeter of frames between frame and adjacent material.
- .6 Maintain continuity of vapour retarder.

3.3 DOOR INSTALLATION

- .1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 10 - Door Hardware.
- .2 Provide even margins between doors and jambs and doors and finished floor as follows.
 - .1 Hinge side: 1.0 mm.
 - .2 Latchside and head: 1.5 mm.
 - .3 Finished floor, top of carpet and thresholds: 13 mm.
- .3 Adjust operable parts for correct function.

3.4 FINISH REPAIRS

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

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 07 92 10 - Joint Sealing.
- .2 Section 07 21 19 - Foamed in Place Insulation.

1.2 REFERENCES

All reference standards shall be current issue or latest revisions at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 National Building Code of Canada (NBC)
- .2 North American Fenestration Standard (NAFS)
 - .1 AAMA/WDMA/SCA 101/I.S.2/A440-8, NAFS - North American Fenestration Standard, Specification for Windows, Doors and Skylights.
- .3 Canadian Standards Associations (CSA) International
 - .1 CSA-A440.2, Energy Performance of Windows and Other Fenestration Systems
 - .2 CSA-A440.4, Window and Door Installation.
 - .3 CSA-A440SI, Canadian supplement to AAMA/WDMA/SCA 101/I.S.2/A440, NAFS- North American Fenestration Standard, Specification for Windows, Doors and Skylights.
 - .4 CSA-440.7, Window and Door Installation.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim, junction between combination units, elevations of unit, anchorage details, description of related components and exposed finishes fasteners, and caulking. Indicate location of manufacturer's nameplates.
- .3 Provide manufacturers fabrication dimensions for all window components (cut sheets) for all window types and configurations.
- .4 Indicate on shop drawings, dimensions, relation to construction of adjacent work, air and vapour seal with adjacent construction materials, component anchorage and locations, anchor methods, shim methods and material, and hardware installation details. Include also opening dimensions, frames opening tolerances and affected related work and installation requirements. Provide shop drawings for anchor and shim methods and materials, sealed by an engineer registered in the Province of Manitoba.

1.4 PERFORMANCE REQUIREMENTS

- .1 Design frames in exterior walls to accommodate expansion and contraction within services temperature range of -40°C to 75°C.
- .2 Accommodate, without damage to components or deterioration of seals:
 - .1 Expansion and contraction within system caused by a cycling temperature changes without causing detrimental affect to system components including buckling, failure of joint seals, or undue stress on fasteners.
 - .2 Movement between system and perimeter framing components.
 - .3 Dynamic loading and release of loads.
 - .4 Deflection of structural support framing.
- .3 System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within the system, to the exterior by a weep drainage network.
- .4 Thermal Movement: Design sections to permit movement caused by thermal expansion and contraction of fibreglass to suite glass, infill, and perimeter opening construction.
- .5 Design glazing system, mullions and frames to support a live load of 1.46 kN/m acting vertically, 1.61kN/m acting horizontally at any point up to 1070mm above the floor or, 0.73kN/m at 1070mm above the floor or 0.73kN/m at 1070mm above the floor, whichever produces the greatest effect.
- .6 Mullions to have L/175 deflection limit rating as per NAFS using Mullion Assembly (MA) designation.

1.5 MOCK UP

- .1 Upon commencement of the contract, one typical unit window shall be prepared as a sample of the work, including insulation and interior casing/finishing. Work shall not proceed until the sample unit has been approved by the Contract Administrator. The quality of the sample unit installation shall be maintained through the balance of the project.

1.6 MAINTENANCE DATA

- .1 Provide operation and maintenance data for windows for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.7 WARRANTY

- .1 Provide written warranty for window sashes and frames against material or manufacturing defects occurring within 20 years from date of substantial performance.
- .2 Provide written warranty for glazing seal failure against material or manufacturing defects occurring within 10 years from the date of substantial performance.

1.8 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for windows for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Materials: to CSA-A440/A440.1 supplemented as follows:
- .2 All windows of similar material to be by same manufacturer.
- .3 Main frame: fiberglass.
- .4 Glass: Polycarbonate security glazing:
 - .1 Single 19 mm thick polycarbonate sheet, clear colour.
 - .2 Flexural strength: to ASTM D 790.
 - .3 Surface burning characteristics for flame and smoke spread: to ASTM E 84.
 - .4 Self ignition characteristics: to ASTM D 1929..
- .5 Isolation coating: alkali resistant bituminous paint.

2.2 WINDOW TYPE AND CLASSIFICATION

- .1 Type:
 - .1 Fixed fiberglass: Polycarbonate security glazing.
 - .1 Acceptable material: Duxton 325 Series or approved equal.

2.3 FABRICATION

- .1 Fabricate in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:
- .2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less, and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.
- .3 Face dimensions detailed maximum permissible sizes.
- .4 Brace frames to maintain squareness and rigidity during shipment and installation.
- .5 Finish steel clips and reinforcement with 380 g/m² zinc coating to ASTM A 123/A 123M.

2.4 FIBERGLASS FINISHES

- .1 Finish exposed interior and exterior surfaces of fiberglass components in metallic silver to match Galvalume Plus AZ 180 finish.

2.4 ISOLATION COATING

- .1 Isolate aluminum from following components, by means of isolation coating:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 - .2 Concrete, mortar and masonry.

.3 Wood.

2.5 GLAZING

.1 Glaze windows in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 with polycarbonate security glazing.

2.7 AIR BARRIER AND VAPOUR RETARDER

- .1 Equip window frames with site installed air/ vapour barrier material for sealing to building air/ vapour barrier as follows:
- .1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
 - .2 All rough openings on windows and doors are to be wrapped on all sides with a modified bituminous membrane.

PART 3 - EXECUTION

3.1 WINDOW INSTALLATION

- .1 Install in accordance with CSA-A440/A440.1.
- .2 Arrange components to prevent abrupt variation in colour.

3.2 SILL INSTALLATION

- .1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece lengths at each location.
- .2 Secure sills in place with anchoring devices located at ends and evenly spaced 600 mm on centre in between.
- .3 Fasten expansion joint cover plates and drip deflectors with self tapping stainless steel screws.

3.3 CAULKING

- .1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.
- .2 Apply sealant in accordance with Section 07 92 10 - Joint Sealing. Conceal sealant within window units except where exposed use is permitted by Contract Administrator.

3.4 SCHEDULE

- .1 Window series and colour.

Window	Type	Series	Int. Colour	Ext. Colour
W1	Fibreglass	325	Metallic Silver to match roof	Metallic Silver to match roof

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 08 11 14 – Metal Doors and Frames
- .2 Section 26 – Wiring Device

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).
 - .1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-69.17, Bored and Preassembled Locks and Latches.
 - .2 CAN/CGSB-69.18/ANSI/BHMA A156.1, Butts and Hinges.
 - .3 CAN/CGSB-69.19/ANSI/BHMA A156.3, Exit Devices.
 - .4 CAN/CGSB-69.20/ANSI/BHMA A156.4, Door Controls (Closers).
 - .5 CAN/CGSB-69.21/ANSI/BHMA A156.5, Auxiliary Locks and Associated Products.
 - .6 CAN/CGSB-69.22/ANSI/BHMA A156.6, Architectural Door Trim.
 - .7 CAN/CGSB-69.26/ANSI/BHMA A156.10, Power-operated Pedestrian Doors.
 - .8 CAN/CGSB-69.28/ANSI/BHMA A156.12, Interconnected Locks and Latches.
 - .9 CAN/CGSB-69.29/ANSI/BHMA A156.13, Mortise Locks and Latches.
 - .10 CAN/CGSB-69.31/ANSI/BHMA A156.15, Closer/Holder Release Device.
 - .11 CAN/CGSB-69.32/ANSI/BHMA A156.16, Auxiliary Hardware.
 - .12 CAN/CGSB-69.34/ANSI/BHMA A156.18, Materials and Finishes.
 - .13 CAN/CGSB-69.35/ANSI/BHMA A156.19, Power Assist and Low Energy Power Operated Doors.

1.3 SUBMITTALS

- .1 Hardware List:
 - .1 Submit contract hardware list in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
- .2 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.
- .3 Closeout Submittals
 - .1 Provide operation and maintenance data for door closers, locksets, door holders and fire exit hardware for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:
 - .1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
- .2 Storage and Protection:
 - .1 Store finishing hardware in locked, clean and dry area.

1.6 WASTE DISPOSAL AND MANAGEMENT

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

1.7 MAINTENANCE

- .1 Provide maintenance data and materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Data:
 - .1 Provide maintenance data, parts lists and manufacturer's instructions for each type of

- .2 door closer, lockset, door holder and fire exit hardware.
- .2 Brief maintenance staff regarding proper care, cleaning and general maintenance.
- .3 Extra Materials:
 - .1 Provide two (2) sets of special wrenches for door closers, locksets and fire exit hardware and other tools applicable to each different or special hardware component.
 - .2 Provide two (2) sets of maintenance tools and accessories supplied by hardware component manufacturer.
 - .3 Provide two (2) copies of all installation instructions, operating manuals, programming guides and product warranties.

PART 2 - PRODUCTS

2.1 HARDWARE ITEMS

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

2.2 DOOR SIGNAGE

- .1 Washroom signs: Rockwood BF689, 200 x 200, metal sign, US10BL/614 finish (Satin Oxidized Bronze, Clear Coated), Grade 2 Braille translation, mechanically fastened to block wall with tamper proof fasteners or Approved Equal.

2.3 FASTENINGS

- .1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .2 Exposed fastening devices to match finish of hardware.
- .3 Use fasteners compatible with material through which they pass.

2.4 KEYING

- .1 Provide construction cores.
- .2 City shall provide all permanent cores to be installed by Contractor.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their Work to receive hardware.
- .3 Furnish manufacturers' instructions for proper installation of each hardware component.
- .4 Install closers and stops to allow maximum door swing permitted by the hardware and adjacent construction.
- .5 Where special placement is required, consult the City.

3.2 INSTALLATION

- .1 Install hardware to meet the new Manitoba Amendments Article 3.8.3.3(3).
- .2 Where door stop contacts door pulls, mount stop to strike bottom of pull.
- .3 Use only manufacturer's supplied fasteners. Failure to comply may void manufacturer's warranties and applicable licensed labels. Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
- .4 Remove construction cores when directed by Contract Administrator; install permanent cores and check operation of locks.

3.3 ADJUSTING

- .1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
- .2 Lubricate hardware, operating equipment and other moving parts.
- .3 Adjust door hardware to provide tight fit at contact points with frames.
- .4 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.4 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacture's instructions.
- .3 Remove protective material from hardware items where present.
- .4 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.5 SCHEDULE

Hardware Set#: 1

Single: D101, D102

4	Hinge	TA2314 NRP 4-1/2" x 4"	US26D	MK
1	Mortise Deadlock	L496 BD L583-363 10-078	626	SC
1	BEST Core	By City		BE
1	Back to Back Pull Set	RM4200-18" Mtg-Type 5HD	US32D	RO
1	Auto Operator	5710	689	NO
1	Kick Plate	K1050 12"	US32D	RO
1	Wall Stop	406	US32D	RO
2	Full Height Actuator	639		NO
1	Latchbolt Monitor	LML-1		SU
1	Threshold	272A		PE
1	Sweep	18100CNB		PE
1	Gasketing	316APK		PE
1	Washroom sign	BF689, metal	614	RO

Hardware Set#: 2

Single: D103

4	Hinge	TA2714 NRP 4-1/2" x 4"	US26D	MK
1	Storeroom Lock	28 70 10G04 LL	US26D	SA
1	BEST Core	By City		BE
1	Door Closer	1431 O	EN	SA
1	Kick Plate	K1050 12"	US32D	RO
1	Threshold	272A		PE
1	Door Bottom	217APK		PE
1	Gasketing	316APK		PE

End of Section

PART 1 - GENERAL

1.1 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C1396/C1396M, Standard Specification for Gypsum Wallboard.
 - .2 ASTM C 475, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - .3 ASTM C 514, Specification for Nails for the Application of Gypsum Board.
 - .4 ASTM C 630/C630M, Specification for Water-Resistant Gypsum Backing Board.
 - .5 ASTM C 840, Specification for Application and Finishing of Gypsum Board.
 - .6 ASTM C 954, Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
 - .7 ASTM C 1002, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - .8 ASTM C 1047, Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - .9 ASTM C 1280, Specification for Application of Gypsum Sheathing Board.
 - .10 ASTM C 1177/C 1177M, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - .11 ASTM C 1178/C1178M, Specification for Glass Mat Water-Resistant Gypsum Backing Board.
- .2 Association of the Wall and Ceilings Industries International (AWEI)
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .4 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials in original packages, containers or bundles bearing manufacturers brand name and identification.
- .2 Store materials inside, level, under cover. Keep dry. Protect from weather, other elements and damage from construction operations and other causes.
- .3 Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal accessories and trim from being bent or damaged.

1.3 SITE ENVIRONMENTAL REQUIREMENTS

- .1 Maintain temperature minimum 10 degrees C, maximum 21 degrees C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.
- .2 Apply board and joint treatment to dry, frost free surfaces.
- .3 Ventilation: Ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Do not dispose of unused paint and caulking materials into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Standard board: to ASTM C1396/C1396M, regular, 1200 mm wide x maximum practical length, ends square cut, edges beveled.
- .2 Fire Rated board: to ASTM C 1396/C1396M, regular, 13 mm thick Type 'C', and 16 mm thick Type 'X', 1200 mm wide x maximum practical length, ends square cut, edges bevelled.
- .3 Glass mat water-resistant gypsum backing board: to ASTM C 1178/C1178M, 13 mm thick and 16 mm thick, 1200 mm wide x maximum practical length.
- .4 Glass mat gypsum substrate sheathing: to ASTM C 1177/C1177M, 13 mm thick and 16 mm thick Type 'X', 1200 mm wide x maximum practical length.
- .5 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.
- .6 Resilient drywall furring: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.
- .7 Nails: to ASTM C 514.
- .8 Casing beads, corner beads, control joints and edge trim: to ASTM C 1047, metal zinc coated by electrolytic process, 0.5 mm base thickness, perforated flanges, one piece length per location.
- .9 Sealants: in accordance with Section 07 92 10 - Joint Sealing.
- .10 Polyethylene: to CAN/CGSB-51.34, Type 2.
- .11 Insulating strip: rubberized, moisture resistant, 3mm thick closed cell neoprene strip, 12 mm wide, with self sticking permanent adhesive on one face, lengths as required.
- .12 Joint compound: to ASTM C 475, asbestos-free.

PART 3 - EXECUTION

3.1 ERECTION

- .1 Do application and finishing of gypsum board in accordance with ASTM C 840 except where specified otherwise.
- .2 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .3 Install work level to tolerance of 1:1200.
- .4 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers and grilles.
- .5 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.
- .6 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.
- .7 Install wall furring for gypsum board wall finishes in accordance with ASTM C 840, except where specified otherwise.
- .8 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
- .9 Furr duct shafts, beams, columns, pipes and exposed services where indicated.
- .10 Do application of gypsum sheathing in accordance with ASTM C 1280.

3.2 APPLICATION

- .1 Do not apply gypsum board until bucks, anchors, blocking, sound attenuation, electrical and mechanical work are approved.
- .2 Apply gypsum board to furring or framing using screw fasteners.
 - .1 Single-Layer Application:
 - .1 Apply gypsum board on ceilings prior to application of walls in accordance with ASTM C 840.
 - .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.
- .3 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes and ducts, in partitions where perimeter sealed with acoustic sealant.
- .4 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.
- .5 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.
- .6 Install gypsum board with face side out.
- .7 Do not install damaged or damp boards.
- .8 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.3 INSTALLATION

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges.
- .2 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated.
- .3 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.
- .4 Construct control joints of two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.
- .5 Provide continuous polyethylene dust barrier behind and across control joints.
- .6 Install control joints straight and true.
- .7 Construct expansion joints as detailed, at building expansion and construction joints. Provide continuous dust barrier.
- .8 Install expansion joint straight and true.
- .9 Install access doors to electrical and mechanical fixtures specified in respective sections.
 - .1 Rigidly secure frames to furring or framing systems.
- .10 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.
- .11 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with Association of the Wall and Ceiling Industries (AWCI) International Recommended Specification on Levels of Gypsum Board Finish:
 - .1 Levels of finish:
 - .1 Level 4: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and

accessories; surfaces smooth and free of tool marks and ridges.

- .12 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
- .13 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.
- .14 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .15 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.
- .16 Provide protection that ensures gypsum drywall work will remain without damage or deterioration at time of substantial completion.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 09 91 23 - Painting of Interior Surfaces.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Architectural Painting Specifications Manual, Master Painters Institute (MPI).

1.3 QUALITY ASSURANCE

- .1 Contractor shall have a minimum of five years proven satisfactory experience. When requested, provide a list of last three comparable jobs including, job name and location, specifying authority, and project manager.
- .2 Qualified journeymen who have a "Tradesman Qualification Certificate of Proficiency" shall be engaged in painting work. Apprentices may be employed provided they work under the direct supervision of a qualified journeyman in accordance with trade regulations.
- .3 Conform to latest MPI requirements for exterior painting work including preparation and priming.
- .4 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) shall be in accordance with MPI Painting Specification Manual "Approved Product" listing and shall be from a single manufacturer for each system used.
- .5 Other paint materials such as linseed oil, shellac, turpentine, etc. shall be the highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and shall be compatible with other coating materials as required.
- .6 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Contract Administrator.
- .7 Standard of Acceptance:
 - .1 Walls: No defects visible from a distance of 1000 mm at 90° to surface.
 - .2 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.4 SCHEDULING OF WORK

- .1 Submit work schedule for various stages of painting to Contract Administrator for approval. Submit schedule minimum of 48 hours in advance of proposed operations.
- .2 Schedule painting operations to prevent disruption of occupants in and about the building.

1.5 SUBMITTALS

- .1 Submit product data and manufacturer's installation/application instructions for paints and coating products to be used in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Upon completion, submit records of products used. List products in relation to finish system and include the following:
 - .1 Product name, type and use.
 - .2 Manufacturer's product number.
 - .3 Colour numbers.

1.6 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit 200 x 300 mm sample panels of each paint, stain, clear coating and special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards submitted on the following substrate materials:
 - .1 3 mm plate steel for finishes over metal surfaces.
 - .2 13 mm birch plywood for finishes over wood surfaces.
 - .3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
 - .4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.

- .3 When approved, samples shall become acceptable standard of quality for appropriate on-site surface with one of each sample retained on-site.
- .4 Submit full range of available colours where colour availability is restricted.

1.7 EXTRA MATERIALS

- .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Submit one - four litre can of each type and colour of primer, stain and finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
- .3 Deliver to Contractor and store where directed.

1.8 DELIVERY, HANDLING AND STORAGE

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver and store materials in original containers, sealed, with labels intact.
- .3 Labels shall clearly indicate:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
- .4 Remove damaged, opened and rejected materials from site.
- .5 Provide and maintain dry, temperature controlled, secure storage.
- .6 Observe manufacturer's recommendations for storage and handling.
- .7 Store materials and supplies away from heat generating devices.
- .8 Store materials and equipment in a well ventilated area with temperature range 7° C to 30° C.
- .9 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
- .10 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Contract Administrator. After completion of operations, return areas to clean condition to approval of Contract Administrator.
- .11 Remove paint materials from storage only in quantities required for same day use.
- .12 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- .13 Fire Safety Requirements:
 - .1 Provide one 4.5 kg Type ABC fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.9 SITE REQUIREMENTS

- .1 Heating, Ventilation and Lighting:
 - .1 Perform no painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10° C for 24 hours before, during and after paint application until paint has cured sufficiently.
 - .2 Where required, provide continuous ventilation for seven days after completion of application of paint.
 - .3 Coordinate use of existing ventilation system with City and ensure its operation during and after application of paint as required.
 - .4 Provide temporary ventilating and heating equipment where permanent facilities are not

- available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
- .5 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities shall be provided by General Contractor.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
- .1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer, perform no painting work when:
- .1 ambient air and substrate temperatures are below 10° C.
- .2 substrate temperature is over 32° C unless paint is specifically formulated for application at high temperatures.
- .3 substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.
- .4 the relative humidity is above 85% or when dew point is less than 3° C variance between air/surface temperature.
- .5 rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
- .2 Perform no painting work when maximum moisture content of substrate exceeds:
- .1 12% for concrete and masonry (clay and concrete brick/block).
- .2 15% for wood.
- .3 12% for plaster and gypsum board.
- .3 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple "cover patch test".
- .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Surface and Environmental Conditions:
- .1 Apply paint finish only in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
- .2 Apply paint only to adequately prepared surfaces and to surfaces within moisture limits noted herein.
- .3 Apply paint only when previous coat of paint is dry or adequately cured.
- .4 Apply paint finishes only when conditions forecast for entire period of application fall within manufacturer's recommendations.
- .5 Do not apply paint when:
- .1 Temperature is expected to drop below 10° C before paint has thoroughly cured.
- .2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
- .3 Surface to be painted is wet, damp or frosted.
- .6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.
- .7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.
- .8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.
- .9 Paint occupied facilities in accordance with approved schedule only. Schedule operations to approval of the City such that painted surfaces will have dried and cured sufficiently before occupants are affected.

1.10 WASTE MANAGEMENT AND DISPOSAL

- .1 Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
- .2 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

- .3 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:
 - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
 - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 - .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - .4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
 - .5 Empty paint cans are to be dry prior to disposal or recycling (where available).
- .4 Close and seal tightly partly used sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Paint materials listed in the latest edition of the MPI Approved Products List (APL) are acceptable for use on this project.
- .2 Paint materials for paint systems shall be products of a single manufacturer.
- .3 Water-borne surface coatings must be manufactured and transported in a manner that steps of processes, including disposal of waste products arising therefrom, will meet requirements of applicable governmental acts, by-laws and regulations including, for facilities located in Canada, Fisheries Act and Canadian Environmental Protection Act (CEPA).
- .4 The following must be performed on each batch of consolidated post-consumer material before surface coating is reformulated and canned. These tests must be performed at a laboratory or facility which has been accredited by the Standards Council of Canada.
 - .1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
 - .2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
 - .3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

2.2 COLOURS

- .1 Contract Administrator will provide Colour Schedule after Contract award.
- .2 Colour schedule will be based upon selection of three base colours and two accent colours. No more than five colours will be selected for the entire project.
- .3 Selection of colours will be from manufacturers full range of colours.
- .4 Where specific products are available in a restricted range of colours, selection will be based on the limited range.
- .5 Second coat in a three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site.
- .2 Paste, powder or catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.
- .3 Where thinner is used, addition shall not exceed paint manufacturer's recommendations. Do not use kerosene or any such organic solvents to thin water-based paints.
- .4 Thin paint for spraying according in strict accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy

of instructions to Contract Administrator.

- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

- .1 Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following values:

<u>Gloss Level</u>	<u>Category</u>	<u>Units @ 60°</u>	<u>Units @ 60°</u>
G1	- matte finish	0 to 5	max. 10
G2	- velvet finish	0 to 10	10 to 35
G3	- eggshell finish	10 to 25	10 to 35
G4	- satin finish	20 to 35	min. 35
G5	- semi gloss	35 to 70	
G6	- gloss finish	70 to 85	
G7	- high gloss finish	> 85	

- .2 Gloss level ratings of painted surfaces as noted on Finish Schedule.

2.5 EXTERIOR PAINTING SYSTEMS

- .1 Structural Steel and Metal Fabrications
 - .1 EXT 5.1D - Alkyd (over alkyd primer).
- .2 Galvanized Metal: not chromate passivated
 - .1 EXT 5.3A - Latex Gloss Level 5 finish.

PART 3 - EXECUTION

3.1 GENERAL

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

3.2 EXISTING CONDITIONS

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Contract Administrator damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test" and report findings to Contract Administrator. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
- .3 Maximum moisture content as follows:
 - .1 Wood: 15%.

3.3 PROTECTION

- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Contract Administrator.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.
- .4 Protect passing pedestrians, building occupants and general public in and about the building.
- .5 Removal of light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings shall be done prior to undertaking painting operations by General Contractor. Items shall be securely stored and re-installed after painting is completed by General Contractor.

- .6 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
- .7 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas to approval of Contract Administrator.

3.4 CLEANING AND PREPARATION

- .1 Clean and prepare exterior surfaces in accordance with MPI Painting Specification Manual requirements. Refer to the MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and other surface debris by brushing, wiping with dry, clean cloths or compressed air.
 - .2 Wash surfaces with a biodegradable detergent (and bleach where applicable) and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and allow to dry thoroughly.
 - .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
 - .6 Use trigger operated spray nozzles for water hoses.
 - .7 Many water-based paints cannot be removed with water once dried. However, minimize the use of kerosene or any such organic solvents to clean up water-based paints.
- .2 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .3 Where possible, prime surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
 - .2 Apply wood filler to nail holes and cracks.
 - .3 Tint filler to match stains for stained woodwork.
- .4 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .5 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes.
- .6 Touch up of shop primers with primer as specified in applicable section. Major touch-up including cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas, shall be by supplier of fabricated material.

3.5 APPLICATION

- .1 Method of application to be as approved by Contract Administrator. Apply paint by brush, roller, or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:
 - .1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Contract Administrator.
 - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray Application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 - .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

- .3 Apply paint in a uniform layer, with overlapping at edges of spray pattern.
- .4 Brush out immediately runs and sags.
- .5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.
- .4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access and only when specifically authorized by Contract Administrator.
- .5 Apply coats of paint as a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .7 Sand and dust between coats to remove visible defects.
- .8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.
- .9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

- .1 Unless otherwise specified, paint exterior exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise.
- .2 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- .3 Do not paint over nameplates.
- .4 Paint fire protection piping red.
- .5 Paint steel electrical light standards. Do not paint outdoor transformers and substation equipment.

3.7 RESTORATION

- .1 Clean and re-install all hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashing's on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .4 Protect freshly completed surfaces from paint droppings and dust to approval of Contract Administrator. Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Contract Administrator.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 09 91 13 – Exterior Painting

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Architectural Painting Specifications Manual, Master Painters Institute (MPI).

1.3 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Contractor: minimum of five years proven satisfactory experience. Provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
 - .2 Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
 - .3 Apprentices: working under direct supervision of qualified trades person in accordance with trade regulations.

1.4 SCHEDULING

- .1 Submit work schedule for various stages of painting to Contract Administrator for review. Submit schedule minimum of 48 hours in advance of proposed operations.
- .2 Schedule painting operations to prevent disruption of occupants.

1.5 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit product data and instructions for each paint and coating product to be used.
 - .2 Submit product data for the use and application of paint thinner.
- .3 Samples:
 - .1 Submit full range colour sample chips to indicate where colour availability is restricted.
 - .2 Submit 200 x 300mm sample panels of each paint, stain, clear coating and special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
 - .1 3 mm plate steel for finishes over metal surfaces.
 - .2 13 mm birch plywood for finishes over wood surfaces.
 - .3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
 - .4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
 - .3 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:
 - .1 Product name, type and use.
 - .2 Manufacturer's product number.
 - .3 Colour numbers.

1.6 MAINTENANCE

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

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:

- .1 Pack, ship, handle and unload materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.
- .2 Acceptance at Site:
 - .1 Identify products and materials with labels indicating:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
- .3 Remove damaged, opened and rejected materials from site.
- .4 Storage and Protection:
 - .1 Provide and maintain dry, temperature controlled, secure storage.
 - .2 Store materials and supplies away from heat generating devices.
 - .3 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
- .5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
- .6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.
- .7 Remove paint materials from storage only in quantities required for same day use.
- .8 Fire Safety Requirements:
 - .1 Provide one 4.5 kg Type ABC fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.
- .9 Waste Management and Disposal:
 - .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .2 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
 - .3 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
 - .4 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
 - .5 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:
 - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
 - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 - .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - .4 Dispose of contaminants in approved legal manner in accordance with hazardous waste regulations.
 - .5 Empty paint cans are to be dry prior to disposal or recycling (where available).

1.8 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
 - .1 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
 - .2 Provide continuous ventilation for seven days after completion of application of paint.
 - .3 Provide temporary ventilating and heating equipment where permanent facilities are not

- available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
- .4 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
- .1 Unless pre-approved written approval by product manufacturer, perform no painting when:
 - .1 Ambient air and substrate temperatures are below 10 degrees C.
 - .2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
 - .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
 - .4 The relative humidity is under 85% or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
 - .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
 - .6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.
 - .2 Perform painting work when maximum moisture content of the substrate is below:
 - .1 Allow new concrete and masonry to cure minimum of 28 days.
 - .2 15% for wood.
 - .3 12% for plaster and gypsum board.
 - .3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".
 - .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Surface and Environmental Conditions:
- .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
 - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
 - .3 Apply paint when previous coat of paint is dry or adequately cured.
- .4 Additional interior application requirements:
- .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
 - .2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of City such that painted surfaces will have dried and cured sufficiently before occupants are affected.

1.9 EXTRA MATERIALS

- .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Submit one - four litre can of each type and colour of primer, stain and finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
- .3 Deliver to Contractor and store where directed.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
- .2 Provide paint materials for paint systems from single manufacturer.
- .3 Conform to latest MPI requirements for interior painting work including preparation and priming.

- .4 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.
- .5 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.

2.2 COLOURS

- .1 Contract Administrator will provide Colour Schedule after Contract award.
- .2 Colour schedule will be based upon selection of two base colours and three accent colours. No more than six colours will be selected for entire project.
- .3 Selection of colours from manufacturers full range of colours.
- .4 Where specific products are available in restricted range of colours, selection based on limited range.
- .5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site.
- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.
- .4 Thin paint for spraying in accordance with paint manufacturer's instructions.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

- .1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

<u>Gloss Level Category</u>	<u>Units @ 60°</u>	<u>Units @ 60°</u>
G1 - matte finish	0 to 5	max. 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	min. 35
G5 - semi gloss	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	> 85	

- .2 Gloss level ratings of painted surfaces as indicated and as noted on Finish Schedule.

2.5 INTERIOR PAINTING SYSTEMS

- .1 Concrete masonry units: smooth and split face block and brick:
 - .1 Clear acrylic sealer - 43700 Aquaseal as manufactured by Cloverdale or approved equal.
- .2 Structural steel and metal fabrications: columns, beams, joists:
 - .1 INT 5.1Q - Latex Gloss Level 5 finish (over alkyd primer). Premium Grade.
- .3 Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts.
 - .1 INT 5.3A - Latex Gloss Level 5 finish. Premium Grade.
- .4 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
 - .1 INT 9.2A - Latex Gloss Level 3 finish (over latex sealer). Premium Grade.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

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

3.3 EXAMINATION

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Contract Administrator damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
- .3 Maximum moisture content as follows:
 - .1 Stucco, plaster and gypsum board: 12%.
 - .2 Clay and Concrete Block/Brick: 12%.
 - .3 Wood: 15%.

3.4 PREPARATION

- .1 Protection:
 - .1 Protect existing building surfaces and adjacent structures from paint splatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Contract Administrator.
 - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
 - .3 Protect factory finished products and equipment.
 - .4 Protect passing pedestrians, building occupants and general public in and about the building.
- .2 Surface Preparation:
 - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
 - .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
 - .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of City.
- .3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and other surface debris by vacuuming, or wiping with dry, clean cloths.
 - .2 Wash surfaces with a biodegradable detergent and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and allow to dry thoroughly.
 - .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
 - .6 Use trigger operated spray nozzles for water hoses.
 - .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.
- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats.

- Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
 - .2 Apply wood filler to nail holes and cracks.
 - .3 Tint filler to match stains for stained woodwork.
 - .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
 - .7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes.
 - .8 Touch up of shop primers with primer as specified.

3.5 APPLICATION

- .1 Method of application to be as approved by Contract Administrator. Apply paint by brush, roller or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:
 - .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
 - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 - .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
 - .3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
 - .4 Brush out immediately all runs and sags.
 - .5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.
- .4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.
- .5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .7 Sand and dust between coats to remove visible defects.
- .8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .9 Finish inside of cupboards and cabinets as specified for outside surfaces.
- .10 Finish closets and alcoves as specified for adjoining rooms.
- .11 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

- .1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.
- .2 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .3 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- .4 Do not paint over nameplates.
- .5 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.
- .6 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .7 Do not paint interior transformers and substation equipment.

3.7 SITE TOLERANCES

- .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
- .2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
- .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.8 RESTORATION

- .1 Clean and re-install hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashing's on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .4 Protect freshly completed surfaces from paint droppings and dust to approval of Contract Administrator. Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Contract Administrator.

End of Section

PART 1 - GENERAL

1.1 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings, product data and catalogue illustrations in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate materials, thicknesses, sizes, finishes, colours, construction details, removable and interchangeable components, mounting methods and schedule of signs.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Aluminum: 5052 Alloy.
- .2 Welding materials: to CSA W59.
- .3 Solder: to ASTM B32, Type Sn50.
- .4 Adhesives, paints, sealants and solvents for sheet: type recommended by sheet manufacturer for applicable condition.
- .5 Acrylic top-coat: clear, non-yellowing, exterior grade, satin finish, acrylic polyester resin protective coating, compatible with metal surface of type recommended by sheet manufacturer.
- .6 Bituminous paint: to MPI EXT 5.4D.

2.2 CUT-OUT LETTERS

- .1 Flat Cut-Out metal letters from aluminum sheet.
- .2 Sizes and letters: Letters sized to be 356, 200 or 125mm, as indicated on exterior elevations. Font to be Helvetica.
- .3 Finish: Aluminum – Clear Anodized, 6061 Alloy, bead-blasted returns process meets A43 Aluminum Architectural grad anodized finish (8.1mm) no clear coat.
- .4 Mounting: stud mounted into wood cladding, 13mm metal spacer sleeve offset.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Erect and install letters plumb and level as per the drawings.
- .2 Mechanical attachment, as per manufacturer's written instructions, specific to wall type at letter locations.
- .3 Allow for thermal movement without distortion of components.
- .4 Exposed fasteners are not permitted.

3.2 CLEANING

- .1 Leave signs clean.
- .2 Touch up any damaged finishes.

End of Section

PART 1 - GENERAL

1.1 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM A 167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM B 456, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
 - .3 ASTM A 653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .4 ASTM A 924/A924M, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.81, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
 - .2 CAN/CGSB-1.88, Gloss Alkyd Enamel, Air Drying and Baking.
 - .4 CGSB 31-GP-107Ma, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.
- .3 Canadian Standards Association (CSA)
 - .1 CAN/CSA-B651, Barrier-Free Design.
 - .2 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.2 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, and building-in details of anchors for grab bars.

1.3 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 EXTRA MATERIALS

- .1 Provide special tools required for accessing, assembly/disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.
- .2 Deliver special tools to City.

PART 2 - PRODUCTS

2.1 COMPONENTS

- .1 Toilet tissue dispenser: surface mounted, dual coreless jumbo roll, 22 gauge stainless steel.
 - .1 Acceptable material: Bradley 5426-11 or approved equal in accordance with B7.
- .2 Security towel hook: 14 gauge stainless steel backplate with satin finish and tamper resistant mounting screws. Stainless steel safety hook with pivoting ball joint that releases when more than 20 lbs of force is applied.
 - .1 Acceptable materials: Bradley SA36, Bobrick B-983, ASI B-123 or approved equal in accordance with B7.
- .3 Hand Dryer: 22 gauge satin finish stainless steel cover, automatic operation.
 - .1 Acceptable materials: Bradley 2902-287400, Bobrick B-7128, ASI 0185 or approved equal in accordance with B7.
- .4 Sanitary Napkin Disposal: surface mounted, satin finish stainless steel
 - .1 Acceptable material: Bradley 4781-15, Bobrick B-270, ASI 20852 or approved equal in accordance with B7.

- .5 Mirrors: 20 gauge bright annealed stainless steel c/w tamper resistant mounting screws
 - .1 Acceptable material: Bradley, 7481 series 610mm x 915mm, ASI8026 or approved equal in accordance with B7.
- .6 Soap Dispenser: surface mounted vertical type, 20 gauge stainless steel construction
 - .1 Acceptable material: Bradley 6562, Bobrick B-2111, ASI 0347 or approved equal in accordance with B7.
- .7 Grab Bars: 32mm x 915mm and 32mm x 610mm concealed mounted grab bar: wall tubing stainless steel, 76 mm diameter wall flanges, concealed screw attachment, flanges welded to tubular bar, provided with steel back plates and all accessories. Grab bar material and anchorage to withstand downward pull of 2.2 kN. Check drawings for length, degree of slope, bends and locations.
 - .1 Acceptable material: Bradley 832 series, Bobrick B-5806 series, ASI 3700 Series or approved equal in accordance with B7.
- .8 Mop and Broom Holder: Type 304 stainless steel, 915mm wide, satin finish with spring loaded, rubber cam, anti slip mop holders.
 - .1 Acceptable material: Bradley 9953, Bobrick B-223 x 36, ASI 8215 or approved equal in accordance with B7.
- .9 Waste Receptacle: 22 gauge stainless steel, 356mm wide x 457mm high x 152mm deep, 6.5 gallon capacity. Fasten to wall with tamper resistant mounting screws. Provide vinyl liner.
 - .1 Acceptable material: Bradley 357, Bobrick B-279, ASI 0828 or approved equal in accordance with B7.

2.2 FABRICATION

- .1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.
- .2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.
- .3 Brake form sheet metal work with 1.5 mm radius bends.
- .4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- .5 Back paint components where contact is made with building finishes to prevent electrolysis.
- .6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CSA G164.
- .7 Shop assemble components and package complete with anchors and fittings.
- .8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.
- .9 Provide steel anchor plates and components for installation on studding and building framing.

2.3 FINISHES

- .1 Chrome and nickel plating: to ASTM B 456, satin finish.
- .2 Baked enamel: condition metal by applying one coat of metal conditioner to CGSB 31-GP-107Ma, apply one coat Type 2 primer to CAN/CGSB-1.81 and bake, apply two coats Type 2 enamel to CAN/CGSB-1.88 and bake to hard, durable finish. Sand between final coats. Colour selected from standard range by Contract Administrator.
- .3 Manufacturer's or brand names on face of units not acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install and secure accessories rigidly in place as follows:
 - .1 Masonry walls: install as per manufacturer's recommendation.
- .2 Use tamper proof screws/bolts for fasteners.

-
- .3 Fill units with necessary supplies shortly before final acceptance of building.

3.2 SCHEDULE

- .1 Toilet tissue dispenser: one per toilet fixture.
- .2 Security towel hook: one per washroom.
- .3 Hand Dryer: one per washroom.
- .4 Napkin Receptacle: one per washroom.
- .5 Mirror: one per washroom.
- .6 Soap Dispenser: one per washroom.
- .7 Grab bars: one 610mm and two 915mm per toilet fixture.
- .8 Mop and Broom Holder: one per Building Services room.
- .9 Waste Receptacle: one per washroom.

End of Section

PART 1 - GENERAL

1.1 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American National Standards Institute (ANSI)
 - .1 ANSI/NFPA 10, Portable Fire Extinguishers.
- .2 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S508, Rating and Fire Testing of Fire Extinguishers and Class "D" Extinguishing Media.

1.2 SHOP DRAWINGS AND PRODUCT DATA

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

1.3 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

PART 2 - PRODUCTS

2.1 MULTI-PURPOSE DRY CHEMICAL EXTINGUISHERS

- .1 Stored pressure rechargeable type with hose and shut-off nozzle, ULC labeled for A, B and C class protection. Size 4.5 kg.

2.2 EXTINGUISHER BRACKETS

- .1 Type recommended by extinguisher manufacturer.

2.3 IDENTIFICATION

- .1 Identify extinguishers in accordance with recommendations of ANSI/NFPA 10.
- .2 Attach tag or label to extinguishers, indicating month and year of installation. Provide space for service dates.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install or mount extinguishers in cabinets or on brackets as indicated.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 30 00 – Cast-in-Place Concrete.
- .2 Section 32 11 19 – Granular Sub-base.
- .3 Section 32 11 23 – Granular Base.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D 4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.3 SAMPLES

- .1 If requested, submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide Contract Administrator with access to source and processed material for sampling.
- .3 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused granular materials from landfill to local facility as approved by Contract Administrator.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D 4791.
 - .1 Greatest dimension to exceed five times least dimension.
- .3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
 - .1 Natural sand.
 - .2 Manufactured sand.
 - .3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
- .4 Coarse aggregates satisfying requirements of applicable section to be one of, or blend of, following:
 - .1 Crushed rock.
 - .2 Gravel composed of naturally formed particles of stone.
 - .3 Light weight aggregate, including slag and expanded shale.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Topsoil stripping
 - .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
 - .2 Begin topsoil stripping of areas as indicated after area has been cleared of brush, weeds and grasses and removed from site.
 - .3 Strip topsoil to depths as directed by Contract Administrator. Avoid mixing topsoil with subsoil.
 - .4 Stockpile in locations as Contract Administrator. Stockpile height not to exceed 3.0m.
- .2 Aggregate source preparation

- .1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as approved by authority having jurisdiction.
- .2 Where clearing is required, leave screen of trees between cleared area and roadways as directed.
- .3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
- .4 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.
- .5 Trim off and dress slopes of waste material piles and leave site in neat condition.
- .3 Processing
 - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
 - .2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Contract Administrator.
 - .3 Wash aggregates, if required to meet specifications. Use only equipment approved by Contract Administrator.
 - .4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.
- .4 Handling
 - .1 Handle and transport aggregates to avoid segregation, contamination and degradation.
- .5 Stockpiling
 - .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Contract Administrator. Do not stockpile on completed pavement surfaces.
 - .2 Stockpile aggregates in sufficient quantities to meet Project schedules.
 - .3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
 - .4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 100 mm of pile into Work.
 - .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
 - .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Contract Administrator within 48 h of rejection.
 - .7 Stockpile materials in uniform layers of thickness as follows:
 - .1 Max 1.5 m for coarse aggregate and base course materials.
 - .2 Max 1.5 m for fine aggregate and sub-base materials.
 - .3 Max 1.5 m for other materials.
 - .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
 - .9 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 CLEANING

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 Leave any unused aggregates in neat compact stockpiles as directed by Contract Administrator.
- .3 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 23 10 - Excavation, Trenching and Backfill.

1.2 DEFINITIONS

- .1 Clearing consists of cutting off trees and brush vegetative growth to not more than a specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.
- .2 Close-cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.
- .3 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.
- .4 Underbrush clearing consists of removal from treed areas of undergrowth, deadwood, and trees smaller than 50 mm trunk diameter and disposing of all fallen timber and surface debris.
- .5 Grubbing consists of excavation and disposal of stumps and roots and boulders and rock fragments to not less than a specified depth below existing ground surface.

1.3 STORAGE AND PROTECTION

- .1 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, existing paved areas, utility lines, site appurtenances, root systems of trees, which are to remain.
 - .1 Repair any damaged items to approval of Contract Administrator.
 - .2 Replace any trees designated to remain, if damaged, as directed by Contract Administrator.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 not applicable

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Inspect site and verify with Contract Administrator, items designated to remain.
- .2 Locate and protect utility lines. Preserve in operating condition active utilities traversing site.
- .3 Notify utility authorities before starting clearing and grubbing.

3.2 CLEARING

- .1 Clear as indicated by Contract Administrator, by cutting at a height of not more than 300 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above ground surface.
- .2 Cut off branches and cut down trees overhanging area cleared as directed by Contract Administrator.

3.3 CLOSE CUT CLEARING

- .1 Close cut clearing to within 100 mm of ground surface.
- .2 Cut off branches overhanging area cleared as directed by Contract Administrator.

3.4 UNDERBRUSH CLEARING

- .1 Clear underbrush from areas as indicated to within 300 mm of ground surface.

3.5 GRUBBING

- .1 Grub out stumps and roots from areas indicated to not less than 200 mm below ground surface.
- .2 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension.

3.6 REMOVAL AND DISPOSAL

- .1 Remove cleared and grubbed materials off site.

3.7 FINISHED SURFACE

- .1 Leave ground surface in condition suitable for stripping of topsoil to approval of Contract Administrator.

End of Section

PART 1 - GENERAL

1.1 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 Canadian Standard Association (CSA)
 - .1 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.

1.2 SOIL REPORT

- .1 Examine soil report attached to this specification document.

1.3 REGULATIONS

- .1 Shore and brace excavations, protect slopes and banks and perform all work in accordance with Provincial and Municipal regulations whichever is more stringent.

1.4 TESTS AND INSPECTIONS

- .1 Testing of materials and compaction of backfill and fill will be carried out by testing laboratory designated by Contract Administrator.
- .2 Do not begin backfilling or filling operations until material has been approved for use by Contract Administrator.
- .3 Not later than 48 hours before backfilling or filling with approved material, notify Contract Administrator so that compaction tests can be carried out by designated testing agency.
- .4 Before commencing work, conduct, with Contract Administrator, condition survey of existing structures, trees and other plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.

1.5 BURIED SERVICES

- .1 Before commencing work establish the location of all buried services on and adjacent to the site.
- .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.
- .3 Remove obsolete buried services within 2 m of foundations. Cap cut-offs.

1.6 PROTECTION

- .1 Protect excavations from freezing.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Contract Administrator's approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .5 Protect buried services that are required to remain undisturbed.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Granular A.

PART 3 - EXECUTION

3.1 CLEARING AND GRUBBING

- .1 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant

- material, exposed boulders and debris within areas designated on drawings.
- .2 Remove stumps and tree roots below slabs, and paving, and to 600 mm below finished grade elsewhere.
 - .3 Dispose of cleared and grubbed material off site daily to disposal areas acceptable to authority having jurisdiction.

3.2 EXCAVATION

- .1 Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil. Stockpile topsoil on site for later use.
- .2 Excavate as required to carry out work, in all materials met. Do not disturb soil or rock below bearing surfaces. Notify Contract Administrator when excavations are complete.
- .3 Excavate trenches to provide uniform continuous bearing and support for 150mm thickness of pipe bedding material on solid and undisturbed ground. Trench widths below point 150mm above pipe not to exceed diameter of pipe plus 600 mm.
- .4 Excavate for slabs and paving to subgrade levels. In addition, remove all topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

3.3 BACKFILLING

- .1 Inspection: do not commence backfilling until fill material and spaces to be filled have been inspected and approved by Contract Administrator.
- .2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.
- .3 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.
- .4 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as specified for fill. Fill excavated areas with gravel and sand compacted as specified for fill.
- .5 Placing:
 - .1 Place backfill, fill and basecourse material in 150 mm lifts. Add water as required to achieve specified density.
- .6 Compaction: compact each layer of material to following densities for material to ASTM D 698:
 - .1 To underside of basecourses: 95%.
 - .2 Basecourses: 100%.
 - .3 Elsewhere: 90%.
- .7 Under slabs and paving:
 - .1 Use 150 mm up to bottom of granular base courses.
 - .2 Use 150 mm for base courses.
- .8 In trenches:
 - .1 Up to 300 mm above pipe or conduit: sand placed by hand.
 - .2 Over 300 mm above pipe or conduit: native material approved by Contract Administrator.
- .9 Under seeded and sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.
- .10 Against foundations (except as applicable to trenches and under slabs and paving): excavated material or imported material with no stones larger than 200 mm diameter within 600 mm of structures.

3.4 GRADING

- .1 Grade so that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by the Contract Administrator. Grade to be gradual between finished spot elevations shown on drawings.

3.5 SHORTAGE AND SURPLUS

- .1 Supply all necessary fill to meet backfilling and grading requirements and with minimum and maximum rough grade variance.
- .2 Dispose of surplus material off site.

End of Section

PART 1 - GENERAL

1.1 NOT USED

- .1 Not Used.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 STRIPPING OF TOPSOIL

- .1 Remove topsoil before any construction procedures commence to avoid compaction of topsoil.
- .2 Handle topsoil only when it is dry and warm.
- .3 Remove vegetation from targeted areas by non-chemical means and dispose of stripped vegetation by alternative disposal.
- .4 Remove brush from targeted area by non-chemical means and dispose of through mulching.
- .5 Strip topsoil to depths as directed by Contract Administrator. Avoid mixing topsoil with subsoil.
- .6 Pile topsoil by mechanical hoe in berms in locations as directed by Contract Administrator. Stockpile height not to exceed 3.0m.
- .7 Dispose of unused topsoil in location as indicated by Contract Administrator for later use.
- .8 Protect stockpiles from contamination and compaction.
- .9 Topsoil that has been piled for long term storage will be covered with trefoil or grass to maintain agricultural potential of soil.

3.2 PREPARATION OF GRADE

- .1 Verify that grades are correct. If discrepancies occur, notify Contract Administrator and do not commence work until instructed by Contract Administrator.
 - .1 Grade area only when soil is dry to lessen soil compaction.
 - .2 Grade soil establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 05 17 - Aggregate Materials.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 117, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D 422-63, Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D 4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

1.3 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock: any solid material in excess of 0.25m and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m³ bucket. Frozen material not classified as rock.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .3 Topsoil:
 - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
 - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25mm in any dimension.
- .4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .6 Unsuitable materials:
 - .1 Weak, chemically unstable, and compressible materials.
 - .2 Frost susceptible materials:
 - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136: Sieve sizes to CAN/CGSB-8.2.
 - .2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45
 - .3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.

1.4 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Preconstruction Submittals:
 - .1 Submit records of underground utility locates, indicating: location plan of existing utilities as found in field, clearance record from utility authority, location plan of relocated and abandoned services, as required.
- .3 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures if requested.
 - .2 Submit ten (10) kg samples of type of fill specified including representative samples of excavated material upon request of Contract Administrator.
 - .3 Ship samples prepaid to Contract Administrator, in tightly closed containers to prevent contamination and exposure to elements.

1.5 QUALITY ASSURANCE

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Storage and Protection:
 - .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.
 - .2 Existing buried utilities and structures:
 - .1 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .2 Prior to beginning excavation Work, notify City and applicable authorities having jurisdiction, establish location and state of use of buried utilities and structures. City and authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
 - .3 Confirm locations of buried utilities by careful test excavations.
 - .4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
 - .5 Where utility lines or structures exist in area of excavation, obtain direction of utility before removing or re-routing.
 - .6 Record location of maintained, re-routed and abandoned underground lines.
 - .3 Existing buildings and surface features:
 - .1 Conduct, with Contract Administrator, condition survey of existing service poles, wires and survey bench marks which may be affected by Work.
 - .2 Protect existing buildings and surface features on adjacent properties from damage while Work is in progress. In event of damage, inform Contract Administrator immediately.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Type 1 and Type 2 fill: properties to Section 31 05 17 - Aggregate Materials and the following requirements:
 - .1 Crushed, pit run or screened stone, gravel or sand.
 - .2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.
 - .3 Table:

Sieve Designation	% Passing		Sieve Designation	% Passing	
	Type 1	Type 2		Type 1	Type 2
75mm	-	100	9.5mm	50-100	-
50mm	-	-	4.75mm	30-70	22-85
37.5mm	-	-	2.00mm	20-45	-
25mm	100	-	0.425mm	10-25	5-30
19mm	75-100	-	0.180mm	-	-
12.5mm	-	-	0.075mm	3-8	0-10

- .2 Type 3 fill: selected material from excavation or other sources, approved by Contract Administrator for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .3 Shearmat: honeycomb type bio-degradable cardboard 150mm thick, treated to provide sufficient structural support for poured concrete until concrete cured.
- .4 Polyethylene: 0.254mm thick
- .5 Void form: Aerofoam Type I insulation.
- .6 Pea Gravel: clean, round stone of uniform 9.5mm size.

PART 3 - EXECUTION

3.1 SITE PREPARATION

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

3.2 STRIPPING OF TOPSOIL

- .1 Begin topsoil stripping of areas as indicated after area has been cleared of brush, weeds, and grasses and removed from site.
- .2 Strip topsoil to depths as indicated as indicated. Do not mix topsoil with subsoil.
- .3 Stockpile in locations as directed by Contract Administrator. Stockpile height not to exceed 3.0 m and should be protected from erosion.
- .4 Dispose of unused topsoil off site.

3.3 STOCKPILING

- .1 Stockpile fill materials in areas designated by Contract Administrator. Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
- .3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.4 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.

3.5 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as indicated.
- .2 Remove concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation.
- .3 For trench excavation, unless otherwise authorized by Contract Administrator in writing, do not excavate more than 30m of trench in advance of installation operations and do not leave open more than 15m at end of day's operation.
- .4 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Contract Administrator.
- .5 Restrict vehicle operations directly adjacent to open trenches.
- .6 Dispose of surplus and unsuitable excavated material off site.
- .7 Do not obstruct flow of surface drainage or natural watercourses.
- .8 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .9 Notify Contract Administrator when bottom of excavation is reached.

- .10 Obtain Contract Administrator approval of completed excavation.
- .11 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Contract Administrator.
- .12 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with concrete specified for footings.
 - .2 Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.
- .13 Hand trim, make firm and remove loose material and debris from excavations.
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

3.6 FILL TYPES AND COMPACTION

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D 698.
 - .1 Exterior side of perimeter walls: use Type 3 fill to subgrade level. Compact to 95% of corrected maximum dry density.
 - .2 Within building area: use Type 2 to underside of base course for floor slabs. Compact to 100% of corrected maximum dry density.
 - .3 Under concrete slabs: provide 150mm compacted thickness base course of Type 1 fill to underside of slab. Compact base course to 100%.
 - .4 Retaining walls: use Type 3 fill to subgrade level on high side for minimum 500mm from wall and compact to 85%.

3.7 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Place and compact granular material for bedding and surround of underground services as indicated.
- .2 Place bedding and surround material in unfrozen condition.

3.8 BACKFILLING

- .1 No machine tracks or vehicular tires are allowed within 1.8m of foundation walls. All backfill within 1.8m of foundation wall shall be placed in maximum 300mm lifts and compacted to maximum 95% Standard Proctor density with light duty, hand-operated plate compactors.
- .2 Do not proceed with backfilling operations until completion of following:
 - .1 Contract Administrator has inspected and approved installations.
 - .2 Contract Administrator has inspected and approved of construction below finish grade.
 - .3 Inspection, testing, approval, and recording location of underground utilities.
 - .4 Removal of concrete formwork.
 - .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .4 Do not use backfill material which is frozen or contains ice, snow or debris.
- .5 Place backfill material in uniform layers not exceeding 150mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .6 Backfilling around installations.
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within 72 hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 0.6 m.
 - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Contract Administrator or:

- .2 If approved by Contract Administrator, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Contract Administrator.
- .7 Install drainage filter system in backfill as indicated.

3.9 RESTORATION

- .1 Replace topsoil as indicated.
- .2 Reinstate lawns to elevation which existed before excavation.
- .3 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .4 Clean and reinstate areas affected by Work as directed by Contract Administrator.
- .5 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 11 00 - Clearing and Grubbing.
- .2 Section 31 23 10 - Excavation, Trenching and Backfill.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D 698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).

1.3 EXISTING CONDITIONS

- .1 Examine subsurface investigation report which is bound into this specification document.
- .2 Known underground and surface utility lines and buried objects are as indicated on site plan.
- .3 Refer to dewatering in Section 31 23 10 – Excavating, Trenching and Backfill.

1.4 PROTECTION

- .1 Protect and/or transplant existing fencing, trees, landscaping, natural features, bench marks, buildings, pavement, surface or underground utility lines which are to remain as directed by Contract Administrator. If damaged, restore to original or better condition unless directed otherwise.
- .2 Maintain access roads to prevent accumulation of construction related debris on roads.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 not used.

PART 3 - EXECUTION

3.1 STRIPPING OF TOPSOIL

- .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected as determined by Contract Administrator.
- .2 Commence topsoil stripping of areas as indicated after area has been cleared of brush, weeds and grasses and removed from site.
- .3 Rototill weeds and grasses in stripped topsoil and retain as topsoil on site. Avoid mixing topsoil with subsoil.
- .4 Dispose of unused topsoil off site.

3.2 GRADING

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Rough grade to following depths below finish grades:
 - .1 150 mm for grassed areas.
 - .2 375 mm for asphalt paving.
 - .3 250 mm for concrete walks.
- .3 Slope rough grade away from building 1:50 minimum.
- .4 Grade ditches to depth as indicated.
- .5 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and

existing surface at approximately same moisture content to facilitate bonding.

- .6 Compact filled and disturbed areas to maximum dry density to ASTM D 698, as per recommendations in soils report attached to this specification document.

3.3 SURPLUS MATERIAL

- .1 Remove surplus material and material unsuitable for fill, grading or landscaping off site.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 05 17 - Aggregate Materials.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 117, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .3 ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM D 422-63, Standard Test Method for Particle-Size Analysis of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused granular material from landfill to local quarry as approved by Contract Administrator.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Granular sub-base material: in accordance with Section 31 05 17 - Aggregate Materials and following requirements:
 - .1 Crushed, pit run or screened stone, gravel or sand.
 - .2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.2.
 - .3 Table

Sieve Designation	% Passing			
100mm	-	-	-	-
75mm	100	100	100	-
50mm	-	-	-	100
37.5mm	-	-	-	-
25mm	55-100	-	-	60-100
19mm	-	-	-	-
12.5mm	-	-	-	38-70
9.5mm	-	-	-	-
4.75mm	25-100	25-85	-	22-55
2.00mm	15-80	-	-	13-42
0.425mm	4-50	5-30	0-30	5-28
0.180mm	-	-	-	-
0.075mm	0-8	0-10	0-8	2-10

- .4 Other Properties as follows:
 - .1 Liquid Limit: to ASTM D 4318, Maximum 25.
 - .2 Plasticity Index: to ASTM D 4318, Maximum 6.
 - .3 Los Angeles degradation: to ASTM C 131. Max% Loss by mass: 40.

PART 3 - EXECUTION

3.1 PLACING

- .1 Place granular sub-base after subgrade is inspected and approved by Contract Administrator.
- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Place granular sub-base materials using methods which do not lead to segregation or degradation.
- .6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Contract Administrator may authorize thicker lifts (layers) if specified compaction can be achieved.
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .8 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 98% corrected maximum dry density.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Contract Administrator.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 SITE TOLERANCES

- .1 Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

3.4 PROTECTION

- .1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Contract Administrator.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 05 17 - Aggregate Materials.
- .2 Section 32 11 19 - Granular Sub-base.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 117, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .3 ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
 - .5 ASTM D 4318, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

1.3 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver and stockpile aggregates in accordance with Section 31 05 17 - Aggregate Materials. Stockpile minimum 50% of total aggregate required prior to beginning operation.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused granular material from landfill to local quarry as approved by Contract Administrator.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Granular base: material in accordance with Section 31 05 17 - Aggregate Materials and following requirements:
 - .1 Crushed stone or gravel.
 - .2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.2.
 - .1 Gradation Method # 1 to:

Sieve Designation	% Passing		
	(1)	(2)	(3)
100mm	-	-	-
75mm	-	-	-
50mm	100	-	-
37.5mm	70-100	-	-
25.0mm	-	100	-
19.0mm	50-75	-	100
12.5mm	-	65-100	70-100
9.5mm	40-65	-	-
4.75mm	30-50	35-60	40-70
2.00mm	-	22-45	23-50
0.425mm	10-30	10-25	7-25
0.180mm	-	-	-
0.075mm	3-8	3-8	3-8

PART 3 - EXECUTION

3.1 SEQUENCE OF OPERATION

- .1 Place granular base after sub-base surface is inspected and approved by Contract Administrator.
- .2 Placing
 - .1 Construct granular base to depth and grade in areas indicated.
 - .2 Ensure no frozen material is placed.
 - .3 Place material only on clean unfrozen surface, free from snow and ice.
 - .4 Place material using methods which do not lead to segregation or degradation of aggregate.
 - .5 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Contract Administrator may authorize thicker lifts (layers) if specified compaction can be achieved.
 - .6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
 - .7 Remove and replace that portion of layer in which material becomes segregated during spreading.
- .3 Compaction Equipment
 - .1 Compaction equipment to be capable of obtaining required material densities.
- .4 Compacting
 - .1 Compact to density not less than 100% maximum dry density.
 - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
 - .3 Apply water as necessary during compacting to obtain specified density.
 - .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Contract Administrator.
 - .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.2 SITE TOLERANCES

- .1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.3 PROTECTION

- .1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Contract Administrator.

End of Section

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 10 00 - Concrete Forming and Accessories.
- .2 Section 03 20 00 - Concrete Reinforcing.
- .3 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

All reference standards shall be current issue or latest revision at the date of building permit issue. This specification refers to the following standards, specifications or publications:

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D 698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
- .2 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Concrete mixes and materials: to Section 03 30 00 - Cast-in-Place Concrete.
- .2 Reinforcing steel: to Section 03 20 00 - Concrete Reinforcing.
- .3 Curing Compound: to Section 03 30 00 - Cast-in-Place Concrete.
- .4 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water soluble soap.
- .5 Fill material: to Section 31 23 10 - Excavating, Trenching and Backfill.
- .6 Boiled linseed oil: to CAN/CGSB-1.2.
- .7 Kerosene: to CAN/CGSB-3.3.

PART 3 - EXECUTION

3.1 GRANULAR BASE

- .1 Obtain Contract Administrator's approval of subgrade before placing granular base.
- .2 Place granular base material to lines, widths, and depths as indicated.
- .3 Compact granular base to at least 95% of maximum density to ASTM D 698.

3.2 CONCRETE

- .1 Obtain Contract Administrator's approval of granular base and reinforcing steel prior to placing concrete.
- .2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .3 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.
- .4 Provide edging as indicated with 10 mm radius edging tool.
- .5 Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Contract Administrator can be demonstrated. Hand finish surfaces when directed by Contract Administrator.

3.3 TOLERANCES

- .1 Finish surfaces to within 3 mm in 3 m as measured with 3 m straightedge placed on surface.

3.4 EXPANSION AND CONTRACTION JOINTS

- .1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals of 1 m.
- .2 Install expansion joints at intervals of 6 m.
- .3 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.5 ISOLATION JOINTS

- .1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.
- .2 Install joint filler in isolation joints in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .3 Seal isolation joints with sealant approved by Contract Administrator.

3.6 CURING

- .1 Cure concrete by adding moisture continuously in accordance with CAN/CSA-A23.1 to exposed finished surfaces for at least 1 day after placing, or sealing moisture in by curing compound approved by Contract Administrator.
- .2 Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.
- .3 Apply curing compound evenly to form continuous film in accordance with manufacturer's requirements.

3.7 BACKFILL

- .1 Allow concrete to cure for 7 days prior to backfilling.
- .2 Backfill to designated elevations with material approved by Contract Administrator. Compact and shape to required contours as indicated or as directed by Contract Administrator.

End of Section

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Supply and installation of all fill and topsoil as necessary for grading, regarding and repairing damaged sodded areas.
- .2 Furnishing all labour, materials, equipment, supervision, incidentals and all other miscellaneous works required to complete the work as shown and detailed on the drawings and/or as specified herein.

1.2 SOURCE QUALITY CONTROL

- .1 Advise Project Administrator of sources of topsoil to be utilized seven days in advance of starting work.
- .2 Contractor is responsible for soil analysis and related costs, and requirements for amendments to supply topsoil as specified.
- .3 Test topsoil for clay, sand and silt, NPK, Mg, soluble salt content, PH, growth inhibitors, soil sterilants and organic matter.
 - .1 Submit 0.5 kg sample of topsoil to testing laboratory and indicate present use, intended use, type of subsoil and quality of drainage. Prepare and ship sample in accordance with provincial regulations and testing laboratory requirements.
 - .2 Submit 2 (two) copies of soil analysis and recommendations for corrections to the Project Administrator.

1.3 SCHEDULE OF WORK

- .1 Schedule finish grading to permit sodding and/or seeding operations under optimum conditions.

1.4 PROTECTION OF EXISTING FACILITIES

- .1 Protect elements surrounding the work of this section from damage or disfiguration.
- .2 Protect landscaping and other features remaining as final Work.
- .3 Protect existing structures, fences, roads, sidewalks, paving and curbs.
- .4 In the event of damage immediately replace such items or make repairs to the same, at no additional cost to the City.

1.5 DELIVERY AND STORAGE

- .1 Coordinate locations for storage of all materials with Project Administrator.
- .2 Deliver and store fertilizer in waterproof bags accompanied in writing by weight, analysis and name of manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Topsoil
 - .1 Shall consist of a screened clay-textured or loam-textured dark topsoil, a fertile, friable material neither of heavy clay nor of very light sandy nature containing by volume, a minimum of 4% to a maximum of 25% organic matter (peat, rotted manure or composted material) and capable of sustaining vigorous plant growth.
 - .2 Ph value: 7.5 to 8.2
 - .3 Contain no toxic elements or growth inhibiting materials.
 - .4 Free from:
 - .1 Debris, roots, stones and clay lumps over 40 mm diameter.
 - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
 - .3 Subsoil contamination.
 - .4 Quackgrass rhizomes, Canada Thistle roots or other noxious weeds.

- .5 Consistence: friable when moist.
- .6 Salinity rating less than 1.5mmhos/cm.
- .5 Planting mix: 4 parts topsoil with 1 part peatmoss.
- .2 Soil Amendments
 - .1 Peatmoss:
 - .1 Derived from partially decomposed species of Sphagnum Mosses.
 - .2 Elastic and homogeneous, brown in colour.
 - .3 Free of wood and deleterious material which could prohibit growth.
 - .4 Shredded particle minimum size: 5 mm.
 - .2 Sand: washed course silica sand, medium to course textured.
 - .3 Limestone, if required as a result of soil analysis:
 - .1 Ground agricultural limestone containing minimum calcium carbonate equivalent of 85%.
 - .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.
 - .4 Fertilizer: Synthetic slow release fertilizer with and NPK analysis of 1-2-1 ratio at a rate to provide 48 kg actual Nitrogen, 96 kg actual Phosphate and 48 kg actual Potassium per hectare.

PART 3 - EXECUTION

3.1 PREPARATION OF EXISTING GRADE

- .1 Subsoil shall be fine graded and shaped so that by spreading a uniform depth of topsoil, the final elevations and contours may be achieved. Uneven areas and low spots shall be eliminated to ensure positive grade.
- .2 Verify that grades are correct. If discrepancies occur, notify Project Administrator and do not commence work until instructed by Project Administrator.
- .3 Areas which are to receive topsoil shall be cultivated to a depth of 100 mm. This cultivation shall be repeated and cross cultivated in locations where machinery or equipment has compacted the soil.
- .4 Remove surface debris, roots, vegetation, branches and stones in excess of 40 mm in diameter. Remove any soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 75 mm above surface. Dispose of removed material off site.

3.2 SPREADING OF TOPSOIL

- .1 Subgrade shall be inspected and approved by the City prior to spreading topsoil.
- .2 Topsoil shall be evenly spread with adequate moisture, in uniform layers not exceeding 150 mm, over approved, unfrozen subgrade free of standing water, in locations where sodding or planting is indicated.
- .3 Keep topsoil 25 mm below finished grade in areas to be sodded.
- .4 Apply topsoil to the following minimum depths after settlement and 80% compaction:
 - .1 Refer to drawing details.
 - .2 150 mm for seeded and sodded areas.
 - .3 300 mm for flower beds.
 - .4 500 mm for shrub beds.
- .5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.3 SOIL AMENDMENTS

- .1 Any soil amendments required shall be applied to the topsoil at a rate as specified and as determined by the soil sampling. Mix any soil amendments in to the full depth of the topsoil prior to application of fertilizer.

3.4 APPLICATION OF FERTILIZER

- .1 Spread fertilizer over entire area to receive topsoil at a rate as recommended by the manufacturer or as determined by the soil testing.
- .2 Mix fertilizer thoroughly to a minimum depth of 150 mm of the topsoil

3.5 FINISH GRADING

- .1 Areas shall be leveled and graded to provide positive drainage. Leveling shall be in accordance with the contour lines, elevations, drainage direction arrows and other descriptions as shown on the drawings or specified herein.
- .2 Positive surface drainage shall be provided on all areas to be sodded by creating grade not less than 2% unless otherwise shown on the drawings.
- .3 Prepare loose friable bed by means of cultivation and subsequent raking. Roll lightly and rake wherever topsoil is too loose.
- .4 Roll topsoil with a 100 kg, 1000 mm minimum wide roller, to consolidate topsoil in areas to be sodded. Leave a smooth, uniform surface, firm against deep foot printing. Surface shall be even textured.
- .5 The site shall be kept tidy during operations and all excess material shall be disposed of off-site, to a legal dump site at no cost to the City.

3.6 ACCEPTANCE

- .1 Contract Administrator will inspect topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

End of Section

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Supply, preparation, installation and ancillary procedures involved in the total application of sod is areas identified herein or as required to correct damage during construction activities.
- .2 Furnishing all labour, materials, preparation, equipment, supervision, incidentals and all other miscellaneous works required to complete the work as shown and detailed on the drawings and/or as specified herein.

1.2 SOURCE QUALITY CONTROL

- .1 Obtain approval from Contract Administrator of sod at source.
- .2 When proposed source of sod is approved, use no other source without written authorization.

1.3 SAMPLES

- .1 Submit one square metre of sod if requested by Contract Administrator.

1.4 DELIVERY AND STORAGE

- .1 Deliver, unload, and store sod on pallets.
- .2 Deliver sod to site within 24 hours of being lifted and lay sod within 36 hours of being lifted.
- .3 Do not deliver small, irregular, broken or discoloured pieces of sod.
- .4 During wet weather, allow sod to dry sufficiently to prevent tearing during lifting and handling.
- .5 During dry weather, protect sod from drying and water sod as necessary to ensure its vitality and prevent dropping of soil in handling. Dry sod will be rejected.

PART 2 - PRODUCTS

2.1 GENERAL

- .1 The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification. All sod supplied under this Specification shall be subject to inspection and testing by the Contract Administrator. There shall be no charge to the City for any materials taken by the Contract Administrator for inspection purposes.
- .2 Sod will be subject to tests for nitrate, phosphate, potassium, sulphate, pH, E.C. (salinity), mineral soil layer thickness and its organic matter content by a testing laboratory designated by the Contract Administrator
- .3 Tests conducted to determine the thickness of the mineral soil layer of the sod and its percent of organic matter shall be done in accordance with standard operating procedures approved by the Contract Administrator for both receiving, and analyzing sod samples.
- .4 Any sod placed on the Work Site that in the opinion of the Contract Administrator does not conform to the Specification detailed herein, shall be rejected by the Contract Administrator and replaced by and at the expense of the Contractor.

2.2 TOPSOIL

- .1 Topsoil shall be supplied in accordance with Section 32 91 21 Topsoil Placement and Grading.

2.3 TURF GRASS SOD

- .1 The Contractor shall supply turf grass sod with a mineral soil layer containing a minimum of seventy (70%) percent inorganic soil. Upon delivery or thirty (30) days following delivery, the salinity rating shall be less than 4.0 mm hos/cm on a saturated paste basis. The pH range shall be between 6.0 – 8.0. Sod supplied shall have been sown in nursery fields with Canada Certified No. 1 or Canada Certified No. 2 grass seed and mixed by percentage (%) of weight to meet the following certified seed blends or mixtures:
 - .1 Athletic grounds, sod shall contain a blend composed of:

- One hundred (100%) percent Kentucky Bluegrass (100% Class 1 cultivars as specified in Clause 2.3.3, 3 cultivars in equal proportion).
- .2 For general park areas and backyards, sod shall contain:
- .1 A blend composed of one hundred (100%) percent Kentucky Bluegrass (100% Class 1 or Class 2 cultivars as specified in Clause 2.3.3, 3 cultivars in equal proportion); or
- .2 A mixture of ninety-five (95%) percent Kentucky Bluegrass (100% Class 2 cultivars as specified in Clause 2.3.3, 3 cultivars in equal proportion) and five (5%) percent Creeping Red fescue.
- .3 Wherever Kentucky Bluegrass is specified, the proportion of the cultivars to be included in the blend shall adhere to the following:
- Class 1 Cultivars** – specified blend of Class 1 cultivars shall consist of equal proportions of any three of the following:
- | | | | | |
|-----------|------------|------------|--------------|---------------|
| Able 1 | Absolute | Allure | Award | Baron |
| Bartitia | Blacksburg | Blackstone | Caliber | Challenger |
| Chateau | Estate | Explorer | Kelly | Liberator |
| Limousine | Midnight | Misty | Northstar | NuGlade |
| Pick 151 | Pick 8 | Platini | Quantum Leap | Rambo |
| Rugby II | Serene | Shamrock | SR 2000 | Total Eclipse |
| Touchdown | Unique | VB 16015 | Wildwood | |
- Class 2 Cultivars** – specified blend of Class 2 cultivars shall consist of equal proportions of any three of the following:
- | | | | | |
|-----------|----------|---------------|-----------|------------|
| A34 | Abbey | Alpine | America | Apollo |
| Arcadia | Ascot | ASP 200 | Banff | Baronie |
| Baruzo | Bluechip | Cardiff | Champagne | Chicago |
| Classic | Compact | Conni | Coventry | Crest |
| Cynthia | Dragon | Eclipse | Fortuna | Glade |
| Goldrush | Haga | Huntsville | Impact | Indigo |
| Jefferson | Kenblue | Langara | Lipoa | Livingston |
| Marquis | Mercury | Moonlight | Nimbus | NuBlue |
| NuStar | Odyssey | Park | Pepaya | Pick 3 |
| Pick 4 | Pick 855 | Princeton 105 | Raven | Rugby |
| Seabring | Sodnet | SR 2100 | SR 2109 | Washington |
- .4 Any variations to the above referenced seed blends or mixtures shall be approved by the Contract Administrator prior to placement of sod.
- .5 Turf grass sod shall be free of disease, turf damaging insects and any grass species, strains or cultivars other than specified herein.
- .6 At the time of delivery, the turf grass sod shall:
- .1 not contain more than ten (10) broadleaf weeds per fifty (50) square metres;
- .2 have been mowed to a height of 50 mm prior to delivery and be of sufficient density that no surface soil will be visible;
- .3 have a uniform inorganic soil layer thickness of not less than 12 mm and not greater than 19 mm and shall be consistent throughout all loads delivered to the work site;
- .4 have the organic thatch layer within the sod not exceed an uncompressed thickness of 12 mm and in all cases, the final rolled and compacted topsoil/sod growing medium shall be maintained at not less than 100 mm in depth.

2.4 HERBICIDES

- .1 Herbicides shall be standard commercial products registered for sale and use in Canada under the Pest Control Products Act.

2.5 PESTICIDES

- .1 Insecticides shall be standard commercial products registered for sale and use in Canada under the Pest Control Product Act.

2.6 OTHER MATERIALS

- .1 Wire mesh: 40mm chicken wire.
- .2 Wooden pegs: 17mm x 17mm x 250mm wood or approved 250mm long steel staples

PART 3 - EXECUTION

3.1 GENERAL

- .1 The Contractor shall not commence sodding operations until the finished topsoil surface has been inspected and approved by the Contract Administrator.
- .2 The Contractor shall provide the Contract Administrator with a minimum of two working days notice for inspection of the finished topsoil surface.

3.2 SITE GRADING

- .1 Site grading will be done and paid for in accordance with Section 31 23 10 Excavating, Trenching and Backfill.

3.3 TOPSOIL AND FINISH GRADING

- .1 Preparation of the finished topsoil surface shall be completed in accordance with Section 32 91 21 Topsoil Placement and Grading.
- .2 To prevent the formation of depressions or water pockets, the Contractor shall smooth out any undulations or irregularities in the topsoil surface prior to placing the sod.

3.4 PLACEMENT OF SOD

- .1 The sod shall be placed evenly and closely packed together, leaving no open joints and no overlap on adjacent pieces of sod. Joints in adjacent rows shall be staggered. A full row of sod, not less than 450 mm in width shall be placed along the perimeter of the sodded area, parallel to planting or walkway areas.
- .2 Where big roll sod is to be placed, the Contractor shall ensure that any reinforcement netting that may be used to assist with the harvesting and/or placement of the sod roll is removed before final placement of the sod.
- .3 On embankments, sod shall be placed lengthwise across the face of the slope. On slopes of 1 vertical to 3 horizontal (18 degrees) or steeper, in every second row on the slope and at the foot of the slope, each piece of sod shall be pegged with two minimum 250 mm long wooden pegs driven into the soil layer of the sod.
- .4 For slopes of 1 vertical to 2 horizontal (26 degrees) or steeper, each piece of sod in every row shall be pegged as indicated above.
- .5 Small, broken or irregular pieces of sod will be rejected.
- .6 All visible joints, low, bare or dead spots shall be repaired to the satisfaction of the Contract Administrator prior to the commencement of the Maintenance Period described in Clause 3.6.
- .7 Sodding operations shall be completed within two working days after placing the sod. This shall be deemed to include watering, rolling, and repairing any visible joints and low, bare or dead spots within the sodded area.
- .8 Sod shall not be placed in a frozen state, or when any other conditions unfavourable to the successful transplanting of sod exist.
- .9 Edge sod to a neat 1 m diameter circular opening at the base of all trees. A full row of sod, not less than 300 mm in width, shall be placed along the perimeter of sodded areas adjacent to the edges of shrub beds.

3.5 WATERING AND ROLLING

- .1 Immediately after placement of sod, the Contractor shall water the area in sufficient quantities and frequencies required to obtain root development and sod growth. All costs to provide water for sodded areas shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.
- .2 After the sod and topsoil has dried sufficiently to prevent damage, the areas shall be rolled (the edges pounded if necessary) with a mechanical roller minimum weight of 220kg and minimum width

of 760mm to form a uniform even surface and level with adjoining existing grades, sidewalks and curbs.

- .3 Heavy rolling to correct irregularities in grade will not be permitted. Sodded areas near existing fixtures that are unable to be rolled shall be thoroughly tamped to ensure a good bond between topsoil and sod.

3.6 COMMENCEMENT OF THIRTY (30) DAY MAINTENANCE PERIOD

- .1 Immediately after the sod has been placed to the satisfaction of the Contract Administrator, the Contractor shall provide and pay for continuous maintenance of the sodded area until the criteria specified for termination of the maintenance period in Clause 3.9 has been met.
- .2 The Contract Administrator will not allow the Thirty (30) Day Maintenance Period to commence until the following requirements are met:
 - .1 The nursery sod supplied meets the seed mixture requirement specified in Clause 2.3.
 - .2 The sod is free of bare and dead spots.
 - .3 The nursery sod does not contain more than 10 broadleaf weeds per 50 square metres.
 - .4 Sodded area has been rolled to form a firm, uniform even surface.
 - .5 The sod has sufficient shoot density that no surface soil is visible within sod.
 - .6 The height of the top growth of the sod is between 50 - 60 mm.
 - .7 The sodded area is free of any visual obstructions such as leaves.
 - .8 Sodded area is free of any turf damaging insects.
- .3 Any deficient, damaged or vandalized areas shall be resodded by the Contractor within three working days after receiving notification from the Contract Administrator and the area so resodded, shall be further maintained until it meets the criteria specified in Clause 3.9.
- .4 In situations where the start of the Thirty (30) Day Maintenance Period is not granted by the Contract Administrator before the end of a growing season, the Thirty (30) Day Maintenance Period will commence on May 15 of the following year or such date as is mutually agreed upon by all parties, at which time all sodded areas must meet the requirements listed above.

3.7 MAINTENANCE OF SODDED AREA

- .1 The Contractor shall mow the turf area at regular intervals to a height of between 50 - 60 mm. Do not cut more than thirty (30%) percent of the grass height at any one mowing. Remove clippings that will smother grassed areas.
- .2 The Contractor shall water sodded areas in sufficient quantities and frequencies required to maintain sod growth. All costs to provide water for sodded areas shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.
- .3 The Contractor shall clean and remove all dead vegetation, leaves, debris and snow mold from turf areas to encourage healthy and uniform grass growth.

3.8 SPRING CLEAN UP

- .1 Where termination of the sod maintenance period has not been achieved in accordance with Clause 3.9 prior to the end of a growing season, the Contractor shall complete all operations related to the clean up of the work area in the following spring. This shall include the cleaning and removal of all dead vegetation, leaves, debris, snow mold and any sand or gravel resulting from winter sanding/deicing operations from turf areas to encourage healthy and uniform grass growth.
- .2 All costs for spring clean up operations shall be borne by the Contractor if in the previous year, the termination of the sod maintenance period, in accordance with Clause 3.9 was not achieved in that same year or where the damage was due to defective sod or maintenance not conforming to this Specification.

3.9 TERMINATION OF MAINTENANCE PERIOD

- .1 The Contract Administrator will terminate the sod maintenance period after the following criteria has been met:
 - .1 The work site is clean and the sodded area is free of any visual obstructions such as leaves.
 - .2 The sod is free of bare and dead spots and without more than 10 broadleaf weeds per 50 square metres.

- .3 Grass roots are well anchored into the underlying topsoil and the sodded area has established into a healthy, vigorously growing condition.
 - .4 Sodded areas are free of visible joints.
 - .5 The sod has sufficient shoot density that no surface soil is visible when the grass has been cut to a height of 50 – 60 mm.
 - .6 Sodded area has been cut to a height of 50 – 60 mm within two working days before the final inspection.
 - .7 Sodded area is free of any turf damaging insects.
- .2 If the sodded area does not meet the above criteria, the deficient area shall be resodded within three working days after receiving notification from the Contract Administrator and maintained by and at the expense of the Contractor in accordance with Clauses 3.6 and 3.7 herein.
 - .3 In situations where the termination of the maintenance period is not granted by the Contract Administrator before the end of a growing season, the maintenance period will commence as described in Clause 3.6.

3.10 SITE CLEAN UP

- .1 During both the placement and maintenance of sod, all sidewalks, streets, approaches, driveways and properties near the sodding operation shall be kept clean at all times by the Contractor.
- .2 Upon completion of the project, the Contractor shall immediately remove all excess material, debris and equipment from the work site.

End of Section