

Woodvale Pentecostal Church

205 Greenbank Rd, Nepean, ON

ADDITION SPECIFICATIONS



ISSUED FOR 70% PROGRESS

November 12 , 2021



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DIVISION 33 - EARTHWORK

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END OF SECTION

1 General

1.1 Description of Work

- .1 The Work includes but is not limited to the construction and related site works and landscaping for the addition to Woodvale Pentecostal Church, 205 Greenbank Road.

1.2 EXAMINATION

- .1 The Contractor and all Sub-Contractors shall familiarize themselves with conditions at the site. Each one shall bear complete responsibility for familiarization with conditions and the affect that same may have on work.
- .2 Every Sub-Contractor and the Contractor shall examine the contract documents, the conditions on site and the Work in place prior to commencing the various portions of his work. Contract Documents are to be read as a set and all trades are responsible to co-ordinate with work of other trades.
- .3 Each Sub-Contractor and the Contractor shall report in writing to the Consultant and the Contractor, any defects affecting the work of that trade.
- .4 Commencement of work shall be construed as evidence of acceptance of underlying surfaces, conditions, arrangement and location as satisfactory.

1.3 PROJECT CO-ORDINATION

- .1 Co-ordinate progress of the Work, including Owner's forces, progress schedules, submittals, use of site, temporary utilities, construction facilities and controls, site access. Coordinate as required with City of Ottawa to confirm areas usable for this contract.
- .2 The overall superintendence of the project, ensuring the complete performance of all Sub-Contractors and suppliers as laid down in the specifications, is the responsibility of the Contractor. A fully competent foreman acceptable to the Architect shall be in charge of the work at all times throughout the contract. The Superintendent shall study the plans and specifications in detail and be completely familiar with the project at the outset. Once conversant with the documents, he shall relate them to the existing conditions. Any errors or discrepancies in dimensions, details, etc., in the plans and specifications or their relationship to the existing conditions, shall be reported to the Architect for clarification or correction before beginning the work. Allow Architect time for clarification or correction as required.
- .3 Ensure that all necessary job dimensions are taken and all trades are co-ordinated for the proper execution of the work. Assume complete responsibility for the accuracy and completeness of such dimensions, and for co-ordination.
- .4 Verify that all work as it proceeds, is executed in accordance with dimensions and positions indicated, with maintain levels and clearances to adjacent work as set out by

- requirements of the drawings; and ensure that work installed in error is rectified before construction continues.
- .5 Check and verify all dimensions referring to the work and the interfacing of all services. Verify with the trade concerned, all dimensions pertaining to the work of other trades.
 - .6 Any errors, discrepancies, or trade conflicts arising during construction shall, when necessary, be referred to the Architect for clarification and/or decision. Allow Architect time for deliberation as required.
 - .7 Co-ordinate all Sub-Contractors and suppliers so that work proceeds smoothly without interruption and in strict accordance with approved schedules. Co-operation so that work is executed in proper sequence, items to be built-in are built-in on time, erected work is protected against damage from the work of other trades and defective work is removed and made good to the satisfaction of the Architect.
 - .8 Study all documents which describe, or are related to, any operation before commencement of that operation. Report discrepancies discovered between elements of documentation and obtain ruling on required interpretation before beginning work. Allow Architect time to make ruling as required.
 - .9 Ensure that material, equipment, services and operatives are brought to site at proper times, in sufficient quantity and quality and in accordance with requirements of work.
 - .10 Contractor shall ensure that each Sub-Contractor informs him of requirements for site conditions and surfaces necessary for the execution of the work and that he provides setting drawings, templates and all other information necessary for the location and installation of material, holes, sleeves, inserts, anchors, accessories, fastenings, connections and access panels. The Contractor shall inform other Sub-Contractors whose work is affected by these requirements and preparatory work. Commencement of work shall imply complete acceptance of all work done by other Sub-Contractors.
 - .11 Contractor is responsible to co-ordinate the staging of all trades in sequence to minimize interferences between trades. Mechanical trade shall produce interference drawings to confirm all duct runs are clear of structure and any other obstructions.
 - .12 Contractor and Sub-Contractors shall co-operate fully with other Contractors and Sub-Contractors working on this project. Perform necessary co-ordination to install equipment supplied, or supplied and installed by Owners.
 - .13 Remove and replace ceilings as required to accommodate the installation of phone lines and other services in ceiling installed by other Contractors. Replace damaged ceiling tiles due to such work.

1.4 CONTRACTOR'S USE OF SITE

- .1 Refer to specifications, plans and drawings for limits of contract.
- .2 Use of Site: Exclusive and complete for execution of the work in coordination with City of Ottawa.

- .3 Do not unreasonably encumber site with materials or equipment.
- .4 Move stored products or equipment which interfere with operations of Owner or other Contractors.
- .5 Obtain and pay for use of additional storage or work areas needed for operations.
- .6 Maintain project grounds and public properties free from accumulation of waste materials and rubbish.

1.5 CUTTING AND PATCHING

- .1 Approvals:
 - .1 Submit written request in advance of cutting or alteration which affects:
 - .1 Structural integrity of any element of Project.
 - .2 Integrity of weather-exposed or moisture-resistant elements.
 - .3 Efficiency, maintenance, or safety of any operational element.
 - .4 Visual qualities of sight-exposed elements.
 - .5 Work of Owner or separate contractor.
- .2 Inspection:
 - .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.
- .3 Execution:
 - .1 Perform cutting, fitting, and patching including excavation and fill, to complete the Work.
 - .2 Remove and replace defective and non-conforming work.
 - .3 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical work.
 - .4 Perform work to avoid damage to other work.
 - .5 Prepare proper surfaces to receive patching and finishing.
 - .6 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
 - .7 Cut rigid materials using power saw or core drill. Pneumatic or impact tools not allowed.
 - .8 Restore work with new products in accordance with Contract Documents.
 - .9 Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
 - .10 At penetration of fire-rated wall, ceiling, or floor construction, completely seal voids with fire-rated material, full thickness of construction element.
 - .11 Refinish surfaces to match adjacent finishes; for continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

1.6 FIELD ENGINEERING

- .1 Contractor shall confirm all elevations and/or dimensions of existing conditions on site and allow for same in tendering price.
- .2 Employ qualified Ontario Land Surveyor to establish and layout in the field all grid lines, exterior wall and other main lines all curves and levels, verify known geodetic elevation, establish bench marks or permanent monuments, correlate geodetic elevations with public utility elevations.
- .3 Verify and record on the record drawings, elevations of footing bearing surfaces, top of footings, new services and existing utilities encountered, all related to finished floor or geodetic elevations.
- .4 Install substantial batter boards, lines, stakes, etc., as required during the progress of the work.
- .5 Within one week of completion of foundations, provide six (6) copies of legal survey showing discrepancies and setting out distances of foundations from each other and from property lines. Such survey to include appropriate elevations as required to verify the finished floor elevation of the Ground Floor.
- .6 Sub-Surface Conditions:
 - .1 Promptly notify consultant in writing if sub-surface conditions at Place of the Work differ materially from those indicated in Contract Documents, or reasonable assumption of probable conditions based thereon.
 - .2 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in the Work as provided in Part 6 - Changes in the Work.
- .7 Provide and pay for preparation of a post-construction survey drawing by a qualified land surveyor registered with the Province of Ontario. The survey drawing will show and dimension the locations of the building, underground services, asphalt and concrete paving, curbs, fencing, trees and shrubs, and any other elements, to the satisfaction of the Architect. Provide one mylar copy , six white prints and digital file in acad .dwg format.

1.7 CONCEALMENT

- .1 Conceal pipes, ducts, and wiring in floor, wall and ceiling construction, except where indicated otherwise on architectural drawings.

1.8 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 useable space, and in accordance with manufacturer's recommendations for safety, access and maintenance.

- .3 Inform Architect of impending installation and obtain his approval for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment.

1.9 PUBLIC AND PRIVATE UTILITIES AND SERVICES

- .1 Verify limitations imposed on project work by presence of utilities and services, and ensure no damage occurs to them.
- .2 Notify service authorities concerned so that they protect, remove, relocate, or disconnect them as they may require.
- .3 Make arrangements and pay for connection charges for services required for project work.
- .4 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

1.10 RUBBISH

- .1 Do not burn or bury rubbish and work materials on site.
- .2 Dispose of rubbish and surplus material off site. Recycle where facilities exist.
- .3 Do not dispose of volatile or corrosive materials in sewers and drains.
- .4 Except if expressly stated otherwise, materials indicated for removal become the Contractor's property and shall be taken from the site.
- .5 Dispose of rubbish and waste in accordance with governing regulations.

1.11 OWNER FURNISHED PRODUCTS

- .1 Products furnished and paid for by the Owner are indicated in the contract documents.
- .2 Owner's responsibilities:
 - .1 Arrange and pay for product delivery to the site, in accordance with the Construction Schedule (except as noted).
 - .2 Deliver supplier's bill of material to Contractor.
 - .3 Inspect deliveries jointly with Contractor.
 - .4 Submit claims for transportation damage.
 - .5 Arrange for the replacement of damaged, defective, or missing items.
 - .6 Arrange for manufacturer's warranties, bonds, service, inspections, as required.
- .3 Contractor's responsibilities:
 - .1 Designate delivery date for each product in the Construction Schedule.
 - .2 Received products at the site. Verify that number of packages received matches freight bill. Check packages for external damage, report damage and loss on freight bill and notify Owner.
 - .3 Promptly inspect products jointly with Owner, record shortages, damaged or

defective items.

- .4 Handle products at the site, including uncrating and storage.
- .5 Protect products from exposure to the elements and from damage.
- .6 Assemble, install, connect, adjust and finish products, ready for use.
- .7 Repair or replace items damaged by Contractor.

1.12 PROJECT MEETINGS – Refer also to Section 01 31 19, Project Meetings

- .1 Administrative:
 - .1 Schedule and administer project progress meetings bi-weekly or more frequently as required.
 - .2 Distribute written notice of each meeting four days in advance of meeting date to Owner and all consultants.
 - .3 Provide physical space on site, for the duration of the project, complete with heat and air conditioning and make arrangements for meetings. Provide table with a minimum of 14 fabric covered chairs. Facilities shall be equipped with phone, fax and data hook-up for use by the Contractor and Consultants.
 - .4 Owner and or Contractor will record and distribute Minutes of Meetings.

1.13 INSPECTION, TESTS AND APPROVAL

- .1 At least twenty-four hours notice shall be given to the Architect in order that all inspections and tests called for by these specifications may be implemented. Failure to give such notice will result in complete retesting if deemed necessary by the Architect. No work shall be covered up until inspection and approval by the Architect or Inspector.

1.14 DOCUMENTS

- .1 Maintain at job site copies of contract drawings, specifications, addenda, regulatory authority approved drawings, permits and certificates, reviewed shop drawings, contemplated change orders, change orders, site instructions, other modifications to contract, field test reports, inspection reports, job minutes, approved schedule, manufacturers' installation and application instructions, Material Safety Data Sheets, set of drawings for as-builts, latest copy of Ontario Building Code and regulations for construction projects.

1.15 SCHEDULE

- .1 Schedules Required
 - .1 Construction Progress Schedule.
 - .2 Submittal Schedule for Shop Drawings, Product Data and Samples.
 - .3 Update must accompany each billing submission - including commentary with respect to schedule.
 - .4 CO/ CCO summary and status

- .5 RFI summary and status
- .6 Cash allowance status
- .7 Schedule dates for specified mock-ups.
- .8 Submit 6 copies within fourteen (14) days of authorization to proceed and maintain construction schedule as indicated in GC 3.5 and Supplementary Conditions.
- .9 Schedule shall be in format acceptable to the architect and the owner. Show clearly proposed progress of all main items. Indicate each trade or operation separately. Order chronologically for beginning of each item or work. Identify first workday of each week. Identify critical sequence of work.
- .10 Include or show separately shop drawing review, decision dates for allowances, fabrication and delivery lead time. Show dates for beginning and completion of each element of construction including sub-trade work, concrete placement, equipment installation and testing.
- .11 Include or show separately delivery dates for equipment and materials which have a critical delivery period.
- .12 Identify work of separate blocks or other phases or other logically grouped activities. Break items into blocks no greater than 2 weeks in duration. Show project percentage of completion for each item of work as of first day of each month.
- .13 Predicate schedule on basis of substantial performance prior to date stated in agreement.
- .14 Revise or elaborate on schedule if requested by owner or architect and submit six (6) copies of approved schedule for distribution to owner.
- .15 Revise and update schedule on a monthly basis. Release of progress payment will be subject to receipt of schedule.
- .2 Test Reports
 - .1 Provide copies of all test reports including materials, geotechnical and technical reviews.
- .3 Site Visit Reports
 - .1 Review status of consultant reports at each meeting to confirm status of deficient work and progress of current work.

1.16 DIMENSIONS

- .1 It shall be understood that wall thickness shown on the drawings may be nominal only, and the actual sizes shall, in all cases, be ascertained at the work.
- .2 Each Sub-Contractor shall verify the dimensions of all shop fabricated portions of the Work on the site before commencing shop drawings and fabrication.
- .3 Each Sub-Contractor shall fabricate all items fitting to structural parts from measurements taken on the Work or verified and be fully responsible for co-ordination of this respect.

1.17 STREETS AND TRAFFIC

- .1 Provide all necessary flagmen, detour signs, warning lights, signs and barricades, necessary to direct and protect pedestrian and vehicular traffic during the work.
- .2 Conform to all Provincial, Regional, and Municipal Regulations and requirements.
- .3 Provide adequate dust and mud control.
- .4 Provide and maintain adequate access to project site.
- .5 Supplement snow clearing operations as required to keep access and work areas and adjacent walkways free of snow and ice.

1.18 MATERIAL AND EQUIPMENT

- .1 Product and Material 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, 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 Consultant based upon requirements of Contract Documents.
- .2 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 seals and labels intact.
 - .3 Store products subject to damage from weather in weatherproof enclosures or as directed by the Consultants.
- .3 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 Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant may establish course of action.
 - .3 Improper installation of erection of Products, due to failure in complying with these requirements, authorizes Consultant to require removal and reinstallation at

no increase in Contract Price or delay in schedule.

- .4 Workmanship
 - .1 Workmanship shall be best quality, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required work is such as to make it impractical to produce required results.
 - .2 Do not employ any unfit person or anyone unskilled in their required duties.
 - .3 Decisions as to quality or fitness of workmanship in cases of dispute rest solely with Consultant, whose decision is final.
- .5 Concealment
 - .1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
 - .2 Before installation, inform Consultant if there is a contradictory situation. Install as directed by Consultant.
- .6 Trade Names
 - .1 Wherever an item or class of material is specified exclusively by trade names or by names of the maker by catalogue reference, only such items shall be used, unless Architect's approval for a substitution is secured in writing during tender period.
 - .2 In no case will the substitution of a product manufactured outside Canada for a Canadian-made product be considered.

1.19 SAFETY REQUIREMENTS

- .1 The Contractor shall comply with the latest edition and amending regulations of the following documents, and in the case of conflicts between documents, the more stringent shall apply:
 - .1 The Occupational Health and Safety Act and Regulation for Construction Projects, R213/91 January 2020
 - .2 Bill 79 - An Act to amend the Occupational Health and Safety Act, Chapter 29, Statutes of Ontario, .
 - .3 Bill C-70, An Act to Amend the Hazardous Projects Act and the Canada Labour Code, June, 1987.
 - .4 Occupational Health and Safety Regulation for Construction Projects, Revised Statutes of Ontario, Chapter 321, Regulation 691.
 - .5 Ontario Building Code Act and Ontario Regulation 423/06.
 - .6 Ontario Regulation 213/07 - Fire Code.
 - .7 Regulation 309 - Environmental Protection Act, revised Ontario Regulation 464/85.
 - .8 Workers' Compensation Board First Aid Regulations (950).
 - .9 This is not a complete list and the contractor is responsible to conform to all relevant codes, legislation in the place of work. Current versions of all noted documents are to be referenced

1.20 FINISHING STANDARDS

- .1 When the project is nearing completion, arrange to have one designated area completed

prior to finishing the remaining areas. When this area is fully completed with all materials, fixtures, cabinets, hardware, etc., in accordance with the contract and the approved colour schedule, request an inspection.

1.21 PROGRESS REPORTS

- .1 Contractor shall prepare daily reports of his operations. Daily report shall contain at least the following information:
 - .1 Weather conditions.
 - .2 Manpower on the job in each trade.
 - .3 Major items of equipment on the job.
 - .4 A brief summary of work accomplished that day.
 - .5 Materials, equipment, or owner-furnished items arriving or leaving site.
 - .6 Inspection reports.
 - .7 Significant events.
 - .8 Any tests made and their final results, if known.
 - .9 Any oral instructions received.
 - .10 Visitors to the job.
- .2 Contractor shall maintain a file of copies of all daily reports on the site and make it available to Consultant or Owner upon request.

2 Products (not applicable)

3 Execution (not applicable)

END OF SECTION

PART 1 - GENERAL

1.1 ADMINISTRATIVE

- .1 Schedule and administer project meetings throughout the progress of the work on a bi-weekly basis
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting four days in advance of meeting date to Consultant team.
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants and, affected parties not in attendance.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETINGS

- .1 Within ten days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Senior representatives of the Owner, Consultants, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum five days before meeting.
- .4 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of Work: in accordance with Section 01 32 16 - Construction Progress Schedules - Bar (GANTT) Chart.
 - .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
 - .5 Delivery schedule of specified equipment critical to maintaining Construction Schedule.

- .6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .7 Proposed changes, change orders, procedures, approvals required.
- .8 Owner provided products and designated sub-contractors.
- .9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .12 Commissioning requirements in accordance with Section 01 91 13 – General Commissioning Requirements
- .13 Monthly progress claims, administrative procedures, photographs, hold backs.
- .14 Appointment of inspection and testing agencies or firms.
- .15 Insurances, transcript of policies.

1.2 PROGRESS
MEETINGS

- .1 During course of Work and prior to project completion, schedule progress meetings bi-weekly.
- .2 Contractor, major Subcontractors involved in Work Consultant team and Owner are to be in attendance.
- .3 Notify parties minimum 2 days prior to meetings.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 2 days after meeting.
- .5 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for affect on construction schedule and on completion date.
 - .12 Other business.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- .1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Owner, and/or Consultant are specified under various sections.

1.2 APPOINTMENT AND PAYMENT

- .1 The Owner will appoint and pay for services of testing laboratory for specific quality control tests and inspections as identified in the documents as being paid for by the Owner, except as follows:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
 - .4 Mill tests and certificates of compliance.
 - .5 Tests specified to be carried out by Contractor under the supervision of Consultant.
 - .6 Additional tests specified under 1.2.2
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Consultant to verify acceptability of corrected work.
- .3 The testing organization appointed by the Owner will be coordinated by the General Contractor.

1.3 CONTRACTOR'S RESPONSIBILITIES

- .1 Provide labour, equipment and facilities to:
 - .1 Provide access to Work for inspection and testing.
 - .2 Facilitate inspections and tests.
 - .3 Make good Work disturbed by inspection and test.
 - .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .2 Notify Consultant sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Consultant.

- .5 Employment of inspection/testing agencies and the reviews by the Consultants does not relieve the Contractor's responsibility to perform work in accordance with the Contract Documents.

1.4 PROCEDURES

- .1 Notify the appropriate agency and Consultants in advance of the requirements for tests, in order that attendance arrangements can be made. Provide 48 hours notice.
- .2 Submit samples and/or materials required for testing, as specifically requested in specification. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the 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 DEFINITIONS

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system, Microsoft Project.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Friday, inclusive, will provide five-day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or another project element. Usually expressed as workdays or workweeks.
- .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: overall system operated by Consultant to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 14 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Consultant within 15 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

1.4 PROJECT MILESTONES

- .1 Project milestones for Project Schedule are identified in Section 00 20 00 – Instruction to Tenderers, item 23 and Section 01 00 50 – General Requirements, item 1.5

1.5 MASTER PLAN

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Consultant will review and return revised schedules within [5] working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.6 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Award
 - .2 Shop Drawings, Samples
 - .3 Permits
 - .4 Mobilization
 - .5 Excavation
 - .6 Backfill
 - .7 Building foundations
 - .8 Slab on grade

- .9 Structural Concrete
- .10 Structural Steel
- .11 Roofing
- .12 Exterior cladding
- .13 Doors and Windows
- .14 Exterior Stairs & Ladders
- .15 Plumbing
- .16 Lighting
- .17 Electrical
- .18 Piping
- .19 Controls
- .20 Heating, Ventilating, and Air Conditioning
- .21 Fire Systems
- .22 Testing and Commissioning
- .23 Supplied equipment long delivery items
- .24 Engineer supplied equipment required dates

1.7 PROJECT
SCHEDULE REPORTING

- .1 Update Project Schedule on monthly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.8 PROJECT
MEETINGS

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

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 Consultant 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 Where items or information is not produced in SI Metric units converted values are acceptable.
- .4 Review submittals prior to submission to Consultant. 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 Consultant, 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 Consultant's review of submittals.
- .8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.
- .9 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Refer to CCDC 5B-2010
- .2 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.
- .3 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.
- .4 After Consultant's review, distribute copies.
- .5 Shop drawings may be submitted electronically in PDF format, or
- .6 Submit 2 paper copies of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.
- .7 Submit 2 paper copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.
- .8 Submit 2 paper copies of test reports for requirements requested in specification Sections and as requested by Consultant.
 - .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 three years of date of contract award for project.

- .9 Submit 2 paper copies of certificates for requirements requested in specification Sections and as requested by Consultant.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .10 Submit 2 paper copies of manufacturer's instructions for requirements requested in specification Sections and as requested by Consultant.
 - .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.
- .11 Submit 2 paper copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant.
 - .1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .12 Submit 2 paper copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Consultant.
- .13 Delete information not applicable to project.
- .14 Supplement standard information to provide details applicable to project.
- .15 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, one copy will be returned for contractor distribution & 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 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Consultant's business address.
- .3 Notify Consultant 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 Consultant re not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
- .6 Make changes in samples which Consultant 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.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

- .2 Not Used.

END OF SECTION

PART 1 - GENERAL

<u>1.0 SCOPE</u>	.1	Woodvale Pentecostal Church is committed to ensuring a clean and safe environment for all its employees and for the employees of the construction companies that will renovate the existing facility and build the new addition. The requirements outlined in this section are provided to ensure that the principals, owners and management of the companies accept this completely.
<u>1.1 RELATED REQUIREMENTS</u>	.1	Section 01 52 00 Construction Facilities
<u>1.2 REFERENCES</u>	.1	Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
	.2	Health Canada/Workplace Hazardous Materials Information System (WHMIS)
	.1	Material Safety Data Sheets (MSDS).
	.3	Province of Ontario
	.1	Occupational Health and Safety Act, R.S.O. 1990 Current Version
	.4	Ministry of Labour, Construction Safety Association of Ontario, Electrical Safety Association of Ontario, Industrial Accident Prevention Association and the Technical Standards and Safety Authority latest standards and publications shall apply.
	.5	Latest version of any noted document shall govern.
<u>1.3 ACTION AND INFORMATIONAL SUBMITTALS</u>	.1	Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
	.2	Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
	.1	Results of site specific safety hazard assessment.
	.2	Results of safety and health risk or hazard analysis for site tasks and operation.
	.3	Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Consultant weekly.
	.4	Submit copies of incident and accident reports.
	.5	Acceptance of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

	.6	On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations. .1 Include responses to fuel spills or damage existing fuel or oil dispensing systems
<u>1.4 FILING OF NOTICE</u>	.1	File Notice of Project with Provincial authorities prior to beginning of Work.
<u>1.5 SAFETY ASSESSMENT</u>	.1	Perform site specific safety hazard assessment related to project.
<u>1.6 MEETINGS</u>	.1	Schedule and administer Health and Safety meetings with prior to commencement of Work.
<u>1.7 GENERAL REQUIREMENTS</u>	.1	Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
<u>1.8 RESPONSIBILITY</u>	.1	Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
	.2	Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
<u>1.9 COMPLIANCE REQUIREMENTS</u>	.1	Comply with all Ontario Health and Safety Act, R.S.O latest versions.
	.2	Ontario Regulation 213 Construction Projects
	.3	Infrastructure Health & Safety Association – Safe Practice Guides
	.4	Construction Safety Association of Ontario D5030 - Health and Safety Program Planning for Construction.
<u>1.10 UNFORSEEN HAZARDS</u>	.1	When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Consultant verbally and in writing.

<u>1.11 POSTING OF DOCUMENTS</u>	.1	Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction.
<u>1.12 CORRECTION OF NON-COMPLIANCE</u>	.1	Immediately address any health and safety non-compliance issues identified by authority having jurisdiction or by any other party.
	.2	Provide Consultant with written report of action taken to correct non-compliance of health and safety issues identified.
	.3	Consultant may stop Work if non-compliance of health and safety regulations is not corrected.
<u>1.13 BLASTING</u>	.1	Blasting or other use of explosives is not permitted.
<u>1.14 WORK STOPPAGE</u>	.1	Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.
<u>PART 2 - PRODUCTS</u>		
<u>2.1 NOT USED</u>	.1	Not used.
<u>PART 3 - EXECUTION</u>		
<u>3.1 NOT USED</u>	.1	Not used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 All Sections

1.2 REFERENCES

- .1 Definitions:
.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.
- .2 Reference Standards:
.1 Canadian Construction Documents Committee (CCDC)
.1 CCDC 5B-2010 Construction Management Contract-for Services and Construction
.2 U.S. Environmental Protection Agency (EPA)/Office of Water
.1 EPA 832/R-92-006, Storm Water Management for Construction Activities, Chapter 3.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prior to commencing construction activities or delivery of materials to site, provide Environmental Protection Plan for review by Consultant.
- .3 Ensure Environmental Protection Plan includes comprehensive overview of known or potential environmental issues to be addressed during construction.
- .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .5 Include in Environmental Protection Plan:
.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.

- .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
- .3 Names and qualifications of persons responsible for training site personnel.
- .4 Descriptions of environmental protection personnel training program.
- .5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations, EPA 832/R-92-006, Chapter 3 requirements.
- .6 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Ensure plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.
- .7 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Ensure plan includes measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
- .8 Spill Control Plan including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
- .9 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
- .10 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
- .11 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .12 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.
- .13 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.14 Pesticide treatment plan to be included and updated, as required.

1.4 FIRES

.1 Fires and burning of rubbish on site not permitted.

1.5 DRAINAGE

.1 Provide Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls provided. Ensure plan includes monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations, EPA 832/R-92-005, Chapter 3 requirements.

.2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.

.3 Provide temporary drainage and pumping required to keep excavations and site free from water.

.4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties as indicated. Refer to landscape drawings and specifications. Review procedures with Landscape Architect on site.

.2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.

.3 Protect roots of designated trees to dripline or as directed by landscape architect during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas indicated.

1.7 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant to local authorities' emission requirements.

- .3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area.
 - .1 Provide temporary enclosures where directed.
 - .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- 1.8 HISTORICAL/
ARCHAEOLOGICAL
CONTROL
- .1 Protect historical and archaeological resources found on the project site: and identify procedures to be followed if historical or archeological resources not previously known to be onsite or in area are discovered during construction.
 - .2 Plan: include methods to assure protection of discovered resources and identify lines of communication between Contractor personnel and Consultant.
- PART 2 - PRODUCTS
- 2.1 NOT USED
- .1 Not Used.
- PART 3 - EXECUTION
- 3.1 CLEANING
- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .3 Ensure storm and sanitary sewers remain free of waste and volatile materials disposal.

END OF SECTION

PART 1 - GENERAL

<u>1.1 REFERENCES</u>	.1	Canadian Construction Documents Committee (CCDC) .1 CCDC 5B-2010 Construction Management Contract-for Services and Construction
<u>1.2 INSPECTION</u>	.1	Refer to CCDC-5B-2010,
<u>1.3 INDEPENDENT INSPECTION AGENCIES</u>	.1	Independent Inspection/Testing Agencies will be engaged by Consultant for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Owner.
	.2	Allocated costs: to Section 01 21 00 - Allowances.
	.3	Provide equipment required for executing inspection and testing by appointed agencies.
	.4	Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
	.5	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 Consultant at no cost to Owner. Pay costs for retesting and re-inspection.
<u>1.4 ACCESS TO WORK</u>	.1	Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
	.2	Co-operate to provide reasonable facilities for such access.
<u>1.5 PROCEDURES</u>	.1	Notify appropriate agency and Consultant 2 days 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.
<u>1.6 REJECTED WORK</u>	.1	Refer to CCDC-5B-2010,

1.7 REPORTS

- .1 Submit 4 four copies of inspection and test reports to Consultant.
- .2 Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

1.8 TESTS AND MIX DESIGNS

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

1.9 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 Consultant as specified in specific Section.
- .3 Prepare mock-ups for Consultant'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 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.10 MILL TESTS

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

1.11 EQUIPMENT AND SYSTEMS

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

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

<u>1.1 RELATED SECTIONS</u>	.1	Section 01 52 00: Construction Facilities
<u>1.2 SUBMITTALS</u>	.1	Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
<u>1.3 INSTALLATION AND REMOVAL</u>	.1	Provide temporary utilities controls in order to execute work expeditiously.
	.2	Remove from site all such work after use.
<u>1.4 HOARDING</u>	.1	Supply and erect construction fencing around perimeter of individual buildings and other construction areas as required. Contractor to co-ordinate hoarding installation with Authorities Having Jurisdiction prior to construction.
	.2	Contractor to present layout of hoarding and obtain approved of by Project Manager prior to construction. Any changes to hoarding layouts to be presented prior to adjustments.
	.4	Contractor to provide lockable truck entrances(s) with lockable gates and at least one pedestrian door conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.
<u>1.5 DEWATERING</u>	.1	Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.
<u>1.6 WATER SUPPLY</u>	.1	Contractor to arrange and pay for continuous supply of potable water for construction use.
<u>1.7 TEMPORARY HEATING AND VENTILATION</u>	.1	Provide temporary heating required during construction period, including attendance, maintenance and fuel. The Contractor may use natural gas supplied to site during construction, but shall be responsible for arranging with gas supplier to suit his requirements.
	.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 degrees 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 unless authorized by Consultant and Owner. Be responsible for damage to heating system if use is permitted.
- .7 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.
- .8 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.8 TEMPORARY POWER AND LIGHT

- .1 Contractor shall be responsible for temporary power during construction. The Contractor may use permanent power supplied to site during construction, but shall be responsible for arranging with supplier to suit his requirements. .
- .2 Provide and maintain adequate temporary lighting throughout project. Ensure level of illumination on all floors and stairs meets requirements of Authority Having Jurisdiction.
- .3 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with

prior approval of Owner's Project Manager and Consultant provided that guarantees are not affected. Guarantees will not be initiated until the date of substantial completion. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.

1.9 TEMPORARY COMMUNICATION FACILITIES

- .1 Provide and pay for temporary telephone fax data hook up, lines equipment necessary for own use.

1.10 FIRE PROTECTION

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

1.11 GUARD RAILS AND BARRICADES

- .1 Contractor to provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs. Guard rails and barricades shall be designed by a Professional Engineer in the Province of Ontario.
- .2 Contractor to provide as required by Authorities Having Jurisdiction.

1.12 WEATHER ENCLOSURES

- .1 Contractor to 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.

1.13 DUST TIGHT SCREENS

- .1 Contractor to provide dust tight screens or insulated 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.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

**3.1 TEMPORARY
EROSION AND
SEDIMENTATION
CONTROL**

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-006 or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC 5B-2010 Construction Management Contract-for Services and Construction
 - .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-0121-M1978, Douglas Fir Plywood.
 - .3 CAN/CSA-S269.2-M1987, Access Scaffolding for Construction Purposes.
 - .4 CAN/CSA-Z321-96, Signs and Symbols for the Occupational Environment.
- *Current version of all documents to be referenced

1.2 SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Identify areas which have to be graveled to prevent tracking of mud.
- .3 Indicate use of supplemental or other staging area.
- .4 Provide construction facilities in order to execute work expeditiously.
- .5 Remove from site all such work after use.

1.4 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding ramps ladders swing staging platforms and temporary stairs.

1.5 HOISTING

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

<u>1.6 SITE STORAGE/LOADING</u>	.1	Refer to CCDC 5B-2010
	.2	Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
	.3	Do not load or permit to load any part of Work with weight or force that will endanger Work.
<u>1.7 CONSTRUCTION PARKING</u>	.1	Parking will be permitted on site provided it does not disrupt performance of Work.
	.2	Provide and maintain adequate access to project site.
<u>1.8 OFFICES</u>	.1	Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
	.2	Provide 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.
	.4	.1 Equip office with 1 x 2.4 m table, 8 chairs, 8 m of shelving 300 mm wide, one 3 drawer filing cabinet, one plan rack and one coat rack and shelf.
	.1	Maintain in clean condition.
<u>1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE</u>	.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.
<u>1.10 SANITARY FACILITIES</u>	.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.
<u>1.11 CONSTRUCTION SIGNAGE</u>	.1	Provide and erect project sign, within three weeks of signing Contract, in a location designated by Consultant
<u>1.12 PROTECTION AND</u>	.1	Provide access and temporary relocated roads as necessary to

MAINTENANCE OF
TRAFFIC

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.
- .9 Dust control: adequate to ensure safe operation at all times.
- .10 Provide snow removal during period of Work.

1.13 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily or as required by Authorities Having Jurisdiction.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 TEMPORARY
EROSION AND
SEDIMENTATION
CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-006 or requirements of authorities having jurisdiction, whichever is more stringent.

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 Provide temporary site enclosures with chain link fencing or Modu-Loc fencing 1.8 metres high, as required to restrict access to facility during demolition. Distinguish between all construction zones and occupied areas.
- .2 Provide lockable truck entrance gate gates and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.
- .3 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.
- .4 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.

1.3 GUARD RAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, 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 AND PARTITIONS

- .1 Provide dust tight screens / insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work occupied and public areas. Screens must be structurally sound and impact resistant.

	.2	Maintain and relocate protection until such work is complete.
	.3	Screens will be required at all work abutting occupied spaces.
<u>1.6 ACCESS TO SITE</u>	.1	Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
<u>1.7 PUBLIC TRAFFIC FLOW</u>	.1	Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.
<u>1.8 FIRE ROUTES</u>	.1	Maintain access to property including overhead clearances for use by emergency response vehicles.
	.2	Provide temporary fire routes and signage as required to suit project phasing. Work with Owner to develop temporary fire exit routes.
<u>1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY</u>	.1	Protect surrounding private and public property from damage during performance of Work.
	.2	Document adjacent properties with digital photography and advise residents of any works likely to disturb adjacent properties.
	.3	Be responsible for damage incurred.
<u>1.10 PROTECTION OF BUILDING FINISHES</u>	.1	Provide protection for finished and partially finished building finishes and equipment during performance of Work.
	.2	Provide necessary screens, covers, and hoardings.
	.3	Confirm with Consultant locations and installation schedule 3 days prior to installation.
	.4	Be responsible for damage incurred due to lack of or improper protection.
<u>1.11 WASTE MANAGEMENT AND DISPOSAL</u>	.1	Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 <u>Section Includes</u>	.1	Product quality, availability, storage, handling, protection, and transportation.
	.2	Manufacturer's instructions.
	.3	Quality of Work, coordination and fastenings.
	.4	Existing facilities.
1.2 <u>Related Sections</u>	.1	Section 01 45 00 – Quality Control
	.2	Section 01 73 03 - Execution.
1.3 <u>Reference Standards</u>	.1	Canadian Construction Documents Committee (CCDC)
	.1	CCDC 5B-2010 Construction Management Contract-for Services and Construction
	.2	Within text of each specifications section, reference may be made to reference standards. List of standards reference writing organizations is contained in Section 01 42 00 - References.
	.3	Conform to these reference standards, in whole or in part as specifically requested in specifications.
	.4	If there is question as to whether any product or system is in conformance with applicable standards, Consultant reserves right to have such products or systems tested to prove or disprove conformance.
	.5	Cost for such testing will be borne by Owner in event of conformance with Contract Documents or by Contractor in event of non-conformance.
	.6	Conform to latest date of issue of referenced standards in effect on date of submission of Tenders, except where specific date or issue is specifically noted.
1.4 <u>Quality</u>	.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 Consultant based upon requirements of Contract Documents.

- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .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.
- .6 Where a product is noted as "or approved equal" approval must be obtained prior to close of tenders.

1.5 Availability

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

1.6 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 and trusses 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 Consultant.
- .9 Touch-up damaged factory finished surfaces to Consultant's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.7 Transportation

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

1.8 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 Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant may establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Consultant to require removal and re-installation at no increase in Contract Price or Contract Time.

1.9 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 Consultant if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Consultant 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 Consultant, whose decision is final.

<u>1.10 Co-Ordination</u>	.1	Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.
	.2	Be responsible for coordination and placement of openings, sleeves and accessories.
<u>1.11 Concealment</u>	.1	In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
	.2	Before installation, inform Consultant if there is interference. Install as directed by Consultant.
<u>1.12 Remedial Work</u>	.1	Refer to Section 01 73 03 - Execution Requirements.
	.2	Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.
	.3	Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.
<u>1.13 Location of Fixtures</u>	.1	Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
	.2	Inform Consultant of conflicting installation. Install as directed.
<u>1.14 Fastenings</u>	.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 as 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.

<u>1.15 Fastenings - Equipment</u>	.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.
<u>1.16 Protection of Work in Progress</u>	.1	Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Consultant.
<u>1.17 Existing Utilities</u>	.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, and pedestrian and vehicular traffic.
	.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.
<u>PART 2 - PRODUCTS</u>	1	Not Used.
<u>PART 3 - EXECUTION</u>	1	Not Used

END OF SECTION

PART 1 - GENERAL

1.1 RELATED
SECTIONS

- .1 Instruction to Bidders and General Requirements
- .2 Section 01 45 00 - Quality Control
- .3 Section 31 23 33 - Excavating, Trenching and Backfilling

1.2 REFERENCES

- .1 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC 5B-2010

1.3 QUALIFICATIONS
OF SURVEYOR

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

1.4 SURVEY
REFERENCE POINTS

- .1 Existing base horizontal and vertical control points are designated on drawings.
- .2 The Contractor shall confirm all elevations and/or dimensions on site prior to proceeding with any work.
- .3 The Contractor will provide one (1) reference line in each direction and a reference benchmark on each level. All Sub-contractors shall employ qualified Ontario Land Surveyor to establish and layout all remaining required lines and levels of the project and assume the responsibility for their accuracy and well being and by such procedure will absolve the Consultant and Owner from any costs whatsoever to rectify from any cause.
- .4 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .5 Inform the Consultant immediately if bench marks or reference points are disturbed or damaged by any work and pay for their repair and/or replacement.
- .6 Locate and fix grid lines and locations of walls, partitions, shafts and all parts of the construction as work proceeds including exposed work.
- .7 Make no changes or relocations without prior written notice to Consultant.

1.5 SURVEY
REQUIREMENTS

- .1 Verify grades, lines, levels and dimensions. Indicate and report any errors or inconsistencies to the construction manager in writing before commencing work.

- .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 and berms.
- .5 Establish pipe invert elevations.
- .6 Establish foundation column locations and floor elevations.
- .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 Consultant of findings.
- .2 Submit schedule to and obtain approval from governing authorities and the Consultant for any shut-down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties. Provide a minimum five (5) working days notice of pre-scheduled interface activities affecting utility services or adjacent use of properties.
- .3 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.
- .4 Verify limitations imposed on Project work by presence of utilities and services and ensure no damage occurs to them
- .5 Notify service authorities concerned so that they protect, remove, relocate or disconnect them as they may require.
- .6 Make arrangements and pay for connection charges for services required for Project Work.
- .7 Make arrangements to protect personnel and equipment from danger from utilities and services.

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	Submit field drawings to indicate relative position of various services and equipment when required.
<u>1.8 RECORDS</u>	.1	Maintain a complete, accurate log of control and survey work as it progresses.
	.2	On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work. Survey shall indicate distances from foundations to property lines.
	.3	Record locations of maintained, re-routed and abandoned service lines.
	.4	Verify and record on the record drawings, elevations of footing bearing surfaces, top of footings, new surfaces and existing utilities encountered, all related finish floor or geodetic elevations.
<u>1.9 SUBMITTALS</u>	.1	Submit name and address of Surveyor to Consultant.
	.2	On request of Consultant, 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.
<u>1.10 SUBSURFACE CONDITIONS</u>	.1	Promptly notify Consultant 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 Consultant determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.
<u>PART 2 - PRODUCTS</u>		
<u>2.1 NOT USED</u>	.1	Not Used.
<u>PART 3 - EXECUTION</u>		
<u>3.1 NOT USED</u>	.1	Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED
SECTIONS

- .1 Section 01 35 30 - Safety Requirements
- .2 Section 01 45 00 - Quality Control
- .3 Section 01 51 00 - Temporary Utilities
- .4 Section 01 52 00 - Construction Facilities
- .5 Section 01 61 00 - Common Product Requirements
- .6 Section 01 71 00 - Examination and Preparation
- .7 Section 01 74 21 - Construction Demolition Waste Management and Disposal

1.2 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.
- .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 Date and time work will be executed.

1.3 MATERIALS

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

1.4 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.

1.5 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.

1.6 WASTE
MANAGEMENT AND
DISPOSAL

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

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC 5B-2010
 - .2 OAA/ OGCA Document 100
 - .3 OAA/ OGCA A Guide to Project Closeout Procedures

1.2 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .2 Remove waste materials from site at regularly scheduled times. Do not burn waste materials on site.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site 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.

1.3 FINAL CLEANING

- .1 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

- .2 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.
- .3 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors and.
- .4 Clean lighting reflectors, lenses, and other lighting surfaces.
- .5 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .6 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .7 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .8 Remove dirt and other disfiguration from exterior surfaces.
- .9 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .10 Sweep and wash clean paved areas.
- .11 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .12 Clean roofs, downspouts, and drainage systems.
- .13 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .14 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 WASTE MANAGEMENT GOALS

- .1 Waste Management Goal 75 percent of total Project Waste to be diverted from landfill sites. Provide documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.
- .2 Accomplish maximum control of solid construction waste.
- .3 Preserve environment and prevent pollution and environment damage.

1.2 DEFINITIONS

- .1 Class III: non-hazardous waste - construction renovation and demolition waste.
- .2 Cost/Revenue Analysis Workplan (CRAW): based on information from WRW, and intended as financial tracking tool for determining economic status of waste management practices.
- .3 Inert Fill: inert waste - exclusively asphalt and concrete.
- .4 Materials Source Separation Program (MSSP): consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.
- .5 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .6 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .7 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .8 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from re-modeling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items including pallets or unused products to vendors.

- .9 Separate Condition: refers to waste sorted into individual types.
- .10 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.
- .11 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A.
- .12 Waste Management Co-ordinator (WMC) : contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
- .13 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. Refer to Schedule B. WRW is based on information acquired from WA (Schedule A).

1.3 DOCUMENTS

- .1 Maintain at job site, one copy of following documents:
 - .1 Waste Audit.
 - .2 Waste Reduction Workplan.
 - .3 Material Source Separation Plan.
 - .4 Schedules A B C D E completed for project.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare and submit following prior to project start-up:
 - .1 Submit 2 copies of completed Waste Audit (WA): Schedule A.
 - .2 Submit 2 copies of completed Waste Reduction Workplan (WRW): Schedule B.
 - .3 Submit 2 copies of Materials Source Separation Program (MSSP) description.
- .3 Submit before final payment summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.
 - .1 Failure to submit could result in hold back of final payment.
 - .2 Provide receipts, scale tickets, waybills, and show quantities and types of materials reused, recycled, co-mingled and separated off-site or disposed of.

- .3 For each material reused, sold or recycled from project, include amount in tonnes quantities by number, type and size of items and the destination.
- .4 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill, incinerator or transfer station.

1.5 WASTE AUDIT (WA)

- .1 Conduct WA prior to project start-up.
- .2 Prepare WA: Schedule A.
- .3 Record, on WA - Schedule A, extent to which materials or products used consist of recycled or reused materials or products.

1.6 WASTE REDUCTION WORKPLAN (WRW)

- .1 Prepare WRW prior to project start-up.
- .2 WRW should include but not limited to:
 - .1 Destination of materials listed.
 - .2 Deconstruction/disassembly techniques and sequencing.
 - .3 Schedule for deconstruction/disassembly.
 - .4 Location.
 - .5 Security.
 - .6 Protection.
 - .7 Clear labelling of storage areas.
 - .8 Details on materials handling and removal procedures.
 - .9 Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.
- .3 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
- .4 Describe management of waste.
- .5 Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.
- .6 Post WRW or summary where workers at site are able to review content.
- .7 Set realistic goals for waste reduction, recognize existing barriers and develop strategies to overcome these barriers.
- .8 Monitor and report on waste reduction by documenting total volume and cost of actual waste removed from project.

1.7 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)	.1	Prepare MSSP and have ready for use prior to project start-up.
	.2	Implement MSSP for waste generated on project in compliance with approved methods.
	.3	Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
	.4	Provide containers to deposit reusable and recyclable materials.
	.5	Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
	.6	Locate separated materials in areas which minimize material damage.
	.7	Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition. .1 Transport to approved and authorized recycling facility or to users of material for recycling.
1.8 STORAGE, HANDLING AND PROTECTION	.1	Store, materials to be reused, recycled and salvaged.
	.2	Unless specified otherwise, materials for removal become Contractor's property.
	.3	Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities. .1 On-site source separation is recommended. .2 Remove co-mingled materials to off-site processing facility for separation. .3 Provide waybills for separated materials.
1.9 DISPOSAL OF WASTES	.1	Do not bury rubbish or waste materials.
	.2	Do not dispose of waste volatile materials mineral spirits oil paint thinner into waterways, storm, or sanitary sewers.
	.3	Keep records of construction waste including: .1 Number and size of bins. .2 Waste type of each bin. .3 Total tonnage generated. .4 Tonnage reused or recycled. .5 Reused or recycled waste destination.
	.4	Prepare project summary to verify destination and quantities on

a material-by-material basis as identified in pre-demolition material audit.

1.10 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises.
- .2 Provide temporary security measures as required.

1.11 SCHEDULING

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 APPLICATION

- .1 Do Work in compliance with WRW.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

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

3.3 DIVERSION OF MATERIALS

- .1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, consistent with applicable fire regulations.
 - .1 Mark containers or stockpile areas.
 - .2 Provide instruction on disposal practices.
- .2 On-site sale of salvaged recovered reusable recyclable materials is not permitted.
- .3 Construction Waste:

3.67 CANADIAN

- .1 Schedule E - Government Chief Responsibility

Woodvale Pentecostal Church- Addition
205 Greenbank Road
Hobin Architecture Project No.: 1939

CONSTRUCTION/DEMOLITION
WASTE MANAGEMENT AND
DISAPOSAL

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GOVERNMENTAL
DEPARTMENTS CHIEF
RESPONSIBILITY FOR
THE ENVIRONMENT

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Toronto, ON M4V 1P5
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416-323-4321
800-565-4923
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416-323-4682
Environment Canada Toronto Ontario
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416-734-4494

END OF SECTION

PART 1 - GENERAL

<u>1.1 Section Includes</u>	.1	Administrative procedures preceding preliminary and final inspections of Work.
<u>1.2 Related Sections</u>	.1	Section 01 78 00 - Closeout Submittals.
	.2	Section 01 91 00 - Commissioning.
<u>1.3 References</u>	.1	Canadian Construction Documents Committee (CCDC)
	.1	CCDC 5B-2010 Construction Management Contract-for Services and Construction
	.2	OAA/OGLA Document 100
	.3	OAA/ OGCA A Guide to Project Closeout
<u>1.4 Inspection and Declaration</u>	.1	Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
	.1	Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
	.2	Request Consultant's Inspection.
	.2	Consultant's Inspection: Consultant and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall 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 Branch Fire Commissioner Utility companies and the Authorities Having Jurisdiction have been submitted.
	.5	Operation of systems have been demonstrated to Owner's personnel.
	.6	Work is complete and ready for Final Inspection.
	.4	Final Inspection: when items noted above are completed, request final inspection of Work by Owner, Consultant, and Contractor. If Work is deemed incomplete by Owner and Consultant, complete outstanding items and request reinspection.

- .5 Declaration of Substantial Performance: when Owner and Consultant consider 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 CCDC 5B-2010, General Conditions Article for specifics to application.
- .6 Commencement of Lien and Warranty Periods: date of Owner'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 Owner and Engineer Consultant consider final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. Refer to CCDC 5B-2010. If Work is deemed incomplete by Owner and Consultant, 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 CCDC 5B-2010.

PART 2 - PRODUCTS

- .1 Not Used.

PART 3 - EXECUTION

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

<u>1.1 Section Includes</u>	.1	As-built, samples, and specifications.
	.2	Equipment and systems.
	.3	Product data, materials and finishes, and related information.
	.4	Operation and maintenance data.
	.5	Spare parts, special tools and maintenance materials.
	.6	Warranties and bonds.
	.7	Final site survey.
<u>1.2 Related Sections</u>	.1	Section 01 45 00 - Quality Control.
	.2	Section 01 77 00 - Closeout Procedures.
	.3	Section 01 91 00 - Commissioning.
	.4	Section 01 79 00 - Demonstration and Training.
<u>1.3 Submission</u>	.1	Prepare instructions and data using personnel experienced in maintenance and operation of described products.
	.2	Copy will be returned after final inspection, with Consultant's comments.
	.3	Revise content of documents as required prior to final submittal.
	.4	Two weeks prior to Substantial Performance of the Work, submit to the Consultant, four final copies of operating and maintenance manuals in English.
	.5	Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
	.6	If requested, furnish evidence as to type, source and quality of products provided.
	.7	Defective products will be rejected, regardless of previous

inspections. Replace products at own expense.

1.4 Format

- .8 Pay costs of transportation.
- .1 Organize data in the form of an instructional manual.
- .2 Binders: solid vinyl, 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 Provide 1:1 scaled CAD files in format on diskettes CD.
 - .1 Provide 2-USB Thumb Drives with all product data and operating instructions to match bound version.

1.5 Contents - Each Volume

- .1 Table of Contents: provide title of project;
 - .1 date of submission; names,
 - .2 addresses, and telephone numbers of Consultant 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 clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of

component parts of equipment and systems, to show control and flow diagrams.

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

1.6 As-builts and
Samples

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

1.7 Recording
Actual Site
Conditions

- .1 Record information on set of black line opaque drawings, and in copy of Project Manual.
- .2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.

- .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.
- .5 Specifications: legibly mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
- 1.8 Final Survey
 - .1 Submit final site survey certificate certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.
- 1.9 Equipment and Systems
 - .1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
 - .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
 - .3 Include installed colour coded wiring diagrams.
 - .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
 - .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control.
- .15 Additional requirements: As specified in individual specification sections.

1.10 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.

1.11 Maintenance
Materials

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

1.12 Storage,
Handling and
Protection

- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to site; place and store.
- .4 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

- .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 Consultant.

1.13 Warranties and
Bonds

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
- .4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.
- .5 Verify that documents are in proper form, contain full information, and are notarized.
- .6 Co-execute submittals when required.
- .7 Retain warranties and bonds until time specified for submittal.

PART 2 - PRODUCTS .1 Not Used.

PART 3 - EXECUTION .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 91 13 - General Commissioning CX Requirements
- .3 Section 01 91 51 - Building Management Manual(BMM)
- .5 Division 21 through to 28

1.2 DESCRIPTION

- .1 The Construction Manager will provide the Owner with a specific trade commissioning authority to co-ordinate and verify the Commissioning activities required. These should include but are not limited to HVAC controls and operation, lighting control systems.
- .2 Provide owner with contact names of individual commissioning authorities. These individuals are to be available for owner assistance for one (1) year following substantial completion.
- .3 Appointment of trade specific authority does not in any way relieve the Construction Manager of any commissioning duties. The Commissioning Authorities role is quality control, performance verification and supervision of training delivery.
- .4 Demonstrate operation and maintenance of equipment and systems to Owner and personnel two weeks prior to date of substantial performance.
- .5 Owner will provide list of personnel to receive instructions, and will co-ordinate their attendance at agreed-upon times.

1.3 QUALITY CONTROL

- .1 When specified in individual Sections require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.

1.4 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 Consultant'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.
<u>1.5 CONDITIONS FOR DEMONSTRATIONS</u>	.1	Equipment has been inspected and put into operation in accordance with Division 21 through 28.
	.2	Testing, adjusting, and balancing has been performed in accordance with appropriate specifications division.
	.3	Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.
<u>1.6 PREPARATION</u>	.1	Verify that conditions for demonstration and instructions comply with requirements.
	.2	Verify that designated personnel are present.
<u>1.7 DEMONSTRATION AND INSTRUCTIONS</u>	.1	Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the designated location.
	.2	Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
	.3	Review contents of manual in detail to explain aspects of operation and maintenance.
	.4	Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instructions.
<u>1.8 TIME ALLOCATED FOR INSTRUCTIONS</u>	.1	.1 Section 08 71 10 – Security Hardware/ access system – electric strikes: 1 hour of instruction
		.2 Mechanical System operation 4 hours
		.3 Lighting System operation 2 hours
<u>PART 2 - PRODUCTS</u>		
<u>2.1 NOT USED</u>	.1	Not Used.
<u>PART 3 - EXECUTION</u>		
<u>3.1 NOT USED</u>	.1	Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 Related Requirements

- .1 Section 03 30 00: Cast-in-Place Concrete
- .2 Section 32 13 13: Concrete Paving
- .3 Section 32 16 00: Curbs, Gutters and Sidewalks

1.2 References

- .1 Editions of all Referenced Standards to be the ones designated by the applicable Building Code in force at the time of building permit application, as indicated on Structural Drawings. For Standards not referenced by the Building Code, use the latest editions.
- .2 CSA Group (CSA):
 - .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/ Test Methods and Standard Practices for Concrete
 - .2 CSA O121, Douglas Fir Plywood
 - .3 CSA O141, Softwood LumberCSA O151, Canadian Softwood Plywood
 - .4 CSA O153, Poplar Plywood
 - .5 CSA S269.1, Falsework and Formwork
- .3 American Concrete Institute (ACI):
 - .1 ACI 347, Guide to Formwork for Concrete
- .4 ASTM International (ASTM)
 - .1 ASTM D2240, Standard Test Method for Rubber Property-Durometer Hardness
 - .2 ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
 - .3 ASTM D570, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
 - .4 ASTM D624, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
 - .5 ASTM D638, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
 - .6 ASTM D746, Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact

1.3 Quality Assurance

- .1 Qualifications
 - .1 Engage a Professional Engineer licensed in the place where the project is located to be responsible for design and site review of all formwork, falsework and re-shoring.

1.4 Unit Prices

- .1 Provide unit prices per Section 01 29 00 – Payment procedures.

1.5 Action and Informational Submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Provide shop drawings for formwork and falsework stamped and signed by the Professional Engineer responsible for their design.
 - .2 Show on drawings:
 - .1 Formwork design data: permissible rate of concrete placement and temperature of concrete in forms.
 - .2 Erection sequence.
 - .3 Stripping and re-shoring procedure.
 - .4 Camber.
 - .5 Locations of all construction and control joints in slabs and walls.
 - .6 Equipment and procedure details when slip forming and / or flying forms are used.
 - .7 Shoring of composite steel beams and composite slabs on steel deck.
 - .8 Shoring of existing construction where required to carry construction loads.

PART 2 - PRODUCTS

2.1 Design Requirements

- .1 Design in accordance with CSA S269.1.
- .2 Design formwork and falsework supporting Post-Tensioned Concrete to account for the differences in load distribution before and after pre-stressing. Design supports under beams and at flat slab columns for the additional load which will be attracted from tributary slab areas after pre-stressing. Where cast concrete will move relative to the formwork during stressing, design and detail the contact face of the formwork to accommodate the movement.
- .3 Design temporary lateral bracing for tall concrete walls as required to keep them stable until the permanent structure which will brace them is completed.
- .4 WSP-S accepts no responsibility for structural adequacy of formwork, falsework and re-shoring and will not review its design.

2.2 Materials

- .1 Formwork materials: to CSA S269.1.
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA O121, CSA O141, CSA O151 or CSA O153.
 - .2 For concrete with special architectural features, use formwork materials to CSA A23.1/A23.2.
 - .3 Tubular column forms: round, spirally wound laminated fibre forms, internally treated with release material.
 - .4 Square fibre column forms: tubular column form with fibre board insert locked into place with polystyrene.
 - .5 Stay forms: expanded hot dip galvanized sheet steel, with min. 20 mm (3/4") deep V-shaped ribs and perforations suitable to carry through reinforcing steel.

- .6 Key-creating stay form: hot dip galvanized prefabricated sheet steel box min. 30 mm (1-1/8") deep, with removable cover and dimpled back casing carrying pre-installed bent dowels.
- .7 Form ties:
 - .1 Removable or internally disconnecting tie rods with or without spreader tubes, or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm (1") diameter in concrete surface.
 - .2 Form ties to be designed to act as ties and spreaders and to have a minimum working strength of 13 kN (3000 pounds).
 - .3 Snap ties to snap cleanly at least 25 mm (1") from concrete surface without damage to the concrete.
- .8 Form liner: high density overlay plywood to CSA O121 or other special materials to achieve the required concrete finish.
- .9 Form stripping agent: colourless mineral oil, non-toxic, low VOC, free of kerosene, with viscosity between 15 to 24 mm²/s (70 and 110s Saybolt Universal) at 40°C, flashpoint minimum 150°C, open cup.
- .10 Grooves, reglets and chamfers: White pine selected for straightness and accurately dressed to size.
- .2 Falsework materials: to CSA S269.1.
- .3 Void Form: Cellular cardboard with minimum compressive strength of 62 kPa (9 psi) designed to carry weight of wet concrete and loads associated with placing concrete and also designed to disintegrate and create an air space below the fully hardened concrete.
- .4 Frost cushion: expanded polystyrene, non-degradable, minimum compressive strength 27.5 kPa, configured to compensate for frost swelling of underlying soils and designed to carry a maximum load of 24 kPa with 5% deformation.

2.3 Accessories

- .1 PVC Waterstops: flexible, extruded, heat weldable, ribbed as follows:
 - .1 Tensile strength: to ASTM D638, minimum 13 MPa.
 - .2 Ultimate elongation: to ASTM D638, minimum 350%.
 - .3 Water absorption: to ASTM D570, 0.15% max.
 - .4 Tear resistance: to ASTM D624, minimum 50 kN/m.
 - .5 Low temperature brittleness: to ASTM D746, no failure at -37°C.
 - .6 Width in construction joints: 100 mm (4") min.
 - .7 Width in control joints: 150 mm (4") min; if surface mounted, with 25 (1") deep centre key to create reglet.
 - .8 Width in expansion joints: 225 mm (9"), with 31 mm (1-1/4") O.D. centre bulb.
- .2 Swellable Waterstops
 - .1 Bentonite Waterstops - composed of 75% sodium bentonite and 25% butyl rubber, rectangular, flexible, min 200% expansion after 21 day aging.
 - .2 Extrudable waterstops - one part polyurethane, bentonite free, 100% expansion after 7 days.

- .3 Co-extruded expending rubber waterstops, comprised of non-bentonite, modified hydrotite and chloroprene rubber forming cellular section, protected by delay action coating. Nominal size 10mm (3/8") thick x 20mm (3/4") wide.
 - .1 Tensile strength: to ASTM D412, 2.4 MPa min.
 - .2 Elongation: to ASTM D412, 400% min.
 - .3 Hardness: to ASTM D2240, 50 +/- 5 per Shore A scale.
- .3 Dovetail anchor slots: minimum 0.6 mm thick galvanized steel with insulation filled slots.
- .4 Weep hole tubes: plastic.

PART 3 - EXECUTION

3.1 Fabrication and Erection

- .1 Confirm to CSA A23.1.
- .2 Fabricate and erect falsework in accordance with CSA S269.1.
- .3 Do not place shores and mud sills on frozen ground.
- .4 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .5 Fabricate and erect formwork in accordance with CSA S269.1 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA A23.1/A23.2.
- .6 Make formwork tight and flush faced to prevent the leakage of mortar and the creation of unspecified fins or panel outlines.
- .7 Form sides of footings unless Structural Drawings and Geotechnical report allow use of earth forms.
- .8 See drawings for any camber required in hardened concrete. Measure cambers relative to member supports.
- .9 Obtain WSP-S approval for formed openings, slots and chases not indicated on Structural Drawings.
- .10 Provide water stops and keys around temporary openings in basement and retaining walls for shoring rakers or similar purposes.
- .11 Do not permit loads from formwork to be transmitted to adjacent existing structure.
- .12 Apply a form coating and release agent uniformly to the contact surface of formwork panels before reuse.
- .13 Use 25 mm (1") chamfer strips on external corners, unless specified otherwise. Note that chamfers are not necessarily shown on drawings, for drafting simplicity.
- .14 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated on Architectural and Structural drawings.
- .15 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
- .16 Anchors and inserts not to protrude beyond surfaces designated to receive applied finishes, including painting.
- .17 Clean formwork in accordance with CSA A23.1/A23.2, before placing concrete.

- .18 Provide vertical dovetail anchor slots at 600 mm (2'-0") on centre where masonry veneer covers face of concrete.
- .19 Build top form on sloping concrete where required to prevent concrete from flowing out of the form. Provide vents to allow air and bleed water to escape.
- .20 Do not close wall forms before reinforcing steel has been reviewed by WSP-S.
- .21 Where removable tie rods are used for form ties, plug and seal tie holes to maintain the fire resistance, gas impermeability, soundproofing and waterproofing of the adjacent concrete.
- .22 Provide lateral bracing as required to keep walls stable after formwork removal.

Void form:

- .1 Conform to manufacturer's recommendations.
 - .2 Place on sand leveling bed.
 - .3 Protect from moisture until concrete is about to be placed.
 - .4 Protect from excessive construction loads. Overlay with max. 3 mm (1/8") thick fibreboard if required to protect it from damage during construction.
 - .5 If void form collapses during construction, remove and replace affected area.
- .23 Frost cushion:
- .1 Store on site on raised platforms protected with lightproof cover.
 - .2 Place at bottom of form with flat surface facing upward.
 - .3 Provide plywood overlay as required to distribute stresses from point loads.

3.2 Joints

- .1 Refer to Typical Details and Drawings Notes for locations, detailing and maximum spacing requirements of all concrete joints.
- .2 Provide construction joints in formed slab and slab on deck.
- .3 Provide evenly spaced vertical control joints in walls.
- .4 Provide expansion joints where shown on Structural Drawings. Remove all forming and filler material used during construction and provide clear space between structural elements equal to width specified.
- .5 Provide construction gaps (closure strips) where shown on Structural Drawings.
- .6 Refer to Section 03 30 00 for construction joints, sawcut joints, expansion / contraction joints and isolation joints in slab on grade and concrete toppings (as applicable).

3.3 Waterstops

- .1 PVC Waterstops:
- .1 Provide PVC waterstops for expansion, construction and control joints in exterior walls, basement walls, retaining walls, tanks walls, slabs supporting earth, and at other locations shown.
 - .2 Do not use surface mounted waterstops at control joints which will be protected by hot applied waterproofing.
 - .3 Do not nail surface mounted waterstops against blindsided waterproofing unless approved by the waterproofing supplier.

- .4 Use equipment to manufacturer's requirements to field splice waterstops for continuity over the full length of runs.
- .5 Use only straight heat-sealed butt joints in the field.
- .6 Use factory welded corners and intersections.
- .7 Securely tie waterstops to reinforcing bars at 1m (3') maximum centres to keep them in alignment when concrete is placed.
- .2 Swellable Waterstops:
 - .1 Provide swellable waterstops for construction and temporary joints in exterior walls, basement walls, retaining walls, slabs supporting earth and at other locations shown where minimum required distance to concrete edge can be achieved. Do not use for expansion joints.
 - .2 Bentonite waterstops:
 - .1 Locate bentonite waterstops 75 mm (3") clear from outside face of concrete to avoid spalling of concrete due to swelling pressure of bentonite.
 - .2 Butt strips together. Do not overlap.
 - .3 Adhere to concrete with continuously applied adhesive in conjunction with mechanical fasteners (where required).
 - .3 Extrudable waterstops:
 - .1 Locate extrudable waterstops 100 mm (4") clear from outside face of concrete to avoid spalling of concrete due to swelling pressure.
 - .2 Refer to manufacturer's specifications for application temperature range.
 - .3 Refer to manufacturers specifications for recommended profile size and number of profiles suitable for particular concrete thickness.
 - .4 Co-extruded expanding rubber waterstops:
 - .1 Locate co-extruded rubber waterstops min. 50 mm (2") clear from outside face of concrete to avoid spalling of concrete due to swelling pressure.
 - .2 Splice waterstops by gluing square / mitered cut ends together, using cyanoacrylate adhesive.
 - .3 Continuously adhere to concrete with peel and stick adhesive backing or with hydrotite adhesive applied to both the waterstop and the concrete surfaces.

3.4 Concrete Exposed to View

- .1 Minimize formwork joints. Locate joints and ties in a uniform pattern with no ties within 300 mm (12") of an edge or joint.
- .2 Make panels forming slab soffits and wall / beam faces as large as possible, and arrange symmetrically.
- .3 Make form joints in columns level from column to column and consistent with form joints in other parts of the structure. Locate lowest horizontal form joints 2400 mm (8'-0") above finished floor elevation.
- .4 Where grooves, reglets or chamfers are shown, locate panel form joints to be hidden behind them.

- .5 Provide reglets at all concrete joints.
- .6 Seal all joints in formwork and between formwork and concrete.
- .7 Place chamfers at member corners unless architectural details show an alternative profile. When beams are supported on columns of the same width, extend chamfer across face of column.
- .8 Do not reuse formwork if there is any evidence of surface damage or wear, which could impair the visual quality of the concrete surface.
- .9 Reuse forms only on identical sections, using the original tie holes. Clean forms and fill nail holes before reuse.
- .10 Use only galvanized nails.
- .11 Where removable tie rods are used for form ties, remove tie cones and plug holes with precast concrete plugs bonded to concrete using a pre-approved adhesive.

3.5 Removal and Reshoring

- .1 Conform to CSA A23.1 and to ACI 347.
- .2 Survey top of formwork and slab elevations before concrete placement, prior and after falsework removal, refer to drawing notes for detailed requirements. Submit survey data for WSP-S record.
- .3 Use pullout tests, on-site cured cylinders (kept beside and treated as the concrete in the structure they represent) or maturity tests to determine in-situ strength of concrete prior to removal of falsework. Do not locate pullout inserts on concrete surfaces exposed to view. Retain a testing company to supply, locate and test the inserts in accordance with ASTM C900.
- .4 Maintain falsework supporting beams and slabs until concrete has reached at least 75% of its specified strength.
- .5 Maintain bracing of walls until the permanent structure which will brace them is completed.
- .6 Keep falsework or reshoring in place until concrete reaches the specified design strength, but not less than 28 days. If reshoring is installed to replace falsework, strip and re-shore simultaneously so that no more than 9 m² of soffit is left unsupported by either formwork or reshoring at any time.
- .7 Install reshores tight to structure above and below so that they do not shorten under load. Do not pre-load or lift the structure above by overtightening.
- .8 When a floor is required to support weight of newly placed concrete on the floor above, provide not less than two levels of re-shoring below it (so that the new concrete load is shared by three levels) and maintain until the newly placed concrete above has reached at least 75% of the specified 28 day strength. If the new structure above is thicker than the floors supporting it, more than two levels of reshoring may be required.
- .9 Construction joints: maintain falsework supporting beams and slab adjacent to the construction joint until the concrete beyond the joint reaches at least 75% of its specified 28 day strength.
- .10 Construction gaps: Do not remove falsework supporting beams and slabs adjacent to construction gaps until the gaps are filled and concrete in gaps has reached at least 75% of its specified 28 day strength.
- .11 Post-tensioned concrete: Remove slab and beam side forms prior to stressing. Do not remove falsework supporting beams and slabs until stressing of the area is complete. Re-tightened reshores after stressing.

- .12 Re-use formwork and falsework subject to requirements of CSA A23.1/A23.2.

3.6 Field Quality Control

- .1 Refer to Section 01 45 00 - Quality Control.
- .2 Obtain field review of falsework and reshoring by the Professional Engineer responsible for that work prior to each pour. WSP-S will not field review the formwork, falsework or reshoring.

3.7 Cleaning

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal and 01 35 21 – LEED Requirements.

END OF SECTION 03 10 00

PART 1 - GENERAL

1.1 Related Requirements

- .1 Section 04 22 00: Concrete Unit Masonry
- .2 Section 32 13 13: Concrete Paving
- .3 Section 32 16 00: Curbs, Gutters and Sidewalks

1.2 References

- .1 Editions of all Referenced Standards to be the ones designated by the applicable Building Code in force at the time of building permit application, as indicated on Structural Drawings. For Standards not referenced by the Building Code, use the latest editions.
- .2 CSA Group (CSA):
 - .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
 - .2 CSA G30.18, Carbon Steel Bars for Concrete Reinforcement
 - .3 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .4 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction
- .3 Reinforcing Steel Institute of Canada (RSIC):
 - .1 Reinforcing Steel Manual of Standard Practice
- .4 American Concrete Institute (ACI):
 - .1 ACI SP-66, ACI Detailing Manual
- .5 ASTM International Inc.(ASTM):
 - .1 ASTM A1064/A1064M, Standard Specification for Carbon Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
 - .2 ASTM A775/A775M, Standard Specification for Epoxy-Coated Reinforcing Steel
 - .3 ASTM D3963 / D3963M, Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars
 - .4 ASTM A1044 / A1044M, Standard Specification for Steel Stud Assemblies for Shear Reinforcement of Concrete

1.3 Quality Assurance

- .1 Qualifications:
 - .1 Welding of reinforcing steel to be performed by welders certified under CSA W186.
 - .2 Shear stud reinforcing to be fabricated in an ICC ES approved facility.

1.4 Quality Control

- .1 Submit in accordance with Section 01 45 00 - Quality Control.
- .2 Source Quality Control Submittals:

- .1 Upon request, provide WSP-S with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis.
- .2 Upon request, inform WSP-S of proposed source of reinforcement material to be supplied.
- .3 Upon request, provide WSP-S with a copy of plant certificate by the Concrete Reinforcing Steel Institute for epoxy coating of reinforcement.
- .4 Upon request, provide WSP-S with a copy of manufacturer's instructions for patching factory applied epoxy coating.

1.5 Unit Prices

- .1 Provide unit prices per Section 01 29 00 – Payment Procedures.

1.6 Action and Informational Submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's data sheets for mechanical rebar splices.
- .3 Shop Drawings:
 - .1 Prepare shop drawings in accordance with RSIC Manual of Standard Practice unless the Contract Documents contain a more stringent requirement. Conform to ACI SP-66 Detailing Manual whenever a detail condition is not covered by any of the above.
 - .2 Submit plans, elevations, sections and details necessary to fabricate, place and review reinforcement without reference to structural drawings, including masonry wall reinforcement. Draw to scale not smaller than 1:50 ($\frac{1}{4}" = 1'-0"$).
 - .3 Show on drawings:
 - .1 Sizes, spacings and locations of reinforcement, with identifying labels.
 - .2 Bar bending details.
 - .3 Lengths and locations of all lap splices.
 - .4 Types and locations of mechanical splices.
 - .5 Placing sequence.
 - .6 Large scale details at areas of steel concentration (such as column / beam / wall intersections), and around cast-ins.
 - .7 Bar lists.
 - .8 Quantities of reinforcement (including all rebar added to accommodate installation).
 - .9 Sizes, spacings and locations of chairs, spacers and hangers.
 - .10 Construction joint, control joint and pour gap locations.
 - .11 Strip dimensions for flat slab and flat plate.
 - .12 Concrete cover.
 - .13 Details and layouts of shear stud reinforcing.
 - .14 Rebar to be site bent.

- .4 Do not release for fabrication reinforcing bars whose length may be affected by field conditions, such as the final elevation of footings, until obtaining the required field measurements.

PART 2 - PRODUCTS

2.1 Materials

- .1 Reinforcing steel: carbon steel, deformed bars to CSA G30.18, unless indicated otherwise.
- .2 Weldable Reinforcing steel: weldable low alloy steel deformed bars to CSA G30.18.
- .3 Stainless Reinforcing steel: deformed bars to ASTM A955/A955M.
- .4 Cold-drawn annealed steel wire ties: to ASTM A1064/A1064M.
- .5 Welded steel wire fabric: to ASTM A1064/A1064M. Provide in flat sheets only.
- .6 Epoxy Coating of reinforcement: to ASTM A775/A775M.
- .7 Chairs, bolsters, bar supports, spacers: to CSA A23.1/A23.2.
- .8 Mechanical splices: to concentrically align bars and develop specified tensile strength of rebar. Threaded couplers to have plastic internal coupler thread protectors.
- .9 Rebar terminators: oversized taper-threaded couplings capable to develop specified tensile strength of rebar; area to be not less than 5 times the rebar area.
- .10 Plain round bars: to CSA G40.20/G40.21.
- .11 Shear stud reinforcing: per ASTM A1044. Min yield strength for studs – 350 MPa, for rails – 300 MPa.
- .12 Expansion cap for dowels at expansion / contraction joints: plastic, tight fitting, with internal pin to locate dowel and create void for expansion.

PART 3 - EXECUTION

3.1 Fabrication

- .1 Fabricate reinforcing steel in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice.
- .2 Fabricate epoxy coated reinforcing steel in accordance with ASTM D3963/D3963M. Provide colour to contrast sharply with reinforcing steel and rust colour.
- .3 Stagger mechanical splices 750 mm (2'-6") unless otherwise noted on drawings.
- .4 Weld reinforcement in accordance with CSA W186 where indicated.
- .5 Fabricate shear stud reinforcing according to ASTM A1044. Weld studs to rail to develop yield strength of stud.
- .6 Ship bundles of bar reinforcement, clearly identified in accordance with bar lists.
- .7 Provide standard hooks at ends of all hooked bars.
- .8 Where drawings indicate "L" dowels from foundation walls to slabs on grade, supply and install straight bars to be field bent.
- .9 Substitute different size bars only if permitted in writing by WSP-S.

3.2 Field Bending

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by WSP-S.

- .2 When field bending is indicated or authorized, bend without heat, applying slow and steady pressure. Use tools which will limit bend radii to the values given in CSA A23.1.
- .3 Where key-creating stay form with pre-installed blind dowels is used, bend the dowels out using special tools approved by the stay form manufacturer.
- .4 Replace bars which develop cracks or splits.

3.3 Placing Reinforcement

- .1 Place reinforcing steel in accordance with contract documents and CSA A23.1 / A23.2.
- .2 Use only the placing drawings reviewed by WSP-S.
- .3 Remove all loose scale, dirt, oil or other coatings which would reduce bond.
- .4 Ensure cover to reinforcement is maintained during concrete pour.
- .5 Turn ends of tie wire towards the interior of concrete.
- .6 Support bars, chairs and spacers:
 - .1 Provide sufficient support bars, chairs, carriers and side form spacers as necessary to secure against displacement of reinforcement and maintain concrete cover before and during concrete placement. Support devices contacting surfaces exposed to the exterior to be non-corroding. Bars which are not shown on Structural Drawings and whose only function is supporting other reinforcing in lieu of other supporting devices to be considered accessories.
 - .2 Use bar supports for beams and slabs.
 - .3 Use side form spacers for walls and columns.
 - .4 Use plastic or plastic tipped bar supports and spacer with colour to match concrete for exposed concrete surfaces.
 - .5 Use plastic bar supports, epoxy coated support bars and plastic-coated tie wire for epoxy coated reinforcement.
 - .6 Use precast concrete chairs where supports rest on the ground. Where welded wire fabric is used in slabs-on-grade, place precast concrete chairs at 600 mm (2'-0") on centre each way. Do not attempt to position welded wire fabric by lifting it after concrete is poured.
- .7 Do not splice reinforcing at locations other than shown on placing or structural drawings without WSP-S written approval.
- .8 Do not cut reinforcement without WSP-S written approval.
- .9 Unless otherwise noted on drawings, stagger alternate mechanical couplers 750 mm (2'-6") apart.
- .10 Install end bearing compression splices so that bearing ends are fitted to within 3 degrees of full bearing after splice installed.
- .11 Do not field weld reinforcement except where indicated or authorized by WSP-S.
- .12 Do not weld epoxy coated reinforcement.
- .13 Bend dowels from foundation walls to slab on grade (supplied and installed straight) only after soil compaction against the wall has been completed.

3.4 Field Touch-Up

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

3.5 Cleaning

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal and 01 35 21 – LEED Requirements.

END OF SECTION 03 20 00

PART 1 - GENERAL

1.1 Related Requirements

- .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 03 35 46: Concrete Floor Hardening
- .5 Section 05 12 23: Structural Steel for Buildings
- .6 Section 32 13 13: Concrete Paving
- .7 Section 32 16 00: Curbs, Gutters and Sidewalks

1.2 References

- .1 Editions of all Referenced Standards to be the ones designated by the applicable Building Code in force at the time of building permit application, as indicated on Structural Drawings. For Standards not referenced by the Building Code, use the latest editions.
- .2 CSA Group (CSA):
 - .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/ Test Methods and Standard Practices for Concrete
 - .2 CSA A283, Qualification Code for Concrete Testing Laboratories
 - .3 CSA A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005)
- .3 ASTM International (ASTM):
 - .1 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - .2 ASTM C920 – Standard Specification for Elastomeric Joint Sealants
 - .3 ASTM D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
 - .4 ASTM E1155M Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Number (Metric)
 - .5 ASTM C1059, Standard Specifications for Latex Agents for Bonding Fresh to Hardened Concrete
- .4 Canadian General Standards Board (CGSB):
 - .1 CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction

1.3 Quality Assurance

- .1 Qualifications:
 - .1 Concrete supplier to have a valid "Certificate of Ready Mixed Concrete Production Facilities" issued by the relevant Ready Mixed Concrete Association.

.2 Samples:

- .1 Include construction joints to be used.
 - .2 Use the same materials and workmanship as will be employed for the actual Work.
 - .3 Include a repaired area for each sample.
 - .4 If a sample does not meet the standard of quality specified for the Work, construct additional samples until the required standard is achieved and accepted.
 - .5 The accepted samples to be the minimum standard of quality for Work. Do not proceed until the samples are accepted by the Architect.
- .2 Steel fibre reinforced slab on grade: Submit samples of steel fibres and construction joint dowels with sleeves.

1.4 Quality Control

- .1 Submit in accordance with Section 01 45 00 - Quality Control.
- .2 Minimum two weeks prior to starting concrete work, provide valid certificate from plant delivering concrete.
 - .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.
- .3 Minimum four weeks prior to starting concrete work, provide proposed quality control procedures on following items:
 - .1 Hot weather concrete.
 - .2 Cold weather concrete.
 - .3 Finishing.
 - .4 Protection.

1.5 Unit Prices

- .1 Provide unit prices per Section 01 29 00 – Payment Procedures.

1.6 Administrative Requirements

- .1 Pre-installation Meeting: convene pre-installation meeting one week prior to beginning concrete works. Ensure key personnel to attend.
- .2 Batch Logs: keep record of each batch delivered to site.
- .3 Concrete Delivery Slips: Keep all concrete delivery slips ("driver's tickets") on site until building is completed. Record on delivery slip where concrete was placed, including time and date.

1.7 Action and Informational Submittals

- .1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Minimum 2 weeks prior to starting concrete work, submit all concrete mix designs, and indicate where each concrete mix is to be used.
- .3 Minimum 2 weeks prior to placing concrete, submit drawings showing proposed locations of all construction and control joints (including wall and slab on grade control joints) for WSP-S review and approval.

- .4 Provide composite sleeving drawings showing sleeves required by all trades.
- .5 Provide composite layout drawings showing all cast in place pipes and conduits.
- .6 Minimum submission requirements for each concrete mix design shall include the following:
 - .1 Minimum specified compressive strength at 28 days (or at the time specified on drawings).
 - .2 Maximum aggregate size.
 - .3 Aggregate type (if not normal density).
 - .4 Concrete density range, wet and dry (if not normal density).
 - .5 CSA exposure class.
 - .6 Cement type (if not type GU).
 - .7 Percentage and type of supplemental cementing materials.
 - .8 Maximum water/cementitious materials ratio.
 - .9 Slump at point of discharge.
 - .10 Assumed method of placement of concrete.
 - .11 Corrosion inhibitor (name and quantity, if applicable).
 - .12 Plastic or steel fibres (type, name and quantity, if applicable).
 - .13 Alkali-aggregate resistance.
 - .14 Architectural requirements (colour of cement and aggregate, if applicable).
 - .15 Maximum time from batching to placing concrete (if retarding admixtures are used).
- .7 Concrete pours: provide accurate records of all concrete pours marked on a set of Structural Drawings.
- .8 Flatness and levelness: when requested, submit measurements of slab tolerances for each concrete pour.
- .9 On completion of the works, provide written report to WSP-S certifying that the concrete in place meets performance requirements established in **PART 2 - PRODUCTS**.

PART 2 - PRODUCTS

2.1 Design Criteria

- .1 To CSA A23.1/A23.2, Alternative 1 – Performance, and as described under Mixes and on Structural Drawings.
 - .1 Chose fibre type and dosage to control cracking and to enable slab on grade of specified thickness to safely support loads indicated on Structural Drawings.
 - .2 Check slabs in centre of panel, at slab edges, at slab corners, at control joints and at construction joints.
 - .3 Design dowels at construction joints.

2.2 Performance Criteria

- .1 Concrete supplier to meet the concrete performance criteria established by WSP-S and to provide verification of compliance.

2.3 Materials

- .1 Portland cement: to CSA A3001.
- .2 Cementitious hydraulic slag: to CSA A3000.
- .3 Fly ash: to CSA A3001, Type CI.
- .4 Water: to CSA A23.1.
- .5 Aggregates: to CSA A23.1/A23.2. Do not use recycled concrete as aggregate.
- .6 Admixtures: not to contain chlorides.
- .7 Corrosion-inhibiting admixture: calcium nitrite solution.
- .8 Plastic fibre additive: fibrillated polypropylene micro fibres at least 19 mm (3/4") in length.
- .9 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2. Minimum compressive strength: 40 MPa at 28 days.
- .10 Non premixed dry pack grout: composition of non metallic aggregate and Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 40 MPa at 28 days.
- .11 Curing/sealing compound: to CSA A23.1/A23.2 and ASTM C309, Type 1, Class B, water based acrylic, compatible with surface hardener where hardener is used.
- .12 Pre-moulded joint fillers: min. 12 (1/2") bituminous impregnated fiber board to ASTM D1751.
- .13 Compressible filler: flexible polyethylene closed cell expansion joint filler to ASTM D 4819, type II.
- .14 Joint Sealants: to ASTM C920, class 100/50.
- .15 Weep hole tubes: plastic.
- .16 Evaporation reducer: water based polymer liquid forming continuous monomolecular temporary film on fresh concrete surface.
- .17 Penetrating sealer: water based, clear water repellent, at least equivalent to AT&U Type 1b as specified in Alberta Infrastructure and Transportation Publication B388.
- .18 Bonding adhesive: synthetic latex per ASTM C1059.
- .19 Non-slip nosing inserts for concrete stairs: fine aluminum oxide strips, 6 mm (1/4") wide x 10 mm (3/8") deep.
- .20 Rigid insulation: extruded polystyrene boards per ASTM C578, structural grade, compressive strength 40 psi (275 kPa).
- .21 Control joint filler: semi-rigid two component epoxy or polyurea with 100% solids, Shore A hardness (per ASTM D2240) min. 85, tensile strength at 7 days (per ASTM D638 or ASTM D412) min 5.0 MPa.
 - .1 For sawcuts in exterior slabs and in slabs in vehicle accessible areas use only polyurea fillers.
- .22 Pre-formed control joint: two piece pre-assembled "T" shaped plastic; detachable top segment, minimum depth of vertical segment equal to 1/4 of slab thickness.
- .23 Continuous sliding bearing:

- .1 Two layers of polyolefin, or two layers of promine covered with rubber top and bottom, approximately 6 mm (1/4") in overall thickness.
- .2 Deformation under 13.8 MPa at 22°C not to exceed 10% when tested for 24 hours.
- .24 Elastomeric bearing pads:
 - .1 Virgin natural polyisoprene or virgin polychloroprene (Neoprene) conforming to CSA S6.
- .25 Prefabricated Seepage Protection System: polymer core with a geotextile laminated on one side.
- .26 Crack Filler: low viscosity epoxy resin.
- .27 Bond Breaker: 0.25 mm (10 mil) polyethylene or grade D, 30 minute building paper perforated with 8 mm (5/16") holes at 150 mm (6") centres, each way.

2.4 Concrete Mixes

- .1 Use ready-mix concrete. Proportion concrete in accordance with CSA A23.1, Alternative 1 - Performance Method for Specifying Concrete.
- .2 Set performance characteristics of concrete in plastic state in coordination with all trades involved.
- .3 Meet performance criteria of concrete in hardened state as shown on Structural Drawings and provide verification of compliance.
- .4 Do not use admixtures containing chlorides.
- .5 supplementary cementing materials (SCM):
 - .1 Conform to CSA A23.1.
 - .2 Follow slag and fly ash manufacturers' directions for proportioning and mixing of concrete.
 - .3 Avoid using SCM in architecturally exposed concrete. If necessary to achieve the required exposure classification, SCM not to affect colour and texture of finished concrete.
 - .4 Do not use concrete with more than 40% of SCM when ambient temperature is forecast to be below +10°C at the time of concrete pour and during the seven days after the pour, except for footings, walls and columns.
 - .5 Reduce W/C ratio to 0.45 where using more than 40% of SCM in concrete for slabs and other horizontal finished surfaces, in order to reduce bleed water and to increase rate or strength gain.

PART 3 - EXECUTION

3.1 Preparation

- .1 Provide advanced notice as indicated on drawings to allow WSP-S field review of reinforcing prior to placing of concrete/closing of wall forms.
- .2 Obtain WSP-S written approval before placing concrete.
- .3 Obtain written approval of each foundation bearing surface by the Geotechnical Consultant before placing concrete.
- .4 Remove water and disturbed soil from excavations before placing concrete.

- .5 Before placing slab-on-grade, confirm that subgrade and backfill meet specifications and are free of frost and surface water.
- .6 Provide bondbreaker under unbonded concrete topping. Attach to base slab, lap min. 150 mm (6") and seal.
- .7 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.

3.2 Installation/Application

- .1 Set sleeves, conduits, pipe hangers, weep hole tubes, drains and other inserts and openings as indicated or specified elsewhere.
- .2 Refer to Typical Details and Drawing Notes for placing guidelines, maximum size and minimum spacing of sleeves, embedded pipes and conduits.
- .3 Check locations and sizes of sleeves and openings shown on Structural Drawings with Architectural, Mechanical and Electrical Drawings. Notify WSP-S of any discrepancies.
- .4 Obtain WSP-S approval for any required sleeves and openings which are not shown on Structural Drawings or reviewed sleeving drawings.
- .5 Set special inserts for strength testing as required for non destructive method of testing concrete.
- .6 Set anchor rods using templates under supervision of appropriate trade prior to placing concrete. Locate each anchor rod group to within 6 mm (1/4") of required location.
- .7 Refer to Section 03 10 00 for construction joint requirements.

3.3 Placing Concrete

- .1 Place concrete in accordance with CSA A23.1.
- .2 Delivery and place concrete with minimum re-handling.
- .3 If concrete is pumped or placed pneumatically, control discharge velocity to prevent separation or scattering of concrete mix ingredients.
- .4 Place concrete in a continuous operation without cold joints. If cold joints develop inadvertently, notify WSP-S to obtain instructions for required remedial work.
- .5 Where higher strength concrete needs to be puddled in slabs above columns and walls, place adjacent lower strength slab concrete within 30 minutes of pouring the puddled concrete.
- .6 Do not overload forms.
- .7 Use rubber tipped vibrators for concrete containing epoxy coated reinforcement.
- .8 Cast slabs and beams at least two hours after casting the supporting columns and walls.
- .9 Cast slabs with a top surface that is level or sloping as required by the Drawings. Allow for cambering where required.
- .10 Where steel beams are used, ensure that slab thickness is as specified. Measure from top of steel to control thickness.
- .11 Concrete exposed to view:
 - .1 Exposed surfaces to be dense, even, uniform in colour, texture and distribution of exposed aggregate.
 - .2 Defects such as honeycombing, voids, loss of fines, visible flow lines, cold joints or excessive bug holes may be cause for rejection at the discretion of the Architect.

- .12 Maintain accurate records of all poured concrete including extent, date and location of each pour, concrete mix used, ambient air temperature, test samples taken and falsework removal date and mark on a set of Structural Drawings.

3.4 Finishing Concrete

- .1 Finish concrete to CSA A23.1/A23.2.
- .2 Cooperate with any trade applying finishes to concrete surfaces and provide surfaces which will ensure adequate bond. Provide chases and reglets where required.
- .3 **Finishing Flatwork:**
 - .1 See Section 03 35 00 - Concrete Floor Finishing.
 - .2 Protect concrete during finishing process. Use evaporation reducer during severe drying conditions.
 - .3 Provide final finish in accordance with proposed use and as follows:
 - .1 Screeded and bull floated for: mud slabs and footings/pile caps.
 - .2 Screeded and bull floated with scratch finish for: base slabs which receive mortar setting beds or bonded toppings.
 - .3 Powered float finish for: roofs (except future floors) and slabs which receive a membrane.
 - .4 Wood float finish with brooming for: exterior exposed slabs.
 - .5 Powered steel trowel finish for: interior exposed slabs, slabs which receive resilient flooring, carpet, epoxy-based finishes, thin-set tiles, etc. and future floors. Do not trowel air entrained concrete.
 - .6 Steel trowel exposed interior concrete floors at least twice. Provide final spin troweling when non-slip finish is required.
 - .7 Incorporate hardener into the surface of the concrete while concrete is still plastic.
 - .8 Follow manufacturer's recommendations for dosage and application procedure.
 - .9 Where coloured hardeners are required, colour will be selected from available colours by the Architect.
 - .10 Hold pre-construction meeting with hardener technical representative and finisher to ensure proper application, curing and protection.
- .4 **Finishing Formed Surfaces:**
 - .1 Completely fill holes left by through-bolts with grout.
 - .2 Do not patch surfaces until instructed in writing by WSP-S.
 - .3 Concrete exposed to view:
 - .1 Provide smooth-form finish.
 - .2 Rub exposed sharp edges with carborundum to produce 3 mm (1/8") radius edges unless otherwise indicated.

3.5 Concrete Curing and Protection

- .1 At a minimum cure and protect concrete in accordance with CSA A23.1

- .2 Extend curing and protection period until concrete has reached following strength levels for structural safety:
 - .1 Framed slabs and beams: 75% of specified 28 day strength.
 - .2 Columns, walls, piers and footings: 50% of specified 28 day strength
- .3 For concrete containing supplementary cementing materials, curing and protection times may need to be extended beyond those outlined by CSA A23.1 to achieve the required structural properties.
- .4 Cure slab surfaces immediately after finishing is completed. Unless otherwise noted or required, use a curing compound compatible with applied finishes.
- .5 Do not use curing compound on parking garage slabs and where bonded topping is to be applied. Cover slab surfaces with absorptive mat or fabric and keep continuously wet.
- .6 Slabs on grade and structural slabs receiving resilient floor or other moisture sensitive finishes:
 - .1 Apply 24 hours of continuous sprinkling with water. Start immediately after finishing slab.
 - .2 Cover slab for at least the following 72 hours using plastic sheets with joints taped and free edges covered.
 - .3 Protect finished and cured slab from surface water (i.e. rain, snow).
 - .4 Refer to Architectural Specifications for required testing methods prior to placing floor finishes.
- .7 Concrete exposed to view:
 - .1 Protect during construction period from wear, damage, marking, discolouration, staining and becoming coated with concrete leakage.
 - .2 Unless rejected, repair damage and remove marks and stains to the approval of the Architect.
- .8 Do not load concrete until sufficient strength is developed.

3.6 Slabs on Grade

- .1 Construction joints and control joints:
 - .1 Refer to Notes on Structural Drawings for maximum spacing requirements.
 - .2 Saw cut control joints to depth equal to one quarter of the concrete thickness u/n. Alternatively, for slabs on grade not exposed to view or vehicle traffic, create control joints by inserting pre-assembled "T" shaped plastic joints into fresh concrete; remove top part prior to concrete finishing.
 - .3 Locate joints on column lines wherever possible and on intermediate lines, which result in approximately square panels, without re-entrant corners.
 - .4 Do not create "L" shaped panels nor "T" shaped joint intersections.
 - .5 Protect edges of sawcuts from breakage.
 - .6 Clean out sawcuts in concrete exposed to view or vehicle traffic and fill with control joint filler after concrete is at least 120 days old.

- .7 Sawcut top 25 mm (1") at construction joints in exposed concrete for a width of 5 mm (3/16") and fill with control joint filler after concrete is at least 120 days old. Alternatively, form construction joint with a 5mm (3/16") thick chamfer strip at top. Depth of the strip to be at least equal to 1/4 of slab thickness.
- .8 Clean out sawcuts in other concrete and fill with a sand-cement paste one month prior to installing floor coverings.
- .2 Isolation Joints:
 - .1 Unless otherwise shown on structural drawings, provide pre-moulded joint filler of the same depth as the thickness of the concrete wherever slabs-on-grade abut foundation walls, columns and piers. Omit if slab is chased or dowelled into structure.
 - .2 Furnish filler for each joint in single piece for depth and width required for joint.
 - .3 When more than one piece of filler is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
- .3 Cracks in Slabs-on-Grade:
 - .1 Extensive cracking of slabs-on-grade or cracks in excess of 3 mm (1/8") in width may be cause for rejection of slab or portion of slab at the Architect's discretion.
 - .2 Protect edges of cracks in slabs-on-grade from breakage.
 - .3 Exposed slab on grade: Unless slab is rejected, repair cracks that are over 0.4 mm (0.016") wide:
 - .1 Fill cracks with a sand-cement grout after concrete is at least 120 days old.
 - .2 Seven days later, cut out top 20 mm (3/4") of crack for a width of 5 mm (3/16") and fill with control joint filler.
 - .4 Architectural slab on grade: Unless slab is rejected, repair cracks that are over 0.2 mm (0.008") wide:
 - .1 Fill cracks with epoxy after concrete is at least 180 days old.
 - .2 Take all measures necessary to prevent epoxy on surface of exposed slab.
 - .3 Have manufacturer's technical representative present during initial repairs.

3.7 Unbonded Concrete Toppings

- .1 Place unbonded concrete topping over bondbreaker.
- .2 Provide construction, control and isolation joints same as specified for slab on grade.

3.8 Bonded Concrete Toppings

- .1 Place bonded topping over hardened concrete base slab in accordance with CSA A23.1.
- .2 Not less than 24 hours prior to applying concrete toppings, remove all laitance, dirt, dust, debris, grease, or other substances that would interfere with the bond between the base slab and the topping using one or more of the following methods:
 - .1 Wet or dry grit sand-blasting.
 - .2 High-pressure water-blasting.
 - .3 Mechanical removal by scarifiers, scabblers, or grinding wheels.
- .3 Notify WSP-S before placement of each topping.

- .4 Bond topping to base slab using an epoxy bonding agent or cement/sand grout procedure.
- .5 Provide joints in topping to match locations of those in base slab.

3.9 Penetrating sealer

- .1 Concrete to receive penetrating sealer to be at least 28 days old.
- .2 Surfaces to be treated with the sealer to be dry and free of dirt and other contaminants.
- .3 Completely remove all curing compounds before the sealer application.
- .4 Follow manufacturer's recommendations for coverage rate and application procedure.
- .5 Do not apply in inclement weather or if ambient air temperature or concrete surface temperature is less than 5°C or more than 38°C.

3.10 Grouting Under Base Plates and Bearing Plates

- .1 Grout under base plates and bearing plates using procedures in accordance with manufacturer's recommendations.
- .2 Provide 100% contact over grouted area.
- .3 Grout column base plates and beam bearing plates as soon as steelwork is completed.
- .4 Do not add load on steelwork until grouting is completed and grout strength has reached at least 20 MPa.

3.11 Existing Structure

- .1 Take precautions to protect the existing structure from damage.
- .2 Remove portions of existing concrete structure as required.
- .3 Provide temporary shoring and bracing as required.
- .4 Retain a Professional Engineer to design the temporary shoring and bracing and to review this work on site.
- .5 Obtain approval from WSP-S before coring or cutting existing slabs, beams or walls.
- .6 Retain an independent testing company to locate existing reinforcement and conduit in the areas of proposed openings and to mark locations on the surfaces of slabs and walls on which the cores and cuts are to be started using a non destructive method.
- .7 Remove toppings prior to locating reinforcement and conduit.
- .8 Mark locations and sizes of cores and openings and locations of reinforcement and conduit using indelible markers as follows:
 - .1 Red for top bars
 - .2 Green for bottom bars
 - .3 Black for cores, openings and conduit.
- .9 Relocate proposed openings and repeat process at no extra cost to the Contract if proposed locations are not acceptable to WSP-S.
- .10 Save the complete length of all cores. Label each core with location taken. Make all cores available for review by WSP-S. Dispose of cores only with approval of WSP-S. See details on structural drawings for sawcutting procedure.

- .11 If new reinforcement is required at an opening, install reinforcement before cutting opening or shore up structure until new reinforcement is installed.
- .12 Roughening existing surfaces:
 - .1 Where drawings call for a roughened surface, bush hammer entire surface to a full amplitude of at least 5 mm.
- .13 Patching:
 - .1 Patch existing concrete where necessary to provide required smooth, flat surfaces for reinforcement and for other trades.

3.12 Inspection and Testing:

- .1 Compressive Strength Testing:
 - .1 One test is required for each 100 cubic meters of placed concrete, but not less than one test for each concrete mix placed each day. At least 3 tests are required for each class of concrete used.
 - .2 A group of three cylinders for each test will be provided, Location of concrete placement will be recorded for each cylinder set. One specimen will be tested at 7 and one at 28 days. The third specimen will be tested at 56 days if the required strength at 28 days is not achieved.
 - .3 If the final concrete strength is specified at 56, 90 or 120 days, a group of four cylinders will be provided. One specimen will be tested at 7 and one at 28 days, with the third specimen tested at the time the final concrete strength is specified. If the required strength is not achieved at the time specified, the fourth specimen will be tested 28 days later.
 - .4 One additional cylinder will be provided for each concrete mix during cold weather concreting. The specimens will be cured on site adjacent to and under the same conditions as the work they represent and will be tested prior to form removal.
 - .5 If standard on site cured cylinders are used to determine concrete strength prior to removal of formwork, they will be kept adjacent to and under the same conditions as the work they represent.
 - .6 If pull out tests are used to determine concrete strength prior to removal of formwork, the Inspection and Testing Agency will supply, locate and test pull out inserts. The inserts not to be located on surfaces exposed to view.
 - .7 If maturity tests are used to determine concrete strength prior to removal of formwork, the Inspection and Testing Agency will develop strength-maturity relationship curves, provide and install temperature sensors into fresh concrete and interpret readings in accordance with ASTM 1074,
- .2 Slump testing:
 - .1 A minimum of one standard slump test will be conducted for every compressive strength test taken.
- .3 Air Entrainment Testing:
 - .1 A minimum of one standard test for air content in plastic concrete will be conducted for each 25cubic meters of each air entrained concrete mix.
 - .2 One standard test per ASTM C457 will be conducted to determine air void spacing factor in hardened concrete for each 100 cubic meters of each air entrained concrete mix.
- .4 Permeability Testing:

- .1 One chloride ion permeability test will be conducted for each 100 cubic meters of all class C-1, A-1 and C-XL concrete mixes used for floor and roof slabs and for salt water pools.
- .5 Mass Concrete Testing:
 - .1 All concrete slabs (including raft foundation slabs) over 600 mm (2'-0") thick, and all walls over 1000 mm (3'-4") thick are considered mass concrete.
 - .2 The Agency will record concrete temperature at placing.
 - .3 The Agency will record concrete temperature and temperature gradient during the 7 day curing period by providing, installing and monitor sufficient number of thermocouples.
- .6 Fresh Density Testing:

One standard fresh density test will be performed on site for each 50 cubic meters of semi-low density, low density and high density concrete. Assist the Agency to correlate fresh density with air-dry density prior to the work beginning on site. Reports will include both fresh density and air-dry density.
- .7 Bond Strength Testing:
 - .1 One standard bond test will be provided for each 200 square meters of bonded concrete topping placed over hardened concrete and designed to act compositely with it.
- .8 Grout Testing
 - .1 One standard test per ASTM C1107 will be made each day when concrete grout is installed under base plates.
 - .2 A group of 6 cubes for each test will be provided. 3 cubes will be tested after 7 days, and 3 after 28 days.

3.13 Cleaning

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal and 01 35 21 – LEED Requirements.

END OF SECTION 03 30 00

PART 1 – GENERAL

1.1 RELATED WORK

.1	Concrete Reinforcement	Section 03 20 00
.2	Cast-in-Place Concrete	Section 03 30 00
.3	Sealants	Section 07 92 00

1.2 REFERENCE STANDARDS

.1	Do concrete floor finishing work in accordance with CAN/CSA-A23.1-14 except where specified otherwise.

PART 2 – PRODUCTS

2.1 MATERIALS

.1	Concrete materials to Section 03 30 00 - Cast-in-Place Concrete; and reinforcement to Section 03 20 00 - Concrete Reinforcement.
.2	Curing and sealing compound: to ASTM C309 Type 1 Class B, clear.

PART 3 – EXECUTION

3.1 FLOOR FINISH

.1	Floor slab surfaces shall be finished to Class A classification as defined in CAN/CSA-A23.1-14, Table 22.
.2	Do not sprinkle dry cement or dry cement and sand mixture over concrete surfaces.
.3	Apply floor curing and sealing compounds to manufacturer's instructions. Cure to manufacturer's recommendations.
.4	Cure concrete in accordance with CAN/CSA-A23.1-14 except where specified otherwise.
.5	Provide any housekeeping pads for electrical and mechanical equipment.
.6	Slope floor to drain at 5mm/m. except as indicated otherwise. Floors to be level around walls.
.7	Provide non-slip light broom finish to exposed steps and landings.

3.2 PROTECTION

.1	Protect concrete to be left exposed throughout the course of construction. Make good damaged areas to the approval of the Engineer.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED
SECTIONS

- .1 Section 01 29 83 - Payment Procedures: Testing Laboratory Services.
- .2 Section 01 33 00 - Submittal Procedures.
- .3 Section 01 45 00 - Quality Control.
- .4 Section 01 61 00 - Common Product Requirements.
- .5 Section 04 05 12 - Mortar and Masonry Grout.
- .6 Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .7 Section 04 05 23 - Masonry Accessories.
- .8 Section 04 22 00 - Concrete Unit Masonry.
- .9 Section 05 50 00 - Metal Fabrications.
- .10 Section 07 27 00 - Air Barriers.
- .11 Section 07 21 13 - Board Insulation.
- .12 Section 07 21 29 - Sprayed Insulation Polyurethane Foam
- .13 Section 07 84 00 - Fire Stopping
- .14 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CSA-A165 Series-04(R2014), Standards on Concrete Masonry Units.
 - .2 CSA A179-14, Mortar and Grout for Unit Masonry.
 - .3 CSA-A371-14, 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.

1.4 QUALITY ASSURANCE

- .2 Samples.
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit samples.
 - .1 Two of each type of masonry unit specified.
 - .2 Two of each type of masonry accessory specified.
 - .3 Two of each type of masonry reinforcement, tie and connector proposed for use.
 - .4 A minimum of six for testing purposes if requested.
- .3 Manufacturer's Instructions.
 - .1 Submit manufacturer's installation instructions.
- .1 Test Reports.
 - .1 Certified test reports showing compliance with specified performance characteristics and physical properties.
 - .2 Submit laboratory test reports in accordance Section 01 29 83 - Payment Procedures: Testing Laboratory Services.
 - .3 Submit laboratory test reports certifying compliance of masonry units and mortar ingredients with specification requirements.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 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 3m x 3m showing masonry colours and textures, use of reinforcement, ties, through-wall flashing, weep holes, jointing, coursing, mortar and workmanship.
 - .3 Mock-up will be used:
 - .1 To judge workmanship, substrate preparation, operation of equipment and material application.
 - .4 Allow 48 hours for inspection of mock-up by Consultant before proceeding with work.
 - .5 When accepted by Consultant, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.
- .4 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 except where wetting of bricks is specified.
 - .2 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

1.6 WASTE
MANAGEMENT AND
DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, pallets, packaging material for recycling in accordance with Waste Management Plan.
- .3 Unused metal materials are to be diverted from landfill to a metal recycling facility as approved by Consultant.
- .4 Unused or damaged masonry materials must be diverted from landfill to a local facility as approved by Consultant.

1.7 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 windchill.
 - .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.

.4 Assume complete responsibility for dimensions, plumbs and levels of this work and constantly check same with graduated rod.

.5 Carry up walls in uniform manner. Raise no one portion more than 1.2m or less to avoid excessive loads on un-set joints. Ensure no impact to plumbness and alignment of wall as work progresses.

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.

.2 Strike flush joints in walls and joints in walls to receive plaster, tile, insulation, or other applied material including paint or similar thin finish coating.

- .1 Joints in exterior exposed masonry units to be tooled with round jointer to provide smooth joints, true to line, compressed, uniformly concave.
- .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 21 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 grout; keep paper 25 mm back from faces of units.
- .7 Provision for movement.
 - .1 Leave 5 mm space below shelf angles.
 - .2 Leave 15 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges. Provide angle clips and bracing as required to suit CSA A371
 - .3 Built masonry to tie in with stabilizers, with provision for vertical movement.
- .8 Loose steel lintels.
 - .1 Install loose steel lintels. Centre over opening width.
- .9 Control joints.
 - .1 Construct continuous control joints as indicated or as follows.
 - .2 Maximum spacing is 9M. Provide control joints between masonry veneer which is supported on different structural levels

(ie brick returns on balconies)

.3 Provide shop drawings indicating location of proposed control joints.

.10 Expansion joints.

.1 Build-in continuous expansion joints as indicated

3.5 SITE TOLERANCES

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

3.6 FIELD QUALITY CONTROL

.1 Inspection and testing will be carried out by Testing Laboratory designated by Consultant.

3.7 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.

3.8 PROTECTION

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

.2 Keep masonry dry using waterproof non-staining coverings. Drape over walls and extend down sufficient to protect walls from wind driven rain until masonry wall is complete and protected by flashings or other permanent construction.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 04 03 07 – Masonry Repointing
- .2 Section 04 03 31 – Replacing Brick Masonry.
- .3 Section 04 05 00 – Common Work Results for Masonry.
- .4 Section 04 05 19 – Masonry Anchorage and Reinforcing.
- .5 Section 04 05 23 – Masonry Accessories.
- .6 Section 04 22 00 – Concrete Masonry Unit

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA A179-04, Mortar and Grout for Unit Masonry.
 - .3 CAN/CSA A371-04, Masonry Construction for Buildings.
 - .4 CAN/CSA-A3000-03, Cementitious Materials Compendium; CAN/CSA-A3002-03, Masonry and Mortar Cement.
- .2 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)
 - .1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.3 ACTION 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 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures and in Section 01 35 29.06 - Health and Safety Requirements. Indicate VOC's mortar, grout, parging, colour additives and admixtures. Expressed as grams per litre (g/L).
- .2 Samples.
 - .1 Sample to be part of mock-up review.
- .3 Manufacturer's Instructions.
 - .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties and in accordance with Section 04 05 00 - Common Work Results for Masonry supplemented as follows:
 - .1 Submit laboratory test reports in accordance Section

01 29 83 - Payment Procedures: Testing Laboratory Services.

- .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.
- .4 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control and requirements of Section 04 05 00 - Common Work Results for Masonry.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handles masonry mortar and grout materials in accordance with Section 01 61 00 - Common Product Requirements, supplemented as follows:
 - .1 Deliver prepackaged, dry-blended mortar mix to project site in labelled plastic-lined bags each bearing name and address of manufacturer, production codes or batch numbers, and colour or formula numbers.
 - .2 Maintain mortar, grout and packaged materials clean, dry, and protected against dampness, freezing, traffic and contamination by foreign materials.

1.6 SITE CONDITIONS

- .1 Ambient Conditions: maintain materials and surrounding air temperature to:
 - .1 Minimum 5 degrees C prior to, during, and 48 hours after completion of masonry work.
 - .2 Maximum 32 degrees C prior to, during, and 48 hours after completion of masonry work.
- .2 Weather Requirements: CAN/CSA A371

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material for recycling in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Use same brands of materials and source of aggregate for entire project.
- .2 Mortar and grout: CSA A179.
- .3 Aggregate: supplied by one supplier.
 - .1 to CAN/CSA A179,
 - .2 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.
- .4 Cement:
 - .1 Portland Cement: to CAN/CSA-A3000, HS - High-sulphate-resistant hydraulic cement (Type 50), gray colour.
 - .2 Masonry Cement: to CAN/CSA-A3002 and CAN/CSA A179, Type N and S.
 - .3 Mortar Cement: to CAN/CSA-A3002 and CAN/CSA A179, Type N and S.
 - .4 Packaged Dry Combined Materials for mortar: to CAN/CSA A179, Type N and S, using gray colour cement.
- .5 Water: clean and potable.
- .6 Lime:
 - .1 Quick Lime: to CAN/CSA A179, Type N.
 - .2 Hydrated Lime: to CAN/CSA A179, Type S.
- .7 Bonding Agent: epoxy type.
- .8 Polymer Latex: organic polymer latex admixture of butadiene-styrene type non-emulsifiable bonding admixture.
- .9 Non-Staining mortar: use non-staining masonry cement for cementitious portion of specified mortar type.
- .10 Grout: to CSA A179, Table 3.

2.2 MORTAR MIXES

- .1 Mortar for exterior masonry above grade:
 - .1 Loadbearing: type S based on proportion specifications.
 - .2 Non-Loadbearing: N based on proportion specifications.
- .2 Mortar for interior masonry:
 - .1 Loadbearing: type S based on proportion specifications.
 - .2 Non-Loadbearing: N based on proportion specifications.
- .3 Mortar for foundation walls, manholes, sewers, pavements, walks, patios and other exterior masonry at or below grade:

type M based on proportion specifications.

- .4 Following applies regardless of mortar types and uses specified above:
 - .1 Mortar for grouted reinforced masonry: type S based on proportion specifications.

2.3 MORTAR MIXING

- .1 Mix mortar ingredients in accordance with CAN/CSA A179 in quantities needed for immediate use.
- .2 Maintain sand uniformly damp immediately before mixing process.
- .3 Add admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and colouration.
- .4 Do not use anti-freeze compounds including calcium chloride or chloride based compounds.
- .5 Do not add air entraining admixture to mortar mix.
- .6 Use a batch type mixer in accordance with CAN/CSA A179.
- .7 Re-temper mortar only within two hours of mixing, when water is lost by evaporation.
- .8 Use mortar within 2 hours after mixing at temperatures of 32 degrees C, or 2-1/2 hours at temperatures under 10 degrees C.

2.4 GROUT MIXES

- .1 Grout: Minimum compressive strength of 12.5 MPa at 28 days. Maximum aggregate size and grout slump: CAN/CSA A179.

2.5 GROUT MIXING

- .1 Mix batched and delivered grout in accordance with CAN/CSA-A23.1 transit mixed.
- .2 Mix grout ingredients in quantities needed for immediate use in accordance with CAN/CSA A179 fine grout.
- .3 Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- .4 Do not use calcium chloride or chloride based admixtures.

2.6 MIX TESTS

- .1 Testing Mortar Mix:
 - .1 Test mortar to requirements of Section 01 45 00 -

Quality Control, and in accordance with CAN/CSA A179, for mortar based on proportion specification. Test prior to construction and during construction for:

- .1 Compressive strength.
- .2 Consistency.
- .3 Mortar aggregate ratio.
- .4 Sand/cement ratio.
- .5 Water content and water/cement ratio.
- .6 Air content.
- .7 Splitting tensile strength.

.2 Testing Grout Mix:

.1 Test grout to requirements of Section 01 45 00 - Quality Control, and in accordance with CAN/CSA A179, for grout based on proportion specification. Test prior to construction and during construction for:

- .1 Compressive strength.
- .2 Sand/cement ratio.
- .3 Water content and water/cement ratio.
- .4 Slump.

.3 Inspection and testing will be carried out by Testing Laboratory designated by Consultant.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Request inspection of spaces to be grouted.

3.2 PREPARATION

- .1 Apply bonding agent to existing concrete surfaces.
- .2 Plug clean-out holes with block masonry units. Brace masonry for wet grout pressure.

3.3 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.

3.4 CONSTRUCTION

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

3.5 MIXING

- .1 Clean all mixing boards and mechanical mixing machine between batches.

- .2 Mortar must be weaker than the units it is binding.
- .3 Contractor to appoint one individual to mix mortar, for duration of project. In the event that this individual must be changed, mortar mixing must cease until the new individual is trained, and mortar mix is tested.

3.6 MORTAR PLACEMENT

- .1 Install mortar to requirements of CAN/CSA A179.
- .2 Remove excess mortar from grout spaces.

3.7 GROUT PLACEMENT

- .1 Install grout in accordance with manufacturer's instructions.
- .2 Install grout in accordance with CAN/CSA A179.
- .3 Work grout into masonry cores and cavities to eliminate voids.
- .4 Do not install grout in lifts greater than 400mm, without consolidating grout by rodding.
- .5 Do not displace reinforcement while placing grout.

3.8 FIELD QUALITY CONTROL

- .1 Site Tests, Inspection: in accordance with Section 04 05 00 - Common Work Results for Masonry supplemented as follows:
 - .1 Test and evaluate mortar prior to construction and during construction in accordance with CAN/CSA A179.
 - .2 Test and evaluate grout prior to construction and during construction to CAN/CSA A179; test in conjunction with masonry unit sections specified.
- .2 Manufacturer's Field Services: in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .3 Inspection and testing will be carried out by Testing Laboratory designated by Owner.

3.9 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.
- .2 Remove droppings and splashings using clean sponge and water.
- .3 Clean masonry with low pressure clean water and soft natural bristle brush.

- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.10 PROTECTION OF
COMPLETED WORK

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 04 05 00 - Common Work Results for Masonry.
- .4 Section 04 05 12 - Mortar and Masonry Grout
- .5 Section 04 05 23 - Masonry Accessories
- .6 Section 04 22 00 - Concrete Unit Masonry
- .7 Section 05 41 00 - Structural Metal Stud Framing
- .8 Section 05 50 00 - Metal Fabrications
- .9 Section 06 10 00 – Rough Carpentry

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CAN/CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
 - .2 CSA-A370-14, Connectors for Masonry.
 - .3 CSA-A371-14, Masonry Construction for Buildings.
 - .4 CAN/CSA G30.18-09(R2014), Billet-Steel Bars for Concrete Reinforcement.
 - .5 CSA-S304.1-04(R2010), Masonry Design for Buildings.
 - .6 CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.
 - .7 CSA A179-14, Mortar and Grout for Unit Masonry.

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 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's for epoxy coatings and galvanized protective coatings and touch-up products.

1.4 QUALITY ASSURANCE

- .2 Shop Drawings :
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures. Stamped by professional Engineer registered in Ontario (PEO)
 - .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.
- .3 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.
- .4 Samples:
 - .1 Samples to be part of mock-up sample for review.
- .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.
- .4 Masonry trade is to coordinate with structural steel trade to confirm placement of plates to accommodate required steel roof framing and other structural items

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material for recycling in accordance with Waste Management Plan.
- .3 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Bar reinforcement: to CSA-A371 and CAN/CSA G30.18, Grade 400.
- .2 Wire reinforcement: to CSA-A371 and CSA G30.14, ladder type, adjustable connectors for cavity walls, with min. 3.8 mm deformed side rods but heavier rods where required, galvanized without a drip, 50 mm narrower than wall.

- .3 Connectors: to CSA-A370 and CSA-S304.
- .4 Corrosion protection: to CSA-S304, galvanized to CSA-S304 and CSA-A370. Hot dip galvanized with min. 0.46 kg. zinc /m2.
- .5 Back up concrete or concrete block walls: - Fero Block Tie Type 2 for new concrete block walls. Ties to be hot dipped galvanized complete with insulation support clip.
- .6 Provide Rap tie length to suit stud plus sheathing thickness plus insulation thickness complete with Fero insulation support plate and V-tie wire to align with centerline of veneer.

2.2 FABRICATION

- .1 Fabricate reinforcing in accordance with CAN/CSA-A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Ontario.
- .2 Fabricate connectors in accordance with CSA-A370.
- .3 Obtain Consultant's approval for locations of reinforcement splices other than shown on placing drawings.
- .4 Upon approval of Consultant, weld reinforcement in accordance with CSA W186.
- .5 Ship reinforcement and connectors, clearly identified in accordance with drawings.

2.3 SOURCE QUALITY CONTROL

- .1 Upon request, provide Consultant with certified copy of mill test report of reinforcement steel and connectors, showing physical and chemical analysis, minimum 5 weeks prior to commencing reinforcement work.
- .2 Upon request inform Consultant of proposed source of material to be supplied.

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 HORIZONTAL REINFORCING

- .2 As part of mock-up assembly obtain Consultant's review of placement of reinforcement and connectors.
- .3 Supply and install additional reinforcement to masonry as indicated.
- .1 Provide horizontal reinforcing in all masonry work in accordance with drawings. Refer to structural drawings.
- .2 Install continuous horizontal reinforcing in each wythe of every concrete block wall at vertical spacing intervals 400mm maximum or 200mm where called for. Lap 150mm at each splice.
- .3 Utilize "L" and "T" shaped horizontal reinforcement at corners and abutting partitions.
- .4 Additionally place reinforcement in the first and second bed joints above and below openings extending 600mm beyond each side of opening.
- .5 Reinforce masonry where thickness is reduced by a column or chase with a length of horizontal reinforcing in the joint of every block course and extending 1.2m beyond each end of the column or chase.

3.4 BONDING AND TYING

- .1 Bond walls of two or more wythes using metal connectors in accordance with CSA-S304, CSA-A371 and as indicated and specified.
- .2 Tie masonry veneer to backing in accordance with NBC, CSA-S304.1, CSA-A371 and as indicated.
- .3 Minimum 400mm horizontal x 600mm vertical spacing and 300mm around wall openings, top, base and corners or as noted
- .4 V-tie length to provide placement of tie legs to the centre line of the veneer.

3.5 EARTHQUAKE

- .1 Reinforce masonry elements in accordance with most recent issue of Ontario Building code and National Building Code.
- .2 Reinforce masonry elements in accordance with CSA-A371, and as indicated, supplemented as follows:
 - .1 Loadbearing and lateral load-resisting masonry and
 - .2 Masonry enclosing elevator shafts and stairways or used as exterior cladding, and
 - .3 Masonry partitions exceeding 200 kg/m² or 3m in height.

- .3 Set dowels in foundations and floor slabs at cores of block to be reinforced. Set clips into U/S of slab as required for all masonry partitions.
- .4 Install vertical rod reinforcing in cores, sized and spaced as shown on drawings.
- .5 Anchor reinforcing to floor of foundation and to structure above.
- .6 Anchor masonry to structural beams, columns, and walls at maximum 400mm o.c. vertically and max. 12.m. o.c. horizontally.
- .7 Lap reinforcing bars min. 36 bar diameters at splices.
- .8 Embed bolts and anchors solidly in mortar or grout to develop maximum resistance to design forces.
- .9 Tie intersecting new bearing walls together with reinforcing in every second course.
- .10 Provide lateral support and anchorage in accordance with CSA-A371 and as indicated and specified.
 - .1 Locate box anchors in cavity walls at max. 400mm o.c. vertically and maximum 600mm o.c. horizontally.
 - .2 Secure special ties to framing: locate at maximum 400mm o.c. horizontally and max. 600mm o.c. vertically to metal studs.
- .11 Consult drawings for additional reinforcing.

3.6 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.

3.7 GROUTING

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

3.8 ANCHORS

- .1 Supply and install metal anchors as indicated.
- .2 Embed metal anchors solidly in mortar or grout to develop maximum resistance to design forces.

- .3 Anchor masonry to structural beams, columns, and walls max. 400mm o.c. vertically and max. 1.2m o.c. horizontally.
 - .1 Anchor concrete block steel columns and beams with 250mm long x 38mm wide x 3mm thick "L" shaped straps at 400mm o.c. with 200mm leg in block and 50mm leg welded to column or beam.
 - .2 Anchor new concrete block to existing concrete block with corrugated ties at 400mm o.c.
- 3.9 LATERAL SUPPORT AND ANCHORAGE .1 Supply and install lateral support and anchorage in accordance with CSA-S304.1 and as indicated.
- 3.10 MOVEMENT JOINTS .1 Reinforcement will not be continuous across movement joints unless otherwise indicated.
 - .2 Stop reinforcing 25mm on each side of control joints unless otherwise indicated.
- 3.11 FIELD BENDING .1 Do not field bend reinforcement and connectors except where indicated or authorized by Consultant.
 - .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.
- 3.12 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.
- 3.13 CLEANING .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED
REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 74 21 - Construction Demolition Waste Management and Disposal
- .3 Section 04 05 00 - Common Work Results for Masonry
- .4 Section 04 05 19 - Masonry Anchorage and Reinforcing
- .5 Section 04 22 00 - Concrete Unit Masonry
- .6 Section 04 22 00 - Concrete Unit
- .7 Section 07 21 13 – Board Insulation
- .8 Section 07 27 00 – Air Barriers

1.2 REFERENCES

- .1 ASTM International Inc.
 - .1 ASTM D 2240-15e1, Standard Test Method for Rubber Property - Durometer Hardness.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN/CSA A371-14, Masonry Construction for Buildings.

1.3 ACTION AND
INFORMATIONAL
SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheets. Include product characteristics, performance criteria, and limitations.
- .3 Shop Drawings:
 - .1 Provide shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Provide drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Shop drawings consist of flashing and installation details. Indicate sizes, spacing, location and quantities of fasteners.
- .4 Samples:
 - .1 Provide masonry accessory samples in accordance with Section 01 33 00 - Submittal Procedures, supplemented as follows:
 - .1 Materials: cured, and coloured samples, illustrating colour and colour range. Include:
 - .1 Movement joint filler.
 - .2 Mechanical fasteners.
 - .3 Reglets.
 - .4 Brick vents.
 - .2 Two moisture control material samples,

illustrating colour and colour range, size, and shape.
Include:

- .1 Weep hole vents.
- .2 Mortar diverters.
- .3 Two flashing material samples, illustrating colour and colour range, size, shape, and profile. Include as specified:
 - .1 Sheet metal flashings.
 - .2 Composite flashings.
 - .3 Plastic and rubber flashings.

- .5 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .6 Pre-installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section 04 05 00 - Common Work Results for Masonry.

1.4 FIELD MEASUREMENTS

- .1 Make field measurements necessary to ensure proper fit of members.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle masonry accessories in accordance with, Section 01 61 00 - Common Product Requirements supplemented as follows:
 - .1 Keep fillers and adhesives dry, protected against dampness, and freezing.
 - .2 Store packaged materials off ground and in accordance with manufacturer's written instructions.
- .2 Packaging Waste Management:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Movement joint filler: purpose-made elastomer 85 +/- 5 durometer hardness to ASTM D 2240 of size and shape indicated.
 - .1 Material type: rubber or closed cell neoprene.
- .2 Lap adhesive: recommended by masonry flashing manufacturer.
- .3 Weep hole vents: purpose-made PVC or galvanized steel colour to match masonry mortar colour.

- .4 Mechanical fasteners: recommended by flashing manufacturer to suit project requirements. stainless steel.
 - .5 Brick vents:
 - .1 Material: aluminum, 100, mm deep frame.
 - .2 Blades: aluminum, overlapping, 45 degree angle opposed blade damper with maximum free area 39%.
 - .3 Size: as noted.
 - .4 Provide 458 x 356 mm mesh aluminum insect screen, single blade flap damper straight duct connection.
 - .5 Finish frame and blades: colour to match masonry colour.
- 2.2 MOISTURE CONTROL
- .1 Weep Hole Vents: PVC or galvanized steel to match masonry mortar colour.
 - .2 Mortar diverters: shaped and sized to suit cavity spaces.
 - .1 Cavity space size: as noted.
 - .2 Manufactures from recycled material.
 - .3 Mortar stop cavity drainage board by Polytite Manufacturing Corporation.
- 2.3 FLASHINGS
- .1 Sheet metal: galvanized steel.
 - .1 Thickness: 26 ga.
 - .2 Finish: prefinished colour.
 - .2 Thru-wall flashings: Perm-a-barrier wall flashing membrane by W.R. Grace, Blueskin AG by Bakor or Sopraseal/Stick 1100 by Soprema. Complete with adhesive and primer recommended by manufacturer of flashing. Provide metal support over cavities larger than 50mm with 26 ga (.55mm) galvanized steel.
- PART 3 - EXECUTION
- 3.1 APPLICATION
- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- 3.2 INSTALLATION:
MATERIALS
- .1 Install continuous movement joint fillers in movement joints at locations indicated on drawings.
 - .2 Lap adhesive: apply adhesive to flashing lap joints.
 - .3 Mechanical fasteners: install fasteners to suit application and in accordance with manufacturer's written installation instructions.
 - .4 Reglets: install reglets at locations indicated on drawings.

	.5	Brick vents: install brick vents at locations indicated on drawings.
<u>3.3 INSTALLATION: MOISTURE CONTROL</u>	.1	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.
	.2	Mortar diverters: install purpose made diverters in cavities where indicated and as directed, size and shape to suit purpose and function.
	.3	Grout screens: install purpose made diverters in cavities where indicated and as directed, size and shape to suit purpose and function.
<u>3.4 INSTALLATION: FLASHINGS</u>	.1	Build in flashings in masonry in accordance with CAN/CSA A371.
	.1	Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings, and at base of cavity wall and where cavity is interrupted by horizontal members or supports and as shown on drawings. Install flashings under weep hole courses and as indicated.
	.2	In cavity walls and veneered walls, carry flashings from front edge of exterior masonry, under outer wythe, then up backing not less than 150 mm, and as follows:
	.1	For masonry backing embed or bond flashing 25 mm in joint.
	.2	For concrete backing, insert or bond flashing into reglets.
	.3	For wood frame backing, staple flashing to walls behind water resistive paper, and lap joints.
	.4	For gypsum board and glass fibre faced sheathing backing, bond to wall using manufacturer's recommended adhesive.
	.5	Lap joints 150 mm and seal with adhesive.
	.2	Form flashing (end dams) at lintels, sills and wall ends to prevent water from travelling horizontally past flashing ends.
	.3	Install vertical flashing where outer veneer returns at window or door jambs, to prevent contact of veneer with inner wall.
<u>3.5 CLEANING</u>	.1	Clean in accordance with Section 01 74 11 - Cleaning.
	.1	Remove surplus materials, excess materials, rubbish, tools and equipment.

- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 04 05 12 - Masonry Mortar and Grout
- .2 Section 04 05 19 - Masonry Anchorage and Reinforcing
- .3 Section 04 05 23 - Masonry Accessories.

1.2 REFERENCES

- .1 ASTM International Inc.
 - .1 ASTM C 216-07a, Standard Specification for, Facing Brick (Solid Masonry Units Made of Clay or Shale).
- .2 Brick Industry Association (BIA)
 - .1 Technical Note No. 20-2006, Cleaning Brick Work.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA A82-06, Fired Masonry Brick Made from Clay or Shale).
 - .2 CAN/CSA-A165 Series-2004, CSA Standards on Concrete Masonry Units.
 - .3 CAN/CSA A371-04, Masonry Construction for Buildings.
- .4 Masonry Units shall meet CSA-A165.1 Series-04 and ASTM C90-03, Specifications for load-bearing units or CSA-A165.2 Series-04 and ASTM C55-03 for veneer units.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Manufacturer's Instructions:
 - .1 Provide manufacturer's installation instructions in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .4 Samples:
 - .1 Provide unit samples in accordance with Section 01 33 00 - Submittal Procedures.

1.4 QUALITY ASSURANCE

- .1 Pre-Installation Meetings: conduct pre-installation meeting in accordance with Section 04 05 00 - Common Work Results for

SUBMITTALS

Masonry to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

- .2 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control and requirements of Section 04 05 00 - Common Work Results for Masonry supplemented as follows:
 - .1 Construct mock-up panel of exterior brick construction 1200 x 1800 mm.
- .3 Delivery, Storage, and Handling:
 - .1 Deliver, store and handle brick unit masonry in accordance with Section 01 61 00 - Common Product Requirements.
- .4 Packaging Waste Management:
 - .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.5 SITE CONDITIONS

- .1 Ambient Conditions: assemble and erect components only when temperature is above 6 degrees C.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- .1 Face Veneer:
 - BV-1**
 - .1 Type:
 - .2 Size:
 - .3 Colour:
- .2 The following adjustments to the permitted tolerances indicated in CAN/CSA A82-06 shall be applied to all face brick for this project:
 - .1 Size: The maximum permissible variation from the specified dimension shall be 2.0mm.
 - .2 Distortion: The maximum permissible distortion of surfaces or edges intended to be exposed in place from

a plane surface and from a single straight line shall be 1.5mm.

- .3 Out of Square: The maximum permitted deviation from square of an exposed face shall be not more than 1.5mm.
- .4 Manufacturer of brick shall sort bricks prior to delivery to site to ensure compliance with CAN/CSA A 82-06 standards and adjusted to tolerances noted in 1,2 ,and 3 above.

.3 Reinforcement:

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

.4 Connectors:

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

.5 Flashings:

- .1 Flashing: in accordance with Section 04 05 23 - Masonry Accessories.

.6 Mortar Mixes:

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

.7 Cleaning Compounds:

- .1 Use low VOC products in compliance with SCAQMD Rule 1168.
- .2 Compatible with substrate and acceptable to masonry manufacturer for use on products.
- .3 Cleaning compounds compatible with brick masonry units and in accordance with manufacturer's written recommendations and instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verify surfaces and conditions are ready to accept work of this Section.
- .2 Commencing installation means acceptance of as-found and existing substrates.

<u>3.2 PREPARATION</u>	.1	Protect adjacent finished materials from damage due to masonry work.
<u>3.3 APPLICATION</u>	.1	Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.
<u>3.4 INSTALLATION</u>	.1	Construction to conform to CAN/CSA A371.
	.2	Bond: stretcher.
	.3	Coursing height: to be as per Architectural sections. Typical coursing to be confirmed with 1200 x 1800 mock up.
	.4	Jointing: concave where exposed or where paint or similar thin finish coating is specified. Confirm final detail for mortar joint tooling in mock-up.
	.1	Mixing and blending: mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.
	.2	Clean unglazed clay masonry as work progresses.
	.3	Reinforcement:
	.1	Install reinforcing in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.
	.4	Connectors:
	.1	Install connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.
	.5	Flashings:
	.1	Install flashings in accordance with Section 04 05 23 - Masonry Accessories.
	.6	Mortar Placement:
	.1	Place mortar in accordance with Section 04 05 12 - Masonry Mortar and Grout.
	.7	Repair/Restoration:
	.1	Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective

work.

- .8 Field Quality Control:
 - .1 Site Tests, Inspection: in accordance with Section 04 05 00 Common Work Results for Masonry
 - .2 Manufacturer's Field Services: in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .9 Tolerances:
 - .1 To CAN/CSA A371 unless noted below
 - .2 Ensure proper blending of all brick lifts and hand blend to suit.

3.5 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning. Use only proprietary cleaning products recommended by the brick manufacturer.
- .2 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .3 Clean unglazed clay masonry: 10 sq.m. area of wall designated by Consultant specified in Section 04 05 00 - Common Work Results for Masonry as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured, protect windows, sills, doors, trim and other work, and clean brick masonry as follows.
 - .1 Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.
 - .2 Scrub with solution of 25 mL trisodium phosphate and 25 mL household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.
 - .3 Repeat cleaning process as often as necessary to remove mortar and other stains.
 - .4 Use acid solution treatment for difficult to clean masonry as described in Technical Note No.20 by the Brick Industry Association. Spot test on small area and

review results with Architect. Confirm acceptability with brick manufacturer.

- .4 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.
- .5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal .

3.6 PROTECTION

- .1 Brace and protect brick masonry in accordance with Section 04 05 00 - Common Work Results for Masonry.

END OF SECTION

PART 1 - GENERAL

1.1 Related Requirements

- .1 Section 03 30 00: Cast in Place Concrete
- .2 Section 05 21 00: Steel Joists
- .3 Section 05 31 00: Steel Decking
- .4 Section 05 50 00: Metal Fabrications
- .5 Section 07 81 00: Applied Fireproofing
- .6 Section 09 91 00: Painting
- .7 Section 13 34 19: Metal Building Systems

1.2 References

- .1 Editions of all Referenced Standards to be the ones designated by the applicable Building Code in force at the time of building permit application, as indicated on Structural Drawings. For Standards not referenced by the Building Code, use the latest editions.
- .2 CSA Group (CSA):
 - .1 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .2 CSA S16, Limit States Design of Steel Structures
 - .3 CSA S136, North American Specifications for the Design of Cold Formed Steel Structural Members
 - .4 CSA W47.1, Certification of Companies for Fusion Welding of Steel
 - .5 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding
 - .6 CSA W55, Certification of Companies for Resistance Welding of Steel and Aluminum
 - .7 CSA W59, Welded Steel Construction (Metal Arc Welding)
 - .8 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction
- .3 ASTM International (ASTM):
 - .1 ASTM A123/A123M, Standard Specification for Zinc (Hot Dip Galvanized) coating on Iron and Steel Products
 - .2 ASTM F3125/F3125M, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
 - .3 ASTM A500, Standard Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 - .4 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated, Welded and Seamless
 - .5 ASTM A1085/A1085M, Standard Specification for Cold Formed Welded Carbon Steel Hollow Structural Sections (HSS)

- .6 ASTM A992, Standard Specifications for Structural Steel Shapes
- .7 ASTM B695, Standard Specification for Coating of Zinc Mechanically Deposited on Iron and Steel
- .8 ASTM F2329/F2329M, Standard Specification for Zinc Coating, Hot-Dip, requirements for Application to Carbon and Alloy Steel Bolts, Screws, washers, Nuts and Special threaded Fasteners.
- .9 ASTM F1136/F1136M, Standard Specification for Zinc/Aluminum Corrosion Protective Coating for fasteners
- .10 ASTM F1554, Standard Specification for Anchor Bolts, Steel 36, 55 and 105 ksi Yield Strength
- .11 ASTM D7803. Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.
- .4 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA):
 - .1 CISC Handbook of Steel Construction
 - .2 CISC/CPMA Standard 1-73a, A Quick-drying One-coat Paint for Use on Structural Steel
 - .3 CISC/CPMA Standard 2-75, Quick-drying Primer for Use on Structural Steel
 - .4 CISC Code of Standard Practice, Appendix I, Architecturally Exposed Structural Steel (AESS)
- .5 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE) International:
 - .1 SSPC-SP 1, Solvent Cleaning
 - .2 NACE No. 3 / SSPC-SP 6, Commercial Blast Cleaning
 - .3 NACE No.4 / SSPC-SP 7, Brush Off Blast Cleaning
 - .4 NACE No.2 / SSPC-SP 10, Near White Blast Cleaning
 - .5 SSPC Technology Guide No.14 –Guide for the Repair of Imperfections in Galvanized, Organic or Inorganic Zinc-Coated Steel Using Organic Zinc Rich Coating.
 - .6 SSPC Paint Specification No. 20 – Zinc Rich Coating, Type I – Inorganic and Type II - Organic

1.3 Quality Assurance

- .1 Qualifications:
 - .1 Structural steel fabricator and erector to be certified by the Canadian Welding Bureau under the requirements of CSA W47.1, Division 1 or 2 for fusion welding and/or CSA W55.3, Division 1 or 2 for resistance welding of structural steel components, and to have CWB approved procedure for welding rebar (Grade 400W) to structural steel in accordance with CSA W186.
 - .2 Welders to be appropriately qualified, working under direction of a qualified welding supervisor.
 - .3 Engage a Professional Engineer licensed in the place where the project is located to be responsible for design, detailing and site review of all connections related to structural steel work.

- .4 The Professional Engineer designing connections to hold a Certificate of Authorization, and to carry a minimum of \$1,000,000.00 in liability insurance (per occurrence).

1.4 Quality Control

- .1 Submit in accordance with Section 01 45 00 – Quality Control.
- .2 Source Quality Control Submittals:
 - .1 Provide all submittals 4 weeks prior to starting fabrication of structural steel.
 - .2 Mill test reports:
 - .1 Mill test reports to include ladle analysis and physical test results, and to show chemical and physical properties and other details of steel to be incorporated in project.
 - .2 The reports to be correlated to the materials or products to which they pertain.
- .3 Tolerances:
 - .1 Conform to the fabrication and erection tolerances of CAN/CSA S16.
 - .2 Comply with more stringent tolerances if specified elsewhere to suit interfacing materials or AESS members

1.5 Unit Prices

- .1 Provide unit prices per Section 01 29 00 – Payment Procedures.

1.6 Action and Informational Submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Provide fabrication and erection documents stamped and signed by the Professional Engineer responsible for steel connections.
 - .2 Before submitting shop drawings, provide a letter signed and sealed by that Engineer stating that the Engineer has been engaged to undertake the responsibility for the above. Also submit a copy of that Engineer's Certificate of Authorization and proof of liability insurance.
 - .3 If additional information is required from WSP-S, allow a minimum of five working days for WSP-S to review and respond to the request for information.
 - .4 It is advisable to submit erection diagrams for review before preparing shop details. Copies of plans and section details developed by WSP-S will not be accepted as erection diagrams.
- .3 Erection documents:
 - .1 Submit erection drawings indicating details and information necessary for assembly and erection purposes, including:
 - .1 Erection procedure
 - .1 Description of erection methods.
 - .2 Sequence of erection.
 - .3 Temporary bracings.
 - .2 Erection diagrams

- .1 Member sizes (in addition to member marks).
- .2 Size and finish of field bolts.
- .3 Connections where threads must be excluded from shear plane.
- .4 Sliding bearing assemblies.
- .5 Members which are considered AESS and their category.
- .6 Type and finish of bolts in AESS connections.
- .7 Side where bolt heads should be placed in AESS connections.
- .3 Field work details
 - .1 Details of all field welded connections.
 - .2 Weld grinding, finish and profile in AESS field connections.
- .2 Provide setting drawings showing dimensions and details for placing steel assemblies which are set in concrete.
- .4 Fabrication documents:
 - .1 Submit shop details showing designed assemblies, member sizes, components and connections. Show on drawings:
 - .1 Material specifications.
 - .2 Surface preparation.
 - .3 Shop painting / galvanizing.
 - .4 Section splices.
 - .5 Types of shop and field connections.
 - .6 Net weld lengths.
 - .7 Size and finish of shop bolts.
 - .8 Precautions which will be taken to exclude threads from shear planes of bearing type bolted connections (where applicable).
 - .9 Protected zones.
 - .10 Vent holes required for galvanizing process.
 - .11 Camber.
 - .12 Architectural clearance lines and finishes where connections could encroach other works.
 - .13 Beam and column web holes required for services and reinforcing around them.
 - .2 Indicate members which are considered AESS, and their category. Refer to AESS Category Matrix as shown in Table 1 of the CISC Code of Standard Practice, Appendix I.
 - .1 For AESS bolted connections, indicate bolt type, finish and which side of the connection bolt heads should be placed.
 - .2 For AESS welded connections, show grinding, profile and weld finish.

- .3 Show details by which steel assemblies, which are set in concrete, are to be connected to the formwork.
- .4 Substitution of alternative sections will only be allowed provided the new members have equal or greater capacity and stiffness and their dimensions are approved by WSP-S.
- .5 When requested, submit sketches and design calculations stamped and signed by the Professional Engineer responsible for connection design.
- .6 Provide technical specifications for all sliding bearing assemblies.
- .7 On completion of erection, submit a letter signed and sealed by the Professional Engineer responsible for structural steel connections certifying that the work has been completed in accordance with all contract documents.

PART 2 - PRODUCTS

2.1 Design and Detailing Requirements

- .1 Design details and connections in accordance with requirements of CSA S16 and CSA S136 to resist forces and to allow for movements indicated. Consider load effects due to fabrication, erection and handling.
- .2 Connection design to include consideration of all pass-through forces, including tension, compression, moment and shear. Provide local reinforcement at connection or joint as required.
- .3 Follow conceptual connection details if shown on structural drawings. Do not change without WSP-S written approval. If welds are defined on drawings, the sizes shown are minimum requirements which might need to be increased to suit connection design.
- .4 Increase specified section thickness at no extra cost if required for fabrication (bending) or galvanizing. Alternatively, build up curved sections from plates.
- .5 Assume that bolt threads are intercepted by shear plane, unless special measures are indicated on shop drawings to exclude threads from shear plane.
- .6 Beams:
 - .1 Select beam end connections from CISC "Handbook of Steel Construction" when connection for shear only (standard connection) is required.
 - .2 Typical beam to spandrel beam and beam to column connections to be two sided or end plate connections.
 - .3 Select or design beam end connections for factored shear indicated on plans.
 - .4 When shears are not indicated, select or design non composite beam end connections to resist reaction due to maximum uniformly distributed load capacity of the beam in bending, assuming the flange in compression is fully braced.
 - .5 When shears are not indicated, select or design composite beam end connections to resist one and a half times the reaction due to maximum uniformly distributed load capacity of the non composite beam section in bending.
 - .6 Except within moment frames, where axial forces occur in beams framing to opposite sides of a supporting member, design connections for a pass-through force equal to the smaller of the two axial forces. If beam sizes differ, assume the axial force is centred in the smaller beam.
 - .7 Where axial forces occur in beams within moment frames, connect both ends of beams to columns for the axial force shown.

- .8 Where no axial force is shown for beam to column connection, design to resist horizontal tension / compression equivalent to 2% of the factored axial force in column, in addition to all other loads.
- .9 Seated beam connections to have top clip angles. Connect to supports as required for lateral bracing.
- .10 End bearing connections of inclined members to have horizontal bearing plane at supported member.
- .11 Extend beams bearing on walls for the full length of bearing plates unless indicated otherwise on drawings.
- .12 For beams continuous over supports and for beams supporting columns, posts or hangers, provide min. 6 mm (1/4") stiffener plates at each side of web at supports / points of concentrated load, unless thicker stiffeners are required by connection design or different details are shown on drawings.
- .13 Provide all spandrel beams and all floor beams not fully braced by floor construction with top and bottom flange connections for torsional restraint.
- .14 Where studs for composite action are connected to composite beams indirectly (i.e. through a plate attached to beam top flange), connect plate to beam to transfer the full shear capacity of all studs.
- .7 Columns:
 - .1 In addition to all other loads, connect columns to base plates to transfer horizontal load equal to 2% of the column vertical load.
 - .2 In addition to all other loads, connect columns to base plates to transfer tensile load equal to the capacity of all anchor bolts,
 - .3 Provide seat angles for joist support at sides of columns continuous through floor.
 - .4 Provide connection for tie joist bottom chord at all columns supporting joists; coordinate with joist supplier.
 - .5 Unless otherwise noted on drawings, provide 102 x 102 x 9.5 seat angles attached to sides of columns to support masonry lintels adjacent to columns. Length of seat to equal width of lintel minus 25 mm (1").
 - .6 Provide connection for masonry wall steel lintels adjacent to columns.
 - .7 Provide diagonal or cantilevered angles at sides of columns where required to support deck or slab.
 - .8 Provide cap plates at tops of columns where required for support of deck, slab, joists, beams or roof anchors.
 - .9 Where columns are built in and stabilized by masonry walls, provide anchors to masonry walls per typical details.
 - .10 Where beams frame into sides of columns forming moment frames, provide min. 6 mm (1/4") stiffener plates at each side of column web in continuation of beam flanges, unless thicker stiffeners are required by connection design or different details are shown on drawings.
- .8 Bracings:
 - .1 Shape and size gusset plates to accommodate required finishes and clearances; refer to Architectural and Mechanical drawings.

- .2 Detail plate and rod bracing connections to be adjustable and to be able to be prestressed to approximately 15 MPa.
- .3 Design gusset plates and bracing connections for members which are parts of seismic force resisting system to allow ductile rotation and to satisfy requirements of CSA S16. Design gusset plates for other compression members for the force equivalent to twice the specified compression member force, or provide stiffeners to prevent gusset plate buckling.
- .4 For tension / compression "X" braces, design and detail connection between the intersecting members so that out of plane stiffness within the connection is same as or larger than the out of plane stiffness of the bracing member itself, thus maintaining the full length of the bracing members effectively continuous.
- .9 Moment connections:
 - .1 Provide moment connections at splices to maintain continuity of cranked beams. Provide header plates or stiffener plates to resist unbalanced flange forces at splices.
 - .2 Where moment connections are called for but values are not indicated, design for moment capacity of the smaller member in the connection.
 - .3 Install web and flange stiffener plates at moment connections as required by connection design and detail but in every case when indicated on the drawings. If the shear generated in column web exceeds its shear capacity, reinforce the web.
- .10 Pretensioned connections - pretension high-strength bolts used in:
 - .1 All elements resisting crane loads.
 - .2 All elements resisting seismic loads.
 - .3 Elements directly supporting machinery which produces impact or cyclic loads.
 - .4 Connections where bolts are subject to tensile loads.
 - .5 Connections using oversized or slotted holes unless finger-tight bolts are required to accommodate movement.
 - .6 Slip critical connections.
- .11 Holes:
 - .1 Where holes for services are required through webs of beams or columns, coordinate size and location with Architectural, Mechanical and Electrical drawings, and show on fabrication drawings. Reinforce in accordance with Typical Detail. Alternatively, design reinforcing in accordance with the procedure set forth in the CISC Handbook of Steel Construction, and provide calculations for WSP-S review.
 - .2 Provide holes in beam flanges or weld threaded studs as required for attachment of wood nailers.
 - .3 Provide 10mm drain holes in all HSS members located outside air / vapour barrier. Locate so that any water inside HSS will drain away when HSS is in its final position.
 - .4 Provide vent holes in all galvanized HSS members as required for galvanizing process.
 - .5 Provide 12 mm (1/2") dia. holes in HSS columns to be filled with concrete. Locate at opposing column faces 150 mm (6") from each end.
 - .6 Provide 19 mm (3/4") dia. vent holes at centerline of all cast in plates supporting columns.
 - .7 Provide 50 mm (2") dia, grouting holes in column bearing plates larger than 600 mm x 600 mm (24"x24").

.12 Built-up members:

- .1 Connect together double beams and double channels at not more than 1200 mm (4 ft) centres unless the members are welded toe to toe.
 - .2 Connect together axially loaded built-up members in accordance with the requirements of CSA S16. In addition, interconnect compression members for trusses and bracing at least at the one-third points.
 - .3 Connect cover plates of built-up members to develop the capacity of the built-up member.
- .13 Provide all wall supporting members (shelf angles, hangers, stubs, back braces, etc.) which are attached to floor beams with adjustable connections capable to compensate for the deflection of the floor beams due to self weight of concrete. Anticipate beam deflection to be equivalent to the camber shown, or 20 mm (whichever is more). Alternatively, fabricate based on actual deflected shape of the beams as measured after concrete is poured.
- .14 Provide slotted holes long enough to allow for movements indicated on drawings plus construction tolerance, see Typical Detail for bolts' positions in slots. Bolts are to be finger-tight with burred threads to allow for movement during the life of structure without bolts loosening.
- .15 Do not oversize anchor rod holes for site tolerances. Use hole sizes suggested in the CISC Handbook of Steel Construction.
- .16 Design and proportion welded and bolted connections at crane girders and at columns supporting them in accordance with the fatigue requirements of CSA S16 to be able to sustain 2,000,000 cycles of load.
- .17 Connect new steel members to existing concrete using drilled concrete anchors, refer to Post Installed Anchors and Dowels notes on drawings. Do not field weld at connections with adhesive anchors.
- .18 Provide closure plates for all exterior tubular members and for all interior tubular members which will be exposed in the finished construction.
- .19 Design sliding bearing assemblies to accommodate forces and movements shown on drawings.

2.2 Materials

- .1 Structural steel:
 - .1 Rolled shapes: to ASTM A992.
 - .2 Hollow structural sections: to ASTM A500, ASTM A1085 or CSA G40.21, refer to drawings.
 - .3 Structural pipe: to ASTM A53.
- .2 Anchor rods: CSA G40.21, or ASTM F1554, refer to drawings.
- .3 Bolts, nuts and washers: to ASTM F3125.
- .4 Load indicating washers: to ASTM F959.
- .5 Maximum percentage of boron in all structural steel elements and fasteners not to exceed 0.0008%.
- .6 Weldable reinforcing steel: to CSA G30.18, deformed bars.
- .7 Grating: Galvanized safety grating. Minimum thickness of material 2 mm (0.079"). Banded ends. Bolted connections. Capacity 4.8 kPa (100 psf) unless noted otherwise on drawings. Maximum deflection 1/180th of span.

- .8 Checker plate: to CSA G40.21, Grade 300W. Plate with rolled-in embossments to provide non-slip surface.
- .9 Welding materials: to CSA W48 and CSA W59, certified by Canadian Welding Bureau. For members in seismic force resisting system, refer to additional brittleness requirements in CSA S16.
- .10 Shop paint: to CISC/CPMA 1-73a.
- .11 Shop paint primer: to CISC/CPMA 2-75, solvent reducible alkyd, red oxide, compatible with specified topcoat.
- .12 Zinc-rich coating: to SSPC Paint Specification No.20, compatible with top coat (where specified).
- .13 Hot dip galvanizing of structural steel members: to ASTM A123/A123M, minimum zinc coating of 600 g/m².
- .14 Coating of fasteners: to ASTM F2329 (hot dip galvanizing), ASTM B695 (mechanical galvanizing) or ASTM F1136 (Zn/Al coating). All fastening elements (bolts, nuts, washers) to be coated using the same process and to be obtained from a single supplier. Nuts to have visible dye lubricant.
- .15 Epoxy coating: pre-mixed, 2 components, high-solids (volume of solids 87 ±3%), self-priming.
- .16 Headed studs: to CSA W59, Type B, min. F_y=350 MPa
- .17 Joint filler for exposed steelwork: Epoxy resin.
- .18 Sliding bearing assembly: Galvanized top steel plate with a type 304 stainless steel highly polished lower surface and bottom elastomeric pad with a polytetrafluoroethylene (Teflon) upper surface, wrapped in water tight polyethylene wrapping. Static and kinetic coefficients of friction not to exceed 5% under working stress. Assembly to have a working stress capacity of min. MPa on the lower pad. Elastomeric bottom pad to allow a 2% rotation of upper plate and still maintain a substantially uniform bearing pressure between plate and pad. Alternative sliding bearing assembly may be proposed for review by WSP-S.
- .19 Elastomeric bearing pad: Virgin natural polyisoprene or virgin polychloroprene (Neoprene) conforming to CSA S6.
- .20 Galvanizing vent hole plug: Grade 6061 Aluminum circular plug.

2.3 Fabrication

- .1 Fabricate structural steel in accordance with CSA S16 and with reviewed shop drawings.
- .2 Weld in accordance with CSA W59 and CSA W186.
- .3 Continuously seal hollow members located outside air / vapour barrier by intermittent welds and plastic filler unless continuous welds are indicated on drawings.
- .4 Position beams having permissible mill camber so that the camber is up.
- .5 Install stud anchors for cast in plates and similar elements in shop with end welds in accordance with the recommendations of the stud manufacturer. Lengths of studs given on drawings are the lengths after welding. Replace studs that crack in the weld or shank.
- .6 Do not shop weld shear studs to composite beams supporting slab on deck which do not run in the direction of deck span.
- .7 HSS members which require galvanizing to either be per CSA G40.21, grade 350W, Class H, or to be stress relieved prior to galvanizing.

- .8 Mill column bearing plates as required to provide full contact bearing and develop column bearing strength.
- .9 Prepare contact surfaces of slip critical connections as required by CSA S16.
- .10 Complete welded shop connections prior to galvanizing.
- .11 Plug vent holes in all galvanized members.
- .12 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping. When steel is to be left unpainted, place marking at locations not visible from exterior.
- .13 Match marking: shop mark bearing assemblies and splices for fit and match.
- .14 Where shop inspection is required, do not ship material to the site before it has been inspected.
- .15 Fabricate in stages complex members for which steel inspection is impossible or difficult once completed, and arrange for the Inspection and Testing Agency to do intermediate shop inspections.
- .16 Fabricate AESS with tolerances and surface quality consistent with AESS category.

2.4 Shop Painting

- .1 Clean all members to SSPC-SP 1 – Solvent Cleaning. Remove loose mill scale, rust, oil, dirt and foreign matter using any suitable method.
- .2 In addition for members to be galvanized or to receive shop primer paint: Clean steel to SSPC-SP 7 Brush-Off Blast Cleaning.
- .3 In addition for members receiving intumescent coating: Clean steel to SSPC-SP 6 Commercial Blast Cleaning
- .4 In addition for members receiving zinc-rich coating: Clean steel to SSPC-SP 10 Near White Blast Cleaning.
- .5 Apply one coat of shop paint CISC/CPMA 1-73a to steelwork in the shop with the exception of:
 - .1 Members to receive spray fireproofing.
 - .2 Members to receive a finish coat of paint on site for which a CISC/CPMA 2-75 shop primer is required.
 - .3 Members to receive intumescent coating for which a compatible shop primer is required.
 - .4 Members to receive zinc-rich coating.
 - .5 Galvanized members.
 - .6 Shear connectors and top flanges of composite beams with field welded shear connectors.
 - .7 Surfaces encased in or in contact with cast-in-place concrete including top flanges of beams supporting slabs.
 - .8 Surfaces and edges to be field welded for a distance of 50 mm (2") from joints.
 - .9 Faying surfaces of slip-critical connections.
- .6 If members to receive sprayed fireproofing are shop painted, only paints tested to ASTM E736 and approved by spray fireproofing supplier may be used. Any other paint must be removed to bare steel prior to application of spray applied fireproofing.

- .7 Apply one coat of compatible primer paint (CISC/CPMA 2-75) in the shop to steelwork to receive a finish coat of paint on site.
- .8 Apply one coat of compatible primer paint in the shop for steel to receive intumescent coating on site, see section 07 81 00 Applied Fireproofing.
- .9 If more than one type of paint is specified, each paint to be visually identifiable after application.
- .10 Apply galvanizing coating in the shop to all structural steel located beyond the vapour barrier, including:
 - .1 Shelf angles and hangers in exterior walls.
 - .2 Spandrel angles to which precast panels are attached.
 - .3 Lintels in exterior walls.
 - .4 Exposed exterior steel members.
 - .5 Exposed anchor rods.
 - .6 Other steel noted on drawings.
- .11 If galvanized steel is to be painted, use only non passivated galvanizing process (without chromate coating).
 - .1 Clean galvanized members to be painted in accordance to ASTM D7803.
- .12 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5°C.
- .13 Maintain dry condition and 5°C minimum temperature until paint is thoroughly dry.
- .14 Touch up paint on bolts, nuts, sharp edges and corners to remove sags, drips and runs before prime coat is dry.

PART 3 - EXECUTION

3.1 General

- .1 Structural steel work: in accordance with CSA S16.
- .2 Welding: in accordance with CSA W59 and CSA W186.

3.2 Connection to Existing Work

- .1 Verify dimensions and condition of existing works prior to start of fabrication. Report discrepancies, modify connection details if required and submit to WSP-S for review. Determine any potential interference with existing services and report problem areas to WSP-S for direction before commencing work.
- .2 Take precautions to protect existing works from damage. Provide temporary shoring as required. Repair damage to adjacent materials caused by structural steel installation.
- .3 When welding to elements cast in concrete, do not overheat the embedded elements. Implement control measures and appropriate welding procedures which will prevent thermal expansion of the embedded elements which could damage to the adjacent concrete.

3.3 Erection

- .1 Erect structural steel in accordance with CSA S16 and reviewed erection drawings.
- .2 Do not field cut or alter any members without WSP-S approval.

- .3 Make adequate provision for all loads acting on the structure during erection. Provide erection bracing to keep the structure stable, plumb and in true alignment during construction. Bracing members or connections shown on Structural Drawings are those required for the completed structure, and may not be sufficient for erection purposes. For load bearing masonry construction, maintain bracing until completion of masonry work and floor / roof decks which together provide permanent bracing. Do not remove erection bracings without written approval from the Engineer who designed it.
- .4 Steel framing to be plumb at temperature of 20°C. If erection is carried out at temperatures greatly differing from 20°C, make adequate provisions; some members may need to be erected out of plumb in order to become plumb when the temperature stabilizes at 20°C.
- .5 Set column base plates to the elevation required for grouting using steel shims or leveling screws attached to sides of base plates. Do not fasten leveling nuts to anchor rods. Alternatively, for base plates equal or smaller than 350 mm x 350 mm (14" x 14"), leveling plates set with grout and level to within 1.5 mm (1/16") across the plate can be used. Do not erect columns upon plates exceeding this tolerance. Lift base plates for inspection when directed.
- .6 Grout under column base plates and beam bearing plates as soon as steelwork is completed. Do not add load on steelwork until grouting is completed and grout strength has reached at least 20 MPa.
- .7 Do not make permanent connections until structure has been properly aligned.
- .8 Where slotted connections are shown on structural drawings, finger tighten bolts to a snug fit and burr threads to prevent nuts from working loose.
- .9 Prestress plate and rod bracing connections to approximately 15 MPa. Adjust connections as required for the prestress to be effective when building ambient temperature has stabilized.
- .10 Weld beams to bearing plates unless otherwise noted on drawings.
- .11 Adjust and finalize connections at wall supporting elements affected by floor beam deflections after concrete is poured.
- .12 Provide dissimilar metal separators at connections between aluminum members and structural steel.
- .13 Report ill-fitting connections to WSP-S before taking corrective measures.
- .14 When welding after galvanizing is in place, grind away galvanizing at areas to be welded.
- .15 Do not weld in an ambient temperature below -18°C. Preheat material adjacent to welding areas when ambient temperature is between -18°C and 0°C.
- .16 Do not weld or otherwise attach any structural or non structural elements to protected zones unless noted specifically on structural drawings. Failure to comply will result in full replacement of the affected members.

3.4 Field Painting

- .1 Paint in accordance with Section 09 91 00 - Painting.
- .2 Touch up damaged surfaces with the same paint as the shop coat.
- .3 Repair any galvanized or zinc rich painted surfaces which have been damaged or field welded in accordance with SSPC Technology Guide No.14.
- .4 Clean and prepare surfaces of bolts, which will receive a finished coat of paint in the same manner as the connected steelwork.

3.5 Inspection and Testing:

- .1 An Inspection and Testing Agency (certified to CSA W178.1 & 2) will be appointed to carry inspection and testing of all structural steel.
- .2 Do not commence fabrication until details of inspection have been worked out with the Agency.
- .3 Assist the Inspection and Testing Agency in its work. Notify as to the Work Schedule and provide safe access to the work area as required.
- .4 Provide Inspection and Testing Agency with a copy of reviewed shop drawings.
- .5 The Inspection Agency will submit reports to WSP-S, Contractor and Municipal Authorities covering the Work inspected and provide details of errors or deficiencies observed. The Reports will make reference to the reviewed shop drawings used for inspection, including the date on the review stamp. Work will be inspected in shop and when erected. Store fabricated members in shop so that they are accessible for inspection.
- .6 Welding inspection:
 - .1 Welding inspection will be conducted in shop and in field.
 - .2 The Inspector will check welders' CWB qualification.
 - .3 The Inspector will review welding procedures for conformance with CWB requirements, manufacturers' requirements and standard practice.
 - .4 The inspector will visually check all welds at plate girders, all butt welds (including cranks and splices), all welds in moment connections, all welds at crane columns and crane girders, all welds of roof anchors to the base structure, 50% of welds in hanger connections and 20% of all other welds for:
 - .1 Size, length and profile.
 - .2 Joint preparation, including cleaning and removal of any paint.
 - .3 Fit up and alignment.
 - .4 Slag removal.
 - .5 Distortion.
 - .6 Porosity.
 - .7 Cracks.
 - .5 Non destructive testing will be conducted on the following connections:
 - .1 All shop and field welded splices.
 - .2 All welds on crane columns and girders.
 - .3 A representative 10% of all other welded connections.
 - .6 Test results will be evaluated in accordance with CSA W59.
- .7 Shop inspection will include:
 - .1 Confirming that all materials meet specifications.
 - .2 Reviewing mill test reports for conformance with specified material grades.

- .3 Checking that mill test reports, boron test reports (if applicable) and producer's certificates are properly correlated to materials and products supplied for the project and that legible markings were made on the material and products by the producers in accordance with the applicable standards. Where this is not possible, WSP-S may request sample testing to be carried out as described below.
- .4 Checking fabricator's qualification under the requirement of CSA W47.
- .5 Sampling fabrication procedures for general conformity with Contract requirements.
- .6 Reviewing cambering procedure for compliance with CSA W59 requirements.
- .7 Checking surface preparation for members to be painted.
- .8 Checking shop painting and galvanizing.
- .9 General checking:
 - .1 Dimensions and cross sections in relation to specified member sizes.
 - .2 Allowable mill sweep and camber.
 - .3 Locations of all holes, cuts and fittings.
 - .4 Reinforcement of openings.
 - .5 Milling of ends for bearing.
 - .6 Base plate orientation.
 - .7 Items to be cast in concrete.
 - .8 Fabrication tolerances.
 - .9 Splicing (where indicated on drawings).
 - .10 Cambering.
 - .11 Compliance with AESS requirements.
- .10 Sample testing: When requested, test coupons will be taken and tested in accordance with CSA G40.20 to establish identification. Cut samples from member locations selected by WSP-S and provide to the Inspection and Testing Agency. Make good the locations if requested, at no extra cost, by adding new plates and welds acceptable to WSP-S. The Agency will have the samples tested for mechanical properties and for chemical composition and will classify the steel as to specification.
- .8 Field inspection:
 - .1 Arrange for the Inspector to start field inspection as soon as each section of the Work is completed, plumbed, bolts tightened and field welding finished.
 - .2 The Inspector will sample erection procedures for general conformity with Contract requirements.
 - .3 The Inspector will check general fit-up and tolerances and report any apparent distortions and misalignments.
 - .4 Minimum 10% of columns and 10% of beams will be checked by instruments for plumbness, alignment and elevation.
 - .5 Field inspection will include:
 - .1 Checking individual frame members for twisting, sweep and local damage.

- .2 Checking levelness of leveling plates.
- .3 Inspection of grouting under base plates and bearing plates.
- .4 Checking column bearings on cast in plates.
- .5 Checking bearings on steel and masonry.
- .6 Inspection of sliding bearings.
- .7 Inspection of bolting, shear studs and post installed anchors as described below.
- .8 Checking installation of permanent bracings and nominal tension in finished building (where specified).
- .9 Checking truss permanent bridging and end connections.
- .10 Checking that column connections are adjusted to keep the columns plumb after supported structure has deflected due to dead loads applied to floor and roof deck.
- .11 Checking that all adjustable connections at wall supporting members have been finalized after concrete is poured.
- .12 Inspection of approved field cutting and reinforcing around openings.
- .13 Inspection of field painting.
- .14 Inspection of field touch-up.
- .6 Bolting inspection:
 - .1 The Inspector will visually check all bolts in bearing connections. Where erection drawings indicate bolts with threads excluded from the shear plane, the Inspector will remove nuts from 1% of all bearing bolts and check that thread is excluded from the shear planes.
 - .2 The Inspector will check that surfaces in slip- critical connections are free from paint and other deleterious substances.
 - .3 The Inspector will torque check at least one bolt in each of the connections indicated to be pre-tensioned.
- .7 Shear stud inspection:
 - .1 The Inspector will visually check all stud shear connectors on composite steel beams.
 - .2 At least one stud in every 150 and all studs which do not have a complete end weld, which are repaired by welding or which show less than the normal reduction in height due to welding will be bent 15 degrees from their axis towards the nearest support, as specified in CSA-W59.
 - .3 Bent studs that show no sign of failure will be accepted and shall remain in the bent position. Studs that crack in weld, base metal or shank will be rejected. Studs with end welds covering less than 85% of the perimeter will be rejected even if they pass the bend test.
- .8 Post installed anchor inspection:
 - .1 The Inspector will sample check drilled concrete and masonry anchors.
 - .2 The Inspector will provide full time inspection during installation of post installed adhesive anchors subject to sustained tension loads.

- .3 The Inspector will randomly select and pull test 5% of all types and sizes of post installed anchors installed on a weekly basis, but not less than one anchor of each type, size and orientation. Pull test to twice the allowable tensile load, or 1.5 times the factored resistance of the anchor given by the manufacturer. Chose anchor locations where proximity to concrete edge does not affect anchor capacity, or use reduced anchor loads per manufacturer's recommendation. Submit reports to WSP-S within one week of testing. Reports to indicate each anchor location, test load and mode of failure, if applicable. Notify WSP-S immediately if any anchor fails the pull test.

3.6 Cleaning

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal and 01 35 21 – LEED Requirements].

END OF SECTION 05 12 23

PART 1 - GENERAL

1.1 Related Requirements

- .1 Section 03 30 00: Cast in Place Concrete
- .2 Section 05 12 23: Structural Steel for Buildings
- .3 Section 05 31 00: Steel Decking
- .4 Section 05 50 00: Metal Fabrications
- .5 Section 07 81 00: Applied Fireproofing
- .6 Section 09 91 00: Painting
- .7 Section 13 34 19: Metal Building Systems

1.2 References

- .1 Editions of all Referenced Standards to be the ones designated by the applicable Building Code in force at the time of building permit application, as indicated on Structural Drawings. For Standards not referenced by the Building Code, use the latest editions.
- .2 CSA Group (CSA):
 - .1 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel
 - .2 CSA S16, Limit States Design of Steel Structures
 - .3 CSA S136, North American Specifications for the Design of Cold Formed Steel Structural Members
 - .4 CSA W47.1, Certification of Companies for Fusion Welding of Steel
 - .5 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding
 - .6 CSA W55, Certification of Companies for Resistance Welding of Steel and Aluminum
 - .7 CSA W59, Welded Steel Construction (Metal Arc Welding)
 - .8 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction
- .3 ASTM International (ASTM):
 - .1 ASTM A123/A123M, Standard Specification for Zinc (Hot Dip Galvanized) coating on Iron and Steel Products
 - .2 ASTM F3125/F3125M, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric dimensions
 - .3 ASTM D7803. Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.
- .4 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA):
 - .1 CISC Handbook of Steel Construction
 - .2 CISC/CPMA Standard 1-73a, A Quick-drying One-coat Paint for Use on Structural Steel
 - .3 CISC/CPMA Standard 2-75, Quick-drying Primer for Use on Structural Steel

- .4 CISC Code of Standard Practice, Appendix I, Architecturally Exposed Structural Steel (AESS)
- .5 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE) International:
 - .1 SSPC-SP 1, Solvent Cleaning
 - .2 NACE No. 3 / SSPC SP-6, Commercial Blast Cleaning
 - .3 NACE No.4 / SSPC SP-7, Brush Off Blast Cleaning
 - .4 NACE No.2 / SSPC SP-10, Near White Blast Cleaning
 - .5 Quality SSPC Paint System Guide No.14 – Guide for Repair of Imperfections in Galvanized or Inorganic Zinc Coated Steel Using Organic Zinc Rich Coating
 - .6 SSPC Technology Guide No.14 – Guide for the Repair of Imperfections in Galvanized, Organic or Inorganic Zinc-Coated Steel Using Organic Zinc Rich Coating
 - .7 SSPC Paint Specification No. 20 – Zinc Rich Coating, Type I – Inorganic and Type II - Organic

1.3 Quality Assurance

- .1 Qualifications:
 - .1 Steel joist fabricator to be a member of the Canadian Institute of Steel Construction and to have at least five years of experience.
 - .2 Steel joist fabricator and erector to be certified by the Canadian Welding Bureau under the requirements of CSA W47.1, Division 1 or 2 for fusion welding and/or CSA W55.3, Division 1 or 2 for resistance welding of structural steel components and to have CWB approved procedure for welding rebar (Grade 400W) to structural steel in accordance with CSA W186 (if applicable).
 - .3 Welders to be appropriately qualified, working under direction of a qualified welding supervisor.
 - .4 Engage a Professional Engineer licensed in the place where the project is located to be responsible for design, detailing and site review of all steel joists.
 - .5 The Professional Engineer designing joists to hold a Certificate of Authorization, and to carry a minimum of \$1,000,000.00 in liability insurance.

1.4 Quality Control

- .1 Submit in accordance with Section 01 45 00 – Quality Control
- .2 Source Quality Control Submittals:
 - .1 Submit mill test reports 4 weeks prior to fabrication of steel joists.
 - .1 Mill test reports to show chemical and physical properties and other details of steel to be used for steel joists.
 - .2 The reports to be correlated to the materials or products to which they pertain.
- .3 Tolerances
 - .1 Conform to the fabrication and erection tolerances of CAN/CSA S16.
 - .2 Comply with more stringent tolerances if specified elsewhere to suit interfacing materials or AESS members.

1.5 Unit Prices

- .1 Provide unit prices per Section 01 29 00 – Payment Procedures.

1.6 Action and Informational Submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Provide drawings stamped and signed by the Professional Engineer responsible for steel joist design.
 - .2 Submit a copy of that Engineer's Certificate of Authorization and proof of liability insurance.
 - .3 Show on drawings:
 - .1 Material specifications.
 - .2 Joist geometry.
 - .3 Joist spacing.
 - .4 Joist camber.
 - .5 Member sizes.
 - .6 Joint details.
 - .7 Net weld lengths.
 - .8 Section splices.
 - .9 Bearing and anchorage details.
 - .10 Surface preparation.
 - .11 Shop painting / galvanizing.
 - .12 Bridging, including anchorage details at ends of bridging lines.
 - .13 Joists which are considered AESS, and their category; Refer to AESS Category Matrix as shown in Table 1 of the CISC Code of Standard Practice, Appendix I.
 - .14 Temporary bracings.
- .4 On completion of erection, submit a letter signed and sealed by the Professional Engineer responsible for steel joists certifying that the work has been completed in accordance with all contract documents.

PART 2 - PRODUCTS

2.1 Design and Detailing Requirements

- .1 Design joists in accordance with requirements of CSA S16 and CSA S136. Consider load effects due to fabrication, erection and handling.
- .2 Submit calculations for strength and deflection. Show design loads, member forces and utilizations.
- .3 Arrange joists and bridging to accommodate recessed fixtures and ductwork. Refer to Mechanical and Electrical Drawings.

- .4 Arrange members to form a statically determinate truss. Chose web and chord members to have an axis of symmetry in the plane of the web. Line up web members along joist runs sufficiently to permit mechanical services.
- .5 Minimum thickness of material: flats and hot rolled sections 2.5 mm (0.10"); rods 10 mm (0.39") diameter; cold formed sections 2mm (0.079"); members supporting steel deck 3.15 mm (0.125").
- .6 Where joists support 76 mm (3") deep composite steel deck, total width of top chord elements that actually support the deck to be 140 mm (5- 5/8") minimum.
- .7 Design joists to carry loads indicated on Structural Drawings, including uplifts, point loads and axial loads; see Steel Joists General Notes for additional design loads. The loads shown on drawings are working loads unless otherwise noted.
- .8 Unless otherwise noted, total load deflection not to exceed 1/240th of the span and live load deflection not to exceed 1/360th of the span.
- .9 Unless otherwise shown on drawings, if a joist is adjacent to a wall or a column which provide next line of support to the deck carried by the joist and are located within the middle half of the joist span, stiffen the joist so that the total load deflection does not exceed $d/50$, where "d" is the distance between the joist and the adjacent wall / column. In addition, design subsequent joists so that differential total load deflection between any two adjacent joists does not exceed joist spacing / 50. Maximum camber for these joists not to exceed total load deflection.
- .10 Provide the minimum required moment of inertia for floor joists where shown on Structural Drawings.
- .11 Design joists and bridging to meet requirements of any Fire Rated Assembly Design specified for the Project. Increase capacity as required for load restricted ULC / UL assemblies.
- .12 Apply unbalanced live loads and concentrated loads in accordance with CSA S16.
- .13 Design joist chords for additional axial forces from horizontal bracings connected to them. Connect joists to all supporting members by welding or bolting.
- .14 Centre reaction point of joist framing from one side only over centroid of supporting beam. Where necessary, increase shoe depths as required for the first diagonal to clear the supporting structure. Coordinate the required supporting steel elevation with steel trade.
- .15 Make all joist shoes with solid webs.
- .16 Design joist shoe connections to supporting members to be able to resist uplift and to transfer axial force into joist top chord equal to 10% of the joist reaction (but not less than 25 kN).
- .17 Design joist shoes for rollover forces where shown on structural drawings.
- .18 At columns where floor slab does not exist at the column side opposite to the joist connection point (such as at perimeter columns), design joist shoe connection to resist axial force not less than 2% of the column axial load at that level.
- .19 Provide top and bottom chord extensions where required. Provide tie joists at all columns as required for erection stability.
- .20 Where supporting girders run over tops of steel columns, design and connect tie joist bottom chord for axial load of +/- 25 kN (in addition to the primary chord loads).
- .21 Where bearing plate sizes are not noted on drawings, design bearing plates for a maximum factored bearing pressure of 1.9 MPa on masonry and 11.0 MPa on cast in place concrete.
- .22 Design end plates and post installed anchors for connection of bridging to concrete and masonry walls.

- .23 Unless noted otherwise, camber floor joists for dead load deflection, excluding any partition allowance.
- .24 Unless noted otherwise, camber roof joists in accordance to CSA S16.
- .25 Provide holes to receive 16 mm (0.625") bolts for securing of any wood framing and blocking. Space at 600 mm (2'-0") centres. Substitute 16 mm (0.625") threaded studs with nuts in locations where appearance is a factor.

2.2 Materials

- .1 Steel joists: to CSA S16 and CSA S136.
- .2 Structural steel: to CSA G40.20/G40.21.
- .3 Welding materials: to CSA W48 and CSA W59, certified by Canadian Welding Bureau.
- .4 Bolts, nuts and washers: to ASTM F3125.
- .5 Anchor rods: CSA G40.21 or ASTM F1554, refer to drawings.
- .6 Shop paint: to CISC/CPMA 1-73a.
- .7 Shop paint primer: to CISC/CPMA 2-75, solvent reducible alkyd, red oxide, compatible with specified topcoat.
- .8 Zinc-rich coating: to SSPC Paint Specification No.20, compatible with top coat (where specified).
- .9 Hot dip galvanizing: to ASTM A123/A123M, minimum zinc coating of 600 g/m².
- .10 Headed studs: to CSA W59, Type B, F_y=350 MPa.
- .11 Joint filler for exposed steelwork: Epoxy resin.

2.3 Fabrication

- .1 Fabricate steel joists in accordance with CSA S16, CSA S136 and with reviewed shop drawings.
- .2 Weld in accordance with CSA W59 and CSA W186.
- .3 Stagger chord member splices. Do not ship joists to the site before being inspected.

2.4 Shop Painting

- .1 Clean all joists to SSPC-SP 1. Remove loose mill scale, rust, oil, dirt and foreign matter.
- .2 In addition for joists to be galvanized or to receive shop primer paint: Clean steel to SSPC-SP 7 Brush-Off Blast Cleaning.
- .3 In addition for members receiving zinc-rich coating: Clean steel to SSPC-SP 10 Near White Blast Cleaning.
- .4 Apply one coat of shop paint CISC/CPMA 1-73a to joists in the shop with the exception of:
 - .1 Members to receive spray fireproofing.
 - .2 Members to receive a finish coat of paint on site for which a CISC/CPMA 2-75 shop primer is required.
 - .3 Members to receive zinc-rich coating.
 - .4 Galvanized members.

- .5 Top chords of composite joists with field welded shear connectors.
- .6 Surfaces encased in or in contact with cast-in-place concrete including top chords of joists supporting slabs.
- .5 If joists to receive sprayed fireproofing are shop painted, only paints tested to ASTM E736 and approved by spray fireproofing supplier may be used. Any other paint must be removed to bare steel prior to application of spray applied fireproofing.
- .6 Apply galvanizing in the shop to:
 - .1 Exposed exterior steel joists.
 - .2 Other joists noted on drawings.
- .7 If galvanized steel is to be painted, use only non passivated galvanizing process (without chromate coating).
 - .1 Clean galvanized members to be painted in accordance to ASTM D7803.
- .8 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.
- .9 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.
- .10 Touch up paint on bolts, nuts, sharp edges and corners to remove sags, drips and runs before prime coat is dry.

PART 3 - EXECUTION

3.1 General

- .1 Structural steel work: in accordance with CSA S16.
- .2 Welding: in accordance with CSA W59 and CSA W186.

3.2 Examination

- .1 Verify conditions of substrates previously installed under other Sections or Contracts are acceptable for steel joist framing installation:
 - .1 Visually inspect substrate.
 - .2 Inform WSP-S of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.3 Connection to Existing Work

- .1 Verify dimensions and condition of existing work. Report discrepancies and potential problem areas to WSP-S for direction before commencing fabrication.
- .2 Take precautions to protect existing works from damage. Repair damage to adjacent materials caused by steel joist installation.

3.4 Erection

- .1 Erect steel joists in accordance with CSA S16 and reviewed shop drawings.
- .2 Do not field cut or alter any members without the WSP-S approval.

- .3 Make adequate provision for all loads acting on the structure during erection. Provide erection bracing to keep the structure stable, plumb and in true alignment during construction. Complete installation of bridging and anchorages before placing construction loads on joists. For load bearing masonry construction, maintain bracing until completion of masonry work and floor / roof decks which together provide permanent bracing. Do not remove erection bracings without written approval from the Engineer who designed it.
- .4 Where bottom cord bridging is terminated by connection to steel beam, bring it up and connect to beam top flange.
- .5 Do not make permanent connections until structure has been properly aligned.
- .6 Report ill-fitting connections to the WSP-S before taking corrective measures.
- .7 When welding after galvanizing is in place, grind away galvanizing at areas to be welded.
- .8 Do not weld in an ambient temperature below -18°C. Preheat material adjacent to welding areas when ambient temperature is between -18°C and 0°C.
- .9 Protect installed products from damage during construction.
- .10 AESS joists: erect using softened slings or other methods such that they are not damaged. Provide padding as required to protect while rigging and aligning.

3.5 Field Painting

- .1 Paint in accordance with Section 09 91 00 Painting
- .2 Touch up damaged surfaces with the same paint as the shop primer.
- .3 Repair any galvanized or zinc rich painted surfaces which have been damaged or field welded in accordance with SSPC Technology Guide No.14.

3.6 Inspection and Testing

- .1 An Inspection and Testing Agency (certified to CSA W178.1 & 2) will be appointed to carry inspection and testing of all steel joists.
- .2 Refer to Section 05 12 23 for inspection and testing requirements.

3.7 Cleaning

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal and 01 35 21 – LEED Requirements.

END OF SECTION 05 21 00

PART 1 - GENERAL

1.1 Related Requirements

- .1 Section 03 20 00: Concrete Reinforcing
- .2 Section 03 30 00: Cast in Place Concrete
- .3 Section 05 12 23: Structural Steel for Buildings
- .4 Section 05 21 00: Steel Joists
- .5 Section 05 50 00: Metal Fabrications
- .6 Section 09 91 00: Painting
- .7 Section 13 34 19: Metal Building Systems

1.2 References

- .1 Editions of all Referenced Standards to be the ones designated by the applicable Building Code in force at the time of building permit application, as indicated on Structural Drawings. For Standards not referenced by the Building Code, use the latest editions.
- .2 CSA Group (CSA):
 - .1 CSA S136, North American Specification for the Design of Cold Formed Steel Structural Members
 - .2 CSA W47.1, Certification of Companies for Fusion Welding of Steel
 - .3 CSA W55, Certification of Companies for Resistance Welding of Steel and Aluminum
 - .4 CSA W59, Welded Steel Construction, (Metal Arc Welding)
- .3 ASTM International (ASTM):
 - .1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .2 ASTM A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
- .4 Canadian Sheet Steel Building Institute (CSSBI):
 - .1 CSSBI 10M, Standard for Steel Roof Deck
 - .2 CSSBI 12M, Standard for Composite Steel Deck
- .5 Factory Mutual Insurance Company:
 - .1 FM Global Property Loss Prevention Data Sheet 1-29, Roof Deck Securement and Above Deck Roof Components

1.3 Quality Assurance

- .1 Qualifications
 - .1 Deck supplier and erector to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel and/or CSA W55.3 Division 1 or 2 for resistance welding.
 - .2 Welders to be CWB approved for deck welding.

- .3 Engage a Professional Engineer licensed in the place where the project is located to be responsible for design, detailing and site review of all decking.
- .4 The Professional Engineer designing steel decking to hold a Certificate of Authorization, and to carry a minimum of \$1,000,000.00 in liability insurance.

1.4 Unit Prices

- .1 Provide unit prices per Section 01 29 00 – Payment Procedures.

1.5 Action and Informational Submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's data sheets for each deck type.
 - .2 When requested, provide data to substantiate deck load capacity, including diaphragm shear capacity.
- .3 Shop Drawings:
 - .1 Provide drawings stamped and signed by a Professional Engineer responsible for design of steel decking. Drawings to include diaphragm connection design.
 - .2 Submit a copy of the Engineer's Certificate of Authorization and proof of liability insurance.
 - .3 Show on drawings:
 - .1 Material grade.
 - .2 Deck layout.
 - .3 Deck profile and base steel thickness.
 - .4 Type of deck metallic coating. Indicate deck which is to be painted on site.
 - .5 Gravity and uplift loads, diaphragm shear and deflection requirements for which the deck is designed.
 - .6 Type and spacing of connections to supports and between sheets.
 - .7 Projections and openings.
 - .8 Reinforcement details and accessories.
 - .9 Layout, size, type and welding requirements for welded stud shear connectors.
 - .10 Temporary shoring required for floor deck.

PART 2 - PRODUCTS

2.1 Design and Detailing Requirements

- .1 Design loads, deck depths and core nominal thicknesses are shown on Structural Drawings. Chose deck profile, design connections and detail in accordance with CSA S136, CSSBI 10M and CSSBI 12M and to satisfy requirements of any Fire Rated Assembly Design specified for the Project.
- .2 If increased wind uplift loads applicable at roof edges and corners are not specifically noted on Structural Drawings, increase the minimum design wind uplift shown (which is applicable in the zones away from roof edges) in accordance with the User's Guide to NBC – Structural Commentaries (Part 4 of Division B).

- .3 Design roof deck for indicated diaphragm action, including anchorage and side laps, in accordance with CSSBI "Design of Steel Deck Diaphragms" and Hilti Product Technical Guide (for Powder Actuated Fasteners)..
- .4 Unless otherwise noted on drawings, floor deck to carry weight of wet concrete and appropriate construction load allowance without shoring.
- .5 Deflection limitations for floor and roof deck:
 - .1 1/360 of span under specified live load.
 - .2 1/240 of span under total load.
- .6 Make deck sheets continuous over 3 spans wherever possible. Combine triple span and double span sheets to suite multi span deck layouts. Use single span sheets only where single span condition is shown on drawings.
- .7 Design reinforcement for roof deck openings up to 450 mm (18") wide across flutes.

2.2 Materials

- .1 Prefinished deck: with underlying zinc protection of Z275. Colour selected by the Architect from manufacturer's standard list.
- .2 Acoustic deck: with web perforations reducing capacity of the deck without perforation by maximum 5%.
- .3 Decks to be painted on site: zinc-iron alloy coated decks suitable for finish painting.
- .4 Fasteners for galvanized deck and prefinished deck: stainless steel, hex head, self-tapping screws with EPDM bonded washers.
- .5 Fasteners for deck to wood supports: galvanized screws with flat seal washers.
- .6 Powder-actuated fasteners: Hilti Decking Fastening System.
- .7 Acoustic insulation: fibrous glass, 17.5 kg/m³ (1.1 lb/ft³) minimum density, profiled to suit deck flutes.
- .8 Cover plates, closures, pour stops, edge strips, flashings and deck reinforcing: steel sheet with minimum base steel thickness of 0.91 mm. Metallic coating same as deck material.
- .9 Headed studs: to CSA W59, Type B, min. Fy=350 MPa.

2.3 Types of Decking

- .1 Roof deck: with interlocking or overlapping side joints. Centre to centre rib spacing to be:
 - .1 150 mm (6") for 38 mm (1.5") deep deck.
 - .2 150 mm (6") or 200 mm (8") for 76 mm (3") deep deck.
- .2 Where roof deck fasteners and fastening pattern are specified on drawings, use deck with flute spacing and side lap type which can accommodate the specified fasteners.
- .3 In addition for acoustic roof deck: provide perforations on vertical face of flutes, to achieve noise reduction coefficient of 0.7 minimum.
- .4 Composite floor deck: embossed fluted profile, interlocking or overlapping side laps. Centre to centre rib spacing to be:
 - .1 150 mm (6") for 38 mm (1.5") deep deck.
 - .2 300 mm (12") for 76 (3") and 51 mm (2") deep deck.

- .5 In addition for composite floor deck over composite steel beams with shear studs, minimum average width of concrete ribs to be:
 - .1 50 mm (2") for 38 deep steel deck.
 - .2 100 mm (4") for 38 mm (1.5") deep inverted steel deck.
 - .3 150 mm (6") for 76 mm (3") and 51 mm (2") deep steel deck.
- .6 Use only decks with overlapping side joints where side lap connections need to be screwed or where multiple deck layers are specified.

2.4 Fabrication

- .1 Conform to CSA S136 and CSA W59.
- .2 Fabricate sections from steel sheets by rolling. Form integral ribs which will bear on supports and form interlocking male and female side laps.

PART 3 - EXECUTION

3.1 General

- .1 Structural steel work: in accordance with CSA S136, CSSBI 10M and CSSBI 12M.
- .2 Welding: in accordance with CSA W59, except where specified otherwise.

3.2 Examination

- .1 Verification of Conditions: verify that conditions of substrates previously installed under other Sections or Contracts are acceptable for steel decking installation.
 - .1 Visually inspect substrate.
 - .2 Inform WSP-S of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.3 Erection

- .1 Erect steel deck in accordance with CSA S136, CSSBI 10M, CSSBI 12M, and reviewed shop drawings.
- .2 Do not overload structure during erection. Place deck bundles near columns.
- .3 Align deck end to end for accurate fit with corresponding sections. Sections to be parallel, even and straight.
- .4 Locate deck rib directly over perimeter steel beams spanning parallel to deck and at same elevation as underside of deck.
- .5 Lap over supports. Minimum lap 50 mm (2"), maximum lap 100 mm (4").
- .6 For exposed deck end laps, do not extend lower deck sheet past the face of the supports.
- .7 Exercise particular care in erection of exposed deck. Sections which are dented, damaged or perforated by welding will be rejected.
- .8 Where composite beams (with shear studs) run in the direction of deck span, split deck and trim with closures as required to allow min. 25 mm (1") clear between studs and closure(s) / deck webs.
- .9 Where composite beams (with shear studs) do not run in the direction of deck span, weld studs through deck. Do not cut deck to accommodate pre-welded studs.

.10 Connections

- .1 Connect deck to all supporting beams and perimeter beams. Interconnect sheets at side laps.
- .2 Predrill holes for screws connecting deck to timber beams. Screws shall tap metal and extend into wood, clamping deck to wood.
- .3 Fasten stud shear connectors to composite beams by welding to beams (through deck where necessary) with a full 360 degrees weld capable of developing 120% of the shear values listed in CAN/CSA S16. Fastening procedure to conform to the recommendations of the stud manufacturer. Test the first two studs installed each day in accordance with CSA W59. Maintain record of the studs tested. Replace studs rejected by Inspection and Testing Agency.
- .11 Immediately after deck is permanently secured in place, touch up metallic coated top surface with compatible primer where burned by welding.
- .12 Prior to concrete placement, steel deck to be free of soil, debris, standing water, loose mill scale and other foreign matter.
- .13 Apply spray paint to deck immediately above the protected zones which are indicated on structural steel members by contrasting shop paint. Do not attach studs nor powder actuated fasteners to these zones. Only acceptable deck fasteners within the protected zones are 19 mm (3/4") puddle welds. If any other fasteners are used, the affected structural steel members will have to be removed and replaced.

.14 Closures and Accessories

- .1 Provide all required edge stiffeners, closures, reinforcing sheet steel and flashing.
- .2 Reinforce edge of free spanning deck with channel shaped edge strip.
- .3 Provide pour stops for concrete slabs over deck. Fasten to deck.
- .4 Provide flashing at columns and points of discontinuity to prevent leakage when concrete is placed over deck.

.15 Openings

- .1 Structural Drawings do not show all openings required. Refer also to Architectural, Mechanical and Electrical drawings.
- .2 Cut all opening required by other trades. Carry deck through floor openings which are not framed with structural steel and cut only after concrete reaches 75% of the specified design strength.
- .3 Reinforce roof deck openings up to 450 mm (18") across flutes. Maximum size of unreinforced openings not to exceed 150 mm (6").
- .16 Protect existing works. Repair damage to adjacent materials caused by steel decking installation.
- .17 Protect installed products and components from damage during construction.
- .18 Temporary shoring, if required, not to be removed until concrete attains 75% of its specified 28 day compression strength.

3.4 Inspection and Testing

- .1 An Inspection and Testing Agency (certified to CSA W178.1 & 2) will be appointed to carry out inspection and testing of steel decks and check conformance with Contract documents and reviewed shop drawings.

- .2 Assist the Inspection and Testing Agency in its work. Notify as to the Work Schedule and provide safe access to the work area as required.
- .3 Provide Inspection and Testing Agency with a copy of reviewed shop drawings.
- .4 The Inspection Agency will submit reports to WSP-S, Contractor and Municipal Authorities covering the Work inspected and provide details of errors or deficiencies observed. The Reports will make reference to the reviewed shop drawings used for inspection, including the date on the review stamp.
- .5 Work will be inspected when erected.
- .6 Inspection will include:
 - .1 Checking that mill test reports are properly correlated to materials.
 - .2 Confirming that all materials meet specifications.
 - .3 Checking welders' CWB qualification.
 - .4 Checking deck types, gauge and coating thicknesses.
 - .5 Checking welding, fastening, side laps and button punching.
 - .6 Checking deck reinforcement at holes cut in deck.
 - .7 Checking installation of sheet metal strips and edge reinforcing.
 - .8 Checking deck bearing lengths at supporting members.
 - .9 Checking appearance of exposed steel deck.
 - .10 Checking and testing field welded stud shear connectors as follows:
 - .1 The Inspector will visually check all stud shear connectors on composite steel beams.
 - .2 At least one stud in every 150 and all studs which do not have a complete end weld, which are repaired by welding or which show less than the normal reduction in height due to welding will be bent 15 degrees from their axis towards the nearest support, as specified in CSA-W59.
 - .3 Bent studs that show no sign of failure will be accepted and shall remain in the bent position. Studs that crack in weld, base metal or shank will be rejected.
 - .4 Studs with end welds covering less than 85% of the perimeter will be rejected even if they pass the bend test.

3.5 Cleaning

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal and 01 35 21 – LEED Requirements.

END OF SECTION 05 31 00

PART 1 - GENERAL

1.1 SUMMARY

- .1 Section Includes:
 - .1 Materials and application of Wind-Load bearing steel stud systems for exterior wall assemblies.
 - .2 Material and application of structural metal stud framing systems at interior glazed screens for support at jambs and overhead wall framing.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 30 - Health and Safety Requirements.
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcing
- .4 Section 05 12 00 – Structural Steel
- .5 Section 06 10 00- Rough Carpentry
- .6 Section 09 21 16 - Gypsum Board Assemblies
- .7 Section 09 22 16 - Non-structural Metal Framing

1.3 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 653/A 653M-04a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM A 792/A 792M-03, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-G164- Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .2 CSA W47.1 Certification of Companies for Fusion Welding of Steel.
 - .3 CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .4 CSA W59-03, Welded Steel Construction (Metal Arc Welding) (Metric Version).
 - .5 CAN/CSA S136-01, North American Specification for the Design of Cold-Formed Steel Structural Members.

- .4 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI 50M, Lightweight Steel Framing Manual.
 - .2 CSSBI 52M, Lightweight Steel Framing Binder.
 - .3 CSSBI Fact Sheet #3 Care and Maintenance of Prefinished Sheet Steel Building Products.
 - .4 CSSBI Technical Bulletin Vol. 7, No. 2 February 2011, Changing Standard Thicknesses for Canadian Lightweight Steel Framing Applications.
 - .5 CSSBI S5-04, Guide Specification for Wind Bearing Steel Studs.
- .5 The Master Painters Institute (MPI) / Architectural Painting Specification Manual
 - .1 MPI # 18, Organic Zinc Rich Primer.

1.4 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Indicate design loads, member sizes, materials, design thickness exclusive of coatings, coating specifications, connection and bracing details, screw sizes and spacing, and anchors.
 - .2 Indicate locations, dimensions, openings and requirements of related work.
 - .3 Indicate welds by welding symbols as defined in CSA W59.
 - .4 Shop drawings shall be stamped and signed by a qualified professional Engineer registered in the Province of Ontario.
- .3 Submit samples of framing components and fasteners to Consultant.
- .4 Prior to beginning Work, submit: two certified copies of mill reports covering material properties.
- .5 Submit Contractor's Engineer certificate/ written report, within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL. Certificate/report shall be stamped and signed by qualified professional engineer registered in the province of Ontario.

1.5 MOCK-UP

- .1 Construct 3.0 linear meters of metal stud wall framing. This mock up will become part of the final wall assembly once reviewed and considered acceptable by the Consultant.
- .2 Mockup to be coordinated with masonry trade to confirm required spacing of masonry veneer ties at base, corners, openings and field areas.

1.6 QUALITY
ASSURANCE

- .1 Site Meetings: as part of Contractor's Services as described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work and mock-up is completed but before general installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.
- .2 Structural steel stud trade is to coordinate with masonry trade to ensure correct spacing of masonry ties is accommodated as noted in 04 05 19 Masonry Anchorage and Reinforcing

1.7 DELIVERY,
STORAGE AND
HANDLING

- .1 Protect steel studs during transportation, site storage and installation in accordance with CSSBI Sheet Steel Facts #3.
- .2 Handle and protect galvanized materials from damage to zinc coating.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
 - .4 Ensure emptied containers are sealed and stored safely.
 - .5 Divert unused metal materials from landfill to metal recycling facility as approved by Consultant.
 - .6 Fold up metal and plastic banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel: to CSA S136, fabricated from ASTM A 653/A 653M, Grade 340 steel.
- .2 Zinc coated steel sheet: quality to ASTM A 653/A 653M, with Z275 designation coating. Sustainable recycled content as specified. Use steel with greatest recycled content available.
- .3 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.

	.4	Screws: pan head, self-drilling, self-tapping sheet metal screws, corrosion protected with minimum zinc coating thickness of 0.008 mm, length 8 mm (shall be 5mm longer than twice thickness of steel)
	.5	Anchors: concrete expansion anchors or other suitable drilled type fasteners.
	.6	Bolts, nuts, washers: hot dipped galvanized to CAN/CSA-G164, 600 g/m ² zinc coating.
	.7	Touch up primer: zinc rich, to CAN/CGSB 1-GP-181 MPI #18.
2.2 STEEL STUD DESIGNATIONS	.1	Colour code: to CSSBI Technical Bulletin Vol.7, No. 2.
2.3 METAL FRAMING	.1	Steel studs: to CSA S136, fabricated from metallic coated steel, depth as indicated. .1 Minimum base steel thickness of 1.087, design thickness of 1.146, designation thickness: 43, designation colour: yellow.
	.2	Stud tracks: fabricated from same material and finish as steel studs, depth to suit. .1 Bottom track: single piece. .2 Top track: single piece.
	.3	Bridging: fabricated from same material and finish as studs, 38 x 12 x 1.09 mm minimum thickness.
	.4	Angle clips: fabricated from same material and finish as studs, 38 x 38 mm x depth of steel stud, 1.37 mm minimum thickness.
	.5	Tension straps and accessories: as recommended by manufacturer.
	.6	Deflection Clips: fabricated from same material and finish as studs, 65mm x 90mm full depth of steel stud, 1.52mm thickness, with screw slots to accommodate specified deflection. Deflection clips must fit snug inside between flanges of the stud, full width of the stud drawing.
	.7	Thickness and gauges indicated in 2.1.4, are minimum guidelines only. Tender price to include for required gauge to meet engineer's requirements for application of specified stud width. Use heavier gauge steel framing as noted on Drawings were required.
2.4 SOURCE QUALITY CONTROL	.1	Ensure mill reports covering material properties are reviewed by Consultant.

PART 3 - EXECUTION

3.1 GENERAL

- .1 Do welding in accordance with CSA W59.
- .2 Certification of companies: CSA W47.1 for fusion welding and CSA W55.3 for resistance welding of structural components.
- .3 Do work to CSSBI S5.

3.2 ERECTION

- .1 Erect components to requirements of reviewed shop drawings.
- .2 Prior to install tracks, scrape and clean off slab to take continuous beads of caulking.
- .3 Install continuous insulating gasket or beads of caulking two rows, under sill tracks and above head tracks at connection to concrete structure for all acoustic rated wall assemblies.
- .4 Install continuous insulating gasket or beads of caulking, two rows at all vertical studs abutting concrete structure for all acoustic rated wall assemblies.
- .5 Anchor tracks securely to structure at 800 mm on centre maximum, unless lesser spacing prescribed on shop drawings.
- .6 Erect studs plumb, aligned and securely attached with two screws minimum, or welded in accordance with manufacturer's recommendations.
- .7 Seat studs into bottom tracks and single piece top track.
- .8 Install deflection clips at top track as per shop drawings to allow deflection of structure. Clip to be full width of stud framing.
- .9 Install studs at not more than 50.0 mm from abutting walls, openings, and each side of corners and terminations with dissimilar materials.
- .10 Brace steel studs with horizontal internal bridging at 200 mm maximum.
 - .1 Fasten bridging to steel clips fastened to steel studs with screws or by welding.
- .11 Frame openings in stud walls to adequately carry loads by use of additional framing members and bracing as detailed on shop drawings.

- .12 At large interior glazed screens engineer wall framing to support screens and lateral loads. Increase stud gauge to suit application. Erect track at head of interior glazed screen openings to accommodate intermediate studs. Secure track to double jamb studs at each end, in accordance with reviewed shop drawings. Install intermediate studs above openings at spacing and manner to support lateral loads. Provide bracing studs above ceilings as required.

- .13 Touch up welds with coat of zinc rich primer.

3.3 ERECTION TOLERANCES

- .1 Plumb: not to exceed 1/500th of member length.
.2 Camber: not to exceed 1/1000th of member length.
.3 Spacing: not more than +/- 3.0 mm from design spacing.
.4 Gap between end of stud and track web: not more than 4.0 mm.

3.4 CUTOUTS

- .1 Maximum size of cutouts for services as follows:

Member Depth	Across Member Depth	Along Member Length	Centre to Centre Spacing (mm)
92	40 max.	105 max.	600 min.
102	40 max.	105 max.	600 min.
152	65 max.	115 max.	600 min.

- .2 Limit distance from centerline of last unreinforced cutout to end of member to less than 300 mm.

3.5 ELECTRICAL BOXES

- .1 Provide additional stud framing from floor to top of outlet. Provide cross members from the additional stud to bearing stud to provide solid backing for installation of electrical box.

3.6 WINDOW AND DOOR FRAMES

- .1 Provide bent galvanized steel plate support angle at perimeter of window frames to support plywood rough opening blocking.
.2 Thickness of support angle plate to be engineered to suit application. Note window loads to be supported and anchored to backup steel stud and structural elements not plywood and support angle as detailed.

3.7 FIELD QUALITY
CONTROL

- .1 Manufacturer's Field Services:
 - .1 Obtain written report from Contractor's Engineer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 – SUBMITTALS.
 - .2 Provide Contractor's Engineer field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 – QUALITY ASSURANCE.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 03 30 00 - Cast-in-Place Concrete.
- .4 Section 04 05 00 - Common Work Results for Masonry.
- .5 Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .6 Section 05 12 00 - Structural Steel.
- .7 Section 05 31 00 - Steel Deck.
- .8 Section 09 91 23 - Interior Painting.
- .9 Section 09 91 13 - Exterior Painting.

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A 53/A 53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A 307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
 - .2 CAN/CGSB-1.181-99, Ready-Mixed, Organic Zinc-Rich Coating.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-G40.20/G40.21-13(R2018), General Requirements for Rolled or Welded Structural Quality Steel.
 - .2 CAN/CSA-G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA-S16.1-01, Limit States Design of Steel Structures.
 - .4 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .5 CSA W59-(R2018), Welded Steel Construction (Metal Arc Welding) (Imperial Version).

- .4 The Environmental Choice Program
 - .1 CCD-047a-05, Paints, Surface Coatings.
 - .2 CCD-048-06, Surface Coatings - Recycled Water-borne.
 - .5 2012 OBC – Subsection 4.1.5.14 – Loads Acting on Guards.
 - .6 2012 OBC – SB-13 – Glass in Guards.
- 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 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
 - .1 For finishes, coatings, primers and paints.
 - .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.
 - .3 Each shop drawing submitted shall bear the stamp and signature of a qualified Professional Engineer registered in the Province of Ontario.
 - .3 Design Requirements:
 - .1 Design metal stair, balustrade and landing construction and connections to OBC vertical and horizontal live load requirements.
 - .2 Detail and fabricate stairs to NAAMM Metal Stairs Manual.
- 1.4 QUALITY ASSURANCE
- .1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - .2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
 - .3 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 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.
<u>1.6 WASTE MANAGEMENT AND DISPOSAL</u>	.1	Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
	.2	Remove from site and dispose of packaging materials at appropriate recycling facilities.
	.3	Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
	.4	Divert unused metal materials from landfill to metal recycling facility approved by Consultant.
<u>PART 2 - PRODUCTS</u>		
<u>2.1 SYSTEM DESCRIPTION</u>	.1	Design Requirements
	.2	Design metal stair, balustrade and landing construction and connections to Ontario Building Code (OBC) vertical and horizontal live load requirements.
	.3	Detail and fabricate stairs to NAAM Metal Stairs Manual.
<u>2.1 MATERIALS</u>	.1	Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W.
	.2	Steel pipe: to ASTM A 53/A 53M 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	Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.
	.7	Stainless steel tubing: to ASTM A269, Type 304L commercial grade. Seamless welded with AISI No. 4 finish.
<u>2.2 FABRICATION</u>	.8	Aluminum plate: ASTM B209, thickness and size as indicated.
	.1	Fabricate work square, true, straight and accurate to required

size, with joints closely fitted and properly secured.

- .2 Use self-tapping shake-proof flat 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 Shop coat primer: to CAN/CGSB-1.40.
- .3 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 ANGLE LINTELS

- .1 Steel angles: galvanized, sizes indicated for openings. Provide 150 mm minimum bearing at ends.
- .2 Weld or bolt back-to-back angles to profiles as indicated.
- .3 Finish: galvanized.
- .4 Refer to structural drawings for size and details of angle lintels, hangers and corner lintels and suspended lintels.

2.7 ACCESS LADDERS

- .1 Stringers: 8 x 75mm thick, steel. Extend stringers to 900mm beyond platforms.

	.2	Steel Rungs: 25 mm diameter x, welded to stringers at 300 mm on centre.
	.3	Roof access ladder to extend from floor to underside of roof deck. Ladders more than 3.0 metres above finished floor or grade shall incorporate safety cages starting at 2.2 metres above floor or grade.
	.4	Rest Platforms: not to exceed 9.0 metre ladder length. Offset ladders at each platform.
	.5	Brackets: sizes and shapes as indicated, weld to stringers at 1000 mm on centre, complete with fixing anchors.
	.6	Fabricate and provide safety cage around access ladders for all ladders over 3 metres in length.
	.7	Galvanize finish for exterior, prime paint for interior.
	.8	Galvanize exterior ladders after fabrication
<u>2.8 RAILINGS</u>	.1	As per details. Continuous to top of all service and storage mezzanines at stair or ladder openings.
	.2	Ramp and stair guards and railings: Refer architectural elevations for details. Exterior galvanized steel to details as noted on drawings. Interior stairs SSPC 6 finish complete with prime paint. Submit shop drawings designed and sealed by P. Eng. Ontario for conformance to OBC Part 4 – Loads Acting on Guards.
<u>2.9 PIT COVERS AND FRAMES</u>	.1	Sump Pit covers: Steel fabricate from 6 mm thick raised pattern plate set in L 55 x 55 x 6 frame. Include anchors 600 mm on centre for embedding in concrete. Supply trench covers in 1200 mm removable lengths. Provide gaskets all around. .1 Provide recessed handles for each cover. .2 Finish: galvanized.
<u>2.10 LATERAL SUPPORT CLIPS FOR MASONRY</u>	.1	See Structural and Architectural drawings for extent of masonry walls to be installed to suit requirements and as per CSA-A371. Required at the top of all masonry partitions.
	.2	Finish: Shop primed.
<u>2.12 SUSPENDED STEEL FRAMING FOR INTERIOR FIT-UP ELEMENTS</u>	.1	Fabricate of suspended steel framing and angle bracing hung from structure above complete with continuous channels and adjustable height mounting plates for support of the following interior elements. .1 Framing as required to support wall system.
<u>2.13 MILLWORK STEEL</u>	.1	Miscellaneous steel supports as detailed on millwork drawings.

SUPPORTS

Co-ordinate with Millwork sub-contractor and provide all necessary steel support components. Incorporate work of this section into millwork installations in shop and on site as required.

- .2 Steel support angles and framing as detailed for radiant heater enclosures. Co-ordinate work with mechanical contractor.

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 Consultant 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 PREPARATION FOR PAINT

- .1 Grind all welds smooth.
- .2 When installation is complete on site carefully review all work. Grind off all drips, marks and protrusions as required to leave a smooth, even flat surface ready for final paint. Touch up with primer.
- .3 Fill any small dents and marks in weld to provide continuous line using specified metal filler.

3.2 INSTALLATION

- .1 Install all items listed under Part 2 of this Section and as indicated on drawings as per the reviewed shop drawings.

3.3 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.

3.4 FIELD QUALITY CONTROL

- .1 Prior to project's substantial completion, engineer responsible for stamped and signed shop drawings shall submit site visit report confirming all items of this section have been fabricated and installed in accordance with reviewed shop drawings. Site visit report shall bear the stamp and signature of the engineer.

END OF SECTION

PART 1 - GENERAL

<u>1.1 SECTION INCLUDES</u>	.1	Supply and installation of all materials, equipment, tools, and labour to fabricate and install metal stairs, ladders, and railings as indicated on the drawings.
<u>1.2 RELATED SECTIONS</u>	.1	Section 03 30 00 – Cast-in-Place Concrete
	.2	Section 04 05 00 - Common Work Results for Masonry.
	.3	Section 05 50 00 - Metal Fabrications.
	.4	Section 09 91 13 - Exterior Painting.
	.5	Section 09 91 23 – Interior Painting.
<u>1.3 REFERENCES</u>	.1	American Society for Testing and Materials International, (ASTM) .1 ASTM A 53/A 53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless. .2 ASTM A 307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength. .3 ASTM A 325M-02, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
	.2	Canadian General Standards Board (CGSB) .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer. .2 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating. .3 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel. .4 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
	.3	Canadian Standards Association (CSA International) .1 CSA W59-1989(R2001), Welded Steel Construction (Metal Arc Welding/Imperial Version).
	.4	National Association of Architectural Metal Manufacturers (NAAMM) .1 AMP 510-92, Metal Stair Manual.
	.5	Steel Structures Painting Council (SSPC), Systems and Specifications Manual, Volume 2.
<u>1.4 SYSTEM DESCRIPTION</u>	.1	Design Requirements:
	.2	Design metal stair, balustrade and landing construction and connections to OBC vertical and horizontal live load

requirements.

- .3 The minimum specified load applied horizontally and normal to the span at the top of every required guard shall be: .75 kN/m or a concentrated load of 1.0 kN whichever governs.
- .4 Individual elements within the guard, including solid panels and pickets, shall be designed for .5 kN concentrated load at any point in the element, whichever results in the more critical loading condition.
- .5 The loads in Sentence .4 need not be considered to act simultaneously with the loads provided for in Sentences .3 and .5.
- .6 The minimum specified load applied vertically at the top of every required guard shall be 1.5 kN/m and need not be considered to act simultaneously with the horizontal load provided for in Sentence .3.
- .7 Detail and fabricate stairs to NAAMM Metal Stairs Manual.

1.5 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 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
 - .1 For finishes, coatings, primers and paints.
- .2 Shop Drawings
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate construction details, sizes of steel sections and thickness of steel sheet.
 - .3 Submit shop drawing bearing stamp of a qualified professional engineer registered in Province of Ontario.
- .3 Submit Contractor's Engineer certificate/ written report, within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL. Certificate/report shall be stamped and signed by qualified professional engineer registered in the province of Ontario.

1.6 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 Site Meetings: as part of Contractor's Services as described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel sections: to CAN/CSA-G40.20/G40.21 Grade 300 W.
- .2 Steel plate: to CAN/CSA-G40.20/G40.21, Grade 260 W, pattern.
- .3 Steel pipe: to ASTM A 53/A 53M, standard weight, schedule 40 seamless black.
- .4 Steel tubing: to CAN/CSA-G40.20/G40.21, Grade 350W, square and round 3.38, mm wall thickness, sizes and dimensions as indicated.
- .5 Metal bar grating: to ANSI/NAAMM MBG 531, steel, Type W-19-4, with checkered plate nosings.
- .6 Welding materials: to CSA W59.

- .7 Bolts: to ASTM A 307.
- .8 High strength bolts: to ASTM A 325M.

2.2 FABRICATION

- .1 Fabricate to NAAMM, Metal Stair Manual.
- .2 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.
- .3 Accurately form connections with exposed faces flush; mitres and joints tight. Make risers of equal height.
- .4 Grind or file exposed welds and steel sections smooth.
- .5 Shop fabricate stairs in sections as large and complete as practicable.

2.3 STEEL PAN STAIRS

- .1 Fabricate stairs with closed and open riser steel pan construction as indicated.
- .2 Form treads and risers from 3 mm thick steel plate. Secure treads and risers to L 35 x 35 x 5 horizontal and vertical welded to stringers.
- .3 Form wall stringers from MC 310 x 15.8.
- .4 Form outer stringers from MC 310 x 15.8 with 5 mm thick plate fascia welded on.
- .5 Form landings from 3 mm thick steel plate, reinforced by L 55 x 55 x 6 mm spaced at 400 mm on centre.
- .6 Provide clip angles for fastening of furring channels, where applied finish is indicated for underside of stairs and landings.
- .7 Extend stringers around mid landings to form steel base.
- .8 Close ends of stringers where exposed.

2.4 BALUSTRADES

- .1 Construct balusters and handrails from steel pipe, steel flat plates, and steel tubing as indicated.

- .2 Cap and weld exposed ends of balusters and handrails.
- .3 Terminate at abutting wall with end flange.
- .4 Provide balusters, handrails, and wall brackets to all concrete stairs throughout the building as noted and detailed.
- .5 Provide steel plates and anchors to be cast in to concrete Construction Manager or responsible trade as directed.

2.5 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164 for all exterior applications.
- .2 Shop coat primer: to CAN/CGSB-1.40 for all interior applications.
- .3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.6 SHOP PAINTING

- .1 Clean surfaces in accordance with Steel Structures Painting Council Manual Volume 2.
- .2 Apply one coat of shop primer except interior surfaces of pans.
- .3 Apply two coats of primer of different colours to parts inaccessible after final assembly.
- .4 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 degrees C.
- .5 Do not paint surfaces to be field welded.

PART 3 - EXECUTION

3.1 INSTALLATION OF STAIRS AND BALUSTRADES

- .1 Install in accordance with NAAMM, Metal Stair Manual.
- .2 Install plumb and true in exact locations, using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting stairs to structure.
- .3 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
- .4 Do welding work in accordance with CSA W59 unless specified otherwise.

- .5 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.

3.2 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Obtain written report from Contractor's Engineer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide Contractor's Engineer field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.3 CLEANING

- .1 Perform cleaning as soon as possible 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

<u>1.1 RELATED SECTIONS</u>	.1	Section 03 10 00 - Concrete Formwork
	.2	Section 05 41 00 - Structural Metal Stud Framing
	.3	Section 06 20 00 - Finish Carpentry
	.4	Section 07 52 00 - Modified Bituminous Membrane Roofing
	.5	Section 08 11 00 - Metal Doors and Frames
	.6	Section 08 71 00 - Door Hardware
	.7	Section 10 28 10 - Toilet and Bath Accessories
<u>1.2 REFERENCES</u>	.1	American National Standards Institute (ANSI)
	.1	ANSI/NPA A208.1, Particleboard, Mat Formed Wood.
	.2	American Society for Testing and Materials International (ASTM)
	.1	ASTM A 653/A 653M-05a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvaneal) by the Hot-Dip Process.
	.2	ASTM D 1761, Standard Test Methods for Mechanical Fasteners in Wood.
	.3	Canadian General Standards Board (CGSB)
	.1	CAN/CGSB-11.3, Hardboard.
	.4	Canadian Standards Association (CSA International)
	.1	CAN/CSA-A247, Insulating Fiberboard.
	.2	CSA B111, Wire Nails, Spikes and Staples.
	.3	CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
	.4	CSA O112 Series, CSA Standards for Wood Adhesives.
	.5	CSA O121, Douglas Fir Plywood.
	.6	CSA O141, Softwood Lumber.
	.7	CSA O151, Canadian Softwood Plywood.
	.8	CSA O153, Poplar Plywood.
	.5	National Lumber Grades Authority (NLGA)
	.1	Standard Grading Rules for Canadian Lumber current version.
<u>1.3 SUBMITTALS</u>	.1	Submit Submittal submissions: in accordance with Section 01 33 00 - Submittal Procedures.
<u>1.4 QUALITY ASSURANCE</u>	.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.

1.5 DELIVERY,
STORAGE, AND
HANDLING

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

PART 2 - PRODUCTS

2.1 FRAMING AND
STRUCTURAL
MATERIALS

- .1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:
 - .1 CSA O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
- .2 Glued end-jointed (finger-jointed), are not acceptable for use on this project without written approval from the consultant.
- .3 Composite wood products and laminate adhesives to contain no added ureaformaldehyde.
- .4 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
 - .1 S2S is acceptable.
 - .2 Board sizes: "Standard" or better grade.
 - .3 Dimension sizes: "Standard" light framing or better grade.
 - .4 Post and timbers sizes: "Standard" or better grade.
 - .5 Materials noted PT are to be pressure treated type wood to sizes noted. CAN/CSA-080-08. All exterior blocking and framing to be pressure treated on walls, parapets and roofing
- .5 Pressure Treated Lumber: unless specified otherwise, softwood, SPF, S4S, moisture content 19% (S-dry) or less in accordance with following standards: with micronized copper azole (MCA)
 - .1 All exterior blocking for roofing, parapets, window blocking and any attached to the exterior face including wood furring for wood siding installations.

2.2 PANEL MATERIALS

- .1 Composite wood products and laminate adhesives to contain no added urea formaldehyde.
- .2 Plywood, OSB and wood based composite panels: to be CAN/CSA-0325.0. Pressure treated products on all exterior applications to CSA 080-08

	.3	Douglas fir plywood (DFP): to CSA O121, standard construction.
	.4	Canadian softwood plywood (CSP): to CSA O151, standard construction.
	.5	Poplar plywood (PP): to CSA O153, standard construction.
	.6	Interior mat-formed wood particleboard: to ANSI 208.1.
	.7	Mat-formed structural panelboards (OSB wafer): to CAN3-O437.0.
<u>2.3 ACCESSORIES</u>	.1	Sealants: in accordance with Section 07 92 10 - Joint Sealants. .1 Maximum allowable VOC limit 250 g/L as per 01 35 21.
	.2	Nails, spikes and staples: to CSA B111.
	.3	Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.
	.4	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.
<u>2.4 FASTENER FINISHES</u>	.1	Galvanizing: to CAN/CSA-G164 ASTM A 653, use galvanized fasteners for exterior work pressure-preservative treated lumber.
	.2	Stainless steel: use stainless steel where indicated.
<u>2.5 WOOD PRESERVATIVE</u>	.1	Wood preservatives applied on site to meet the VOC limits not to exceed 50g/L.
	.2	Apply compatible MCA preservative to all cut faces and ends.
<u>PART 3 - EXECUTION</u>		
<u>3.1 PREPARATION</u>	.1	Store wood products.
<u>3.2 INSTALLATION</u>	.1	Comply with requirements of OBC 2017, Part 3 supplemented by following paragraphs.
	.2	Install members true to line, levels and elevations, square and plumb.

- .3 Construct continuous members from pieces of longest practical length.
- .4 Install spanning members with "crown-edge" up.
- .5 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.
- .6 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.
- .7 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.
 - .1 Align and plumb faces of furring and blocking to tolerance of 1:600.
- .8 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .9 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.
- .10 Install sleepers as indicated. Anchor wood roof sleepers to building structure to meet seismic requirements of O.B.C.
- .11 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 grade, square edge 19 mm thick, fire treated pressure impregnated fire retardant material for all electrical / IT/Building, Security Mounting boards as required for installation of other trades work. Co-ordinate locations with other trades.

- .2 Provide wood blocking and backing to areas to receive wall mounted speakers, wall-mounted sconces, grab bars, wall mounted appliances and fixtures, washroom accessories, recessed cabinets, surface mounted cabinets, corner guards, hardware wall stops and as indicated on drawings.
- .3 Frame window and door rough openings using pressure treated exterior grade plywood mounted to bent steel angle supports specified in Section 05 41 00 Structural Metal Stud Framing.
- .4 Install (MCA)pressure treated wood sleepers to roof areas as detailed for support and anchoring of roof top equipment and piping. Anchor sleepers to building structure to meet O.B.C. requirements.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Surface Preparation

.2 Wood blocking and reinforcing.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI A208.2, Medium Density Fibreboard (MDF) for Interior Applications.

.2 ANSI/HPVA HP-1, American National Standard for Hardwood and Decorative Plywood.

.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)

.1 Architectural Woodwork Quality Standards, current version.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-11.3, Hardboard.

.4 CSA International

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

.2 CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA O141, Softwood Lumber.

.4 CSA O151, Canadian Softwood Plywood.

.5 National Lumber Grades Authority (NLGA)

.1 NLGA Standard Grading Rules for Canadian Lumber current version.

.6 Underwriters Laboratories of Canada (ULC)

.1 CAN4-S104, Standard Method for Fire Tests of Door Assemblies.

.2 CAN/ULC-S105, Standard Specification for Fire Door Frames.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

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

- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by
 - .2 Indicate details of construction, profiles, jointing, fastening and other related details.
 - .3 Indicate materials, thicknesses, finishes and hardware.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit duplicate 300 x 300 mm samples of veneer and finish.
- .5 Certifications: submit certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.
- .6 Test and Evaluation Reports: submit certified test reports for composite wood from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties if requested.
- .7 Construction Waste Management:
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

1.4 QUALITY ASSURANCE

- .1 Lumber by grade stamp of agency certified by Canadian Lumber Standards Accreditation Board (CLSAB).
- .2 Plywood and wood based composite panels to CSA and ANSI standards.
- .3 Wood fire rated frames and panels: listed and labeled by an organization accredited by Standards Council of Canada to CAN4-S104 and CAN/ULC-S105.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labeled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wood products from any damage.
 - .3 Replace defective or damaged materials with new.

- .4 Develop Waste Reduction Workplan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Softwood lumber: S4S, moisture content 19% or less in accordance with following standards:
 - .1 CSA O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
 - .3 AWMAC custom grade, moisture content as specified.
 - .4 Machine stress-rated lumber is acceptable.
 - .5 Hardwood lumber: moisture content 8 % or less in accordance:
 - .1 National Hardwood Lumber Association (NHLA).
 - .2 AWMAC custom grade, moisture content as specified.
- .2 Panel Material: Urea-formaldehyde free
 - .1 Canadian softwood plywood (CSP): to CSA O151, standard construction.
 - .2 Hardwood plywood: to ANSI/HPVA HP-1.
 - .3 Hardboard: to CAN/CGSB-11.3.
 - .4 Medium density fibreboard (MDF): to ANSI A208.2, density 640-800 kg/m³.
 - .5 Decorative overlaid composite panels.
 - .1 Decorative overlay, heat and pressure laminated with suitable resin to thickness indicated 15.9 mm thick MDF urea-formaldehyde free core.
 - .2 Overlay bonded to both faces where exposed two sides, and when panel material require surface on one side only, reverse side to be overlaid with a plain (buff) balancing sheet.
 - .3 Furniture finish: wood grain, pattern or solid colour selected by Consultant.
 - .4 Edge finishing: Refer to drawings.

2.2 ACCESSORIES

- .1 Nails and staples: to CSA B111; galvanized to CAN/CSA-G164 for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.
- .2 Wood screws: electroplated or stainless steel, type and size to suit application.
- .3 Splines: wood.

- .4 Adhesive and Sealants: in accordance with Section 07 92 00 - Joint Sealants.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Inform of unacceptable conditions immediately upon discovery.
 - .1 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

- .1 Do finish carpentry to Quality Standards of (AWMAC).
- .2 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.
- .3 Form joints to conceal shrinkage.

3.3 CONSTRUCTION

- .1 Fastening:
 - .1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
 - .2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
 - .3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.
 - .4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.
- .2 Standing and running trim:
 - .1 Butt and cope internal joints of baseboards to make snug, tight, joint. Cut right angle joints of casing and base with mitred joints.
 - .2 Fit backs of baseboards and casing snugly to wall surfaces to eliminate cracks at junction of base and casing with walls.
 - .3 Make joints in baseboard, where necessary using a 45 degrees scarf type joint.
 - .4 Install door and window trim in single lengths without splicing.
- .3 Interior and exterior frames:
 - .1 Set frames with plumb sides and level heads and sills and secure.
- .4 Handrails, wall rails and bumper rails.
 - .1 Install handrails, wall rails and bumper rails in locations indicated.

	.2	Make joints hair line, dowelled and glued.
	.3	Install support brackets as indicated.
	.4	Install metal backing plates between studs at bracket locations to ensure proper support for brackets and bolts or self-tapping screws.
	.5	Secure using counter sunk screws plugged with matching wood plugs.
	.5	Shelving:
	.1	Install shelving on as indicated.
3.4 INSTALLATION OF WINDOW SILLS	.1	Window sills:
	.1	Maple or Ash species, grade select, solid stock, per details.
3.5 INSTALLATION OF SHELVING	.1	Hardwood plywood:
	.1	Thickness: 19 mm.
	.2	Number of plies:7.
	.3	Face veneer: Maple or Ash species, A grade, rotary cut.
	.4	Back veneer: Maple or Ash species, A grade, rotary cut.
	.5	Core: Veneer.
	.6	Bond: Type II.
	.7	Sanding: touch sanding.
	.8	Grain direction: long direction.
	.2	Edge banding: provide 12mm thick solid matching wood strip on plywood edges 12 mm or thicker, exposed in final assembly. Strips same width as plywood.
3.8 CLEANING	.1	Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
	.1	Leave Work area clean at end of each day.
	.2	Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
	.3	Waste Management: separate waste materials for reuse and recycling.
	.1	Remove recycling containers and bins from site and dispose of materials at appropriate facility.
3.9 PROTECTION	.1	Protect installed products and components from damage during construction.
	.2	Repair damage to adjacent materials caused by finish carpentry installation.

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 01 74 21 Construction / Demolition Waste Management and Disposal
	.4	Section 01 61 00 Common Product Requirements
	.5	Section 06 10 00 Rough Carpentry
	.6	Section 06 20 00 Finish Carpentry
	.7	Section 06 47 00 Plastic Laminate
	.8	Section 07 92 00 Joint Sealing
	.9	Section 08 70 05 Cabinet Hardware
	.10	Section 10 00 00 Manufactured Specialties

1.2 REFERENCES

.1	American Society for Testing and Materials (ASTM)
.1	ASTM E 1333, Standard Test method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products using a Large Chamber.
.2	ASTM D 2832, Standard Guide for Determining Volatile and Non-volatile Content of Paint and Related Coatings.
.3	ASTM D 5116, Standard Guide for Small Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials / Products.
.2	Architectural Woodwork Manufacturers Association of Canada (AWMAC)
.1	AWMAC Quality Standards for Architectural Woodwork, latest version.
.3	Canadian General Standards Board (CGSB)
.1	CAN/CGSB-71.20, Adhesives, Contact, Brushable.
.4	Canadian Standards Association (CSA)
.1	CSA B111-74Wire Nails, Spikes and Staples.
.2	CSA O112.4-M1997, Standards for Wood Adhesives.
.3	CSA O115-M1982, Hardwood and Decorative Plywood.
.4	CSA O121, Douglas Fir Plywood.
.5	CAN/CSA O141, Softwood Lumber.

- .6 CAN/CSA O151, Canadian Softwood Plywood
- .7 CSA O153, Poplar Plywood
- .5 ANSI A208.2, Medium Density Fiberboard for Interior Use.
- .6 National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber 2000.
- .7 National Hardwood Lumber Association (NHLA) Rules for the Measurement and Inspection of Hardwood and Cypress.
- .8 Environmental Choice Program (EPC)
 - .1 ECP-44, Adhesives.
 - .2 ECP-45, Sealants and Caulking Compounds.
 - .3 ECP-78, Surface Coatings.
- .9 Green Seal Environmental Standards(GS)
 - .1 GS-11,Current Edition, Paints and Coatings
 - .2 GS-36, Commercial Adhesives

1.3 WORK INCLUDED

- .1 The work of this section includes the provision of all labour, material, equipment and services required to fabricate and install all shop fabricated finished cabinetwork and millwork items, as indicated on the drawings and specified herein and as required for a complete project.
- .2 The work of this section includes the provisions of all labour, material, equipment, and services required to finish shop fabricated finished cabinetwork and millwork as specified in Section 06 47 00, Plastic Laminate and Section 09 91 23 Painting.
- .3 The work includes, but is not necessarily limited to the following:
 - .1 Laminated plastic faced cabinetwork and millwork.
 - .2 Hardwood veneer faced cabinetwork and millwork.
 - .3 Flat countertops, faced with laminated plastic.
 - .4 Countertops as specified in Section 06 47 00

1.4 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittals.
- .2 Indicate details of construction, profiles, jointing, fastening and other related details.
 - .1 Scale: profiles full size.
- .3 Indicate all materials, thicknesses, finishes and hardware.

- .4 Indicate locations of all service outlets in casework, typical and special installation conditions, and all connections, attachments, anchorage and location of exposed fastenings.

1.5 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 – Submittals.

1.6 MOCK-UPS

- .1 Construct mock-ups in accordance with Section 01 33 00 – Submittals.
- .2 Shop prepare one base cabinet unit with counter top, complete with hardware and shop applied finishes, and install on project at designated location.
- .3 Allow 24 hours for inspection of mock-up by Consultant before proceeding with this work.
- .4 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may not remain as part of finished work.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, handle, store, and protect materials of this Section in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Protect millwork against dampness and damage during and after delivery.
- .3 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.

1.7 WARRANTY

- .1 Warrant the work of this Section in accordance with GC12.3 but for the time periods specified following.
- .2 Contractor's Warranty: Warrant that the cabinetwork and millwork against defects in fabrication and or finish caused by poor workmanship or materials for a period of two (2) years from the date of Substantial Completion of the contract. Make all necessary repairs and replacements at no cost to the owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Softwood lumber: unless specified otherwise, S4S, moisture content 15 % or less in accordance with following standards:
 - .1 CAN/CSA-O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
 - .3 AWMAC premium grade, moisture content as specified.
- .2 Machine stress-rated lumber is acceptable for all purposes.
- .3 Douglas fir plywood (DFP): to CSA O121, standard construction.
- .4 Hardwood Lumber: moisture content 7% or less in accordance with the following standards:
 - .1 National Hardwood Lumber Association (NHLA).
 - .2 AWMAC custom grade, moisture content as specified.
- .5 Hardboard: To CGSB 11-GP-3M.
 - .1 Type 2 (tempered), density 496 kg/m³. thickness 5 mm unless otherwise indicated, prefinished one side, colour white.
 - .2 Manufactured such that formaldehyde emissions do not exceed 0.15 ppm (180 microg/m³) when tested in accordance with ASTM E 1333.
- .6 Medium density fibreboard (MDF): to ANSI A208.2, density 769 kg/m³.
 - .1 Be manufactured such that formaldehyde emissions do not exceed 0.15 ppm (180 g/m³) when tested in accordance with ASTM E 1333.
 - .2 Contain at least 15 % recycled materials by weight.
- .7 Canadian Softwood plywood: to CSA 0151, standard construction.
- .8 Hardwood Plywood: to CSA 0115, standard construction.
- .9 Plywood Core: to CSA 0121 Solid two sides, 19mm thick minimum.
- .10 Laminated Plastic: in accordance with Section 06 66 60
- .11 Sealant: in accordance with Section 07 92 00.
- .12 Nails and Staples: to CSA B111, galvanized.
- .13 Wood screws: steel type and size to suit application.
- .14 Splines: wood.
- .15 Sealant: as per section 07 90 00.

- .16 Aluminum profiles, plate and extrusions, aluminium alloy AA6061-T6, clear anodised finish AA-M12-C22-A41.
- .17 Stainless Steel: Stainless Steel: to CSA G110.6 and ASTM A167, Type 304, No. 4 finish.

2.2 MANUFACTURED UNITS

- .1 Casework.
 - .1 Fabricate caseworks to AWMAC custom quality grade.
- .2 Furring, blocking, nailing strips, grounds, and rough bucks and sleepers.
 - .1 S2S is acceptable.
 - .2 Board sizes: Standard or better grade.
 - .3 Dimension sizes: Standard light framing or better grade.
- .3 Deleted
- .4 Case Bodies: (ends, gables, divisions and bottoms).
 - .1 Hardwood plywood:
 - .1 Thickness: 16 and 19 mm.
 - .2 Number of plies: 7.
 - .3 Face veneer: Maple or Ash species, select grade, rotary cut, matching requirement.
 - .4 Back veneer: Maple or Ash species, select grade, rotary cut, matching requirement.
 - .5 Core: veneer.
 - .6 Bond: Type II.
 - .7 Sanding: touch sanding.
 - .8 Grain direction longitudinal.
 - .2 Solid wood: Maple or Ash species, select grade, 19 mm thick.
- .5 Backs:
 - .1 Hardwood plywood:
 - .1 Thickness: 6 mm.
 - .2 Number of plies: 4.
 - .3 Face veneer: Maple or Ash species, select grade, rotary cut, matching requirement.
 - .4 Back veneer: Maple or Ash species, natural grade, rotary cut, matching requirement.
 - .5 Core: veneer.
 - .6 Bond: Type II.
 - .7 Sanding: touch sanding.
 - .8 Grain direction vertical.

- .6 Doors:
 - .1 Fabricate doors to AWMAC premium grade supplemented as follows:
 - .2 Hardwood plywood:
 - .1 Thickness: 19mm.
 - .2 Number of plies: 7.
 - .3 Face veneer: Maple or Ash species, grade, cut, matching requirement bookmatch.
 - .4 Back veneer: Maple or Ash species, select grade, rotary cut,.
 - .5 Core: veneer.
 - .6 Bond: Type II.
 - .7 Sanding: touch sanding
 - .8 Grain direction vertical.
 - .3 Full height casework doors, use MDF core with matching face veneer, 19mm thick.
 - .4 Edge banding: provide 10mm thick solid matching wood strip on plywood edges 12mm or thicker, exposed in final assembly. Strips same width as plywood.
- .7 Shelves:
 - .1 Hardwood plywood:
 - .1 Thickness: 19 mm.
 - .2 Number of plies: 7.
 - .3 Face veneer: Maple or Ash species, select grade, rotary cut, bookmatch.
 - .4 Back veneer: Maple species, select grade, rotary cut, matching requirement.
 - .5 Core: veneer.
 - .6 Bond: Type II.
 - .7 Sanding: touch sanding.
 - .8 Grain direction longitudinal.
 - .2 Edge banding: provide 10 mm thick solid matching wood strip on plywood edges 12 mm or thicker, exposed in final assembly. Strips same width as plywood.
- .8 Drawers:
 - .1 Fabricate drawers to AWMAC premium grade supplemented as follows:
 - .2 Sides and Backs.
 - .1 Hardwood plywood:
 - .1 Thickness: 12 mm.
 - .2 Number of plies: 7.
 - .3 Face veneer: Maple or Ash species, select grade, rotary cut,.

- .4 Back veneer: Maple or Ash species, select grade, rotary cut, matching requirement.
 - .5 Core: veneer.
 - .6 Bond: Type II.
 - .7 Sanding: touch sanding.
 - .8 Grain direction longitudinal.
- .3 Bottoms.
- .1 Hardwood plywood:
 - .1 Thickness: 12 mm drawers >than 1000mm wide.6mm hardboard < than 900mm
 - .2 Number of plies: 3 or hardboard smooth face up.
 - .3 Face veneer: Maple or Ash species, select grade, rotary cut, matching requirement.
 - .4 Back veneer: Maple or Ash species, stain grade, rotary cut, matching requirement.
 - .5 Core: veneer.
 - .6 Bond: Type II captured 4 sides.
 - .7 Sanding: touch sanding.
 - .8 Grain directionlongitudinal.
- .4 Fronts.
- .1 Hardwood plywood:
 - .1 Thickness: 19 mm.
 - .2 Number of plies: 7.
 - .3 Face veneer: Maple or Ash species, select grade, rotary cut, bookmatch.
 - .4 Back veneer: Maple or Ash species, stain grade, rotary cut, matching requirement.
 - .5 Core: veneer.
 - .6 Bond: Type II.
 - .7 Sanding: touch sanding.
 - .8 Grain direction vertical.
 - .2 Solid wood: Maple or Ash species, select grade, 19 mm thick.

2.3 FABRICATION OF CABINETWORK

- .1 Fabricate all cabinet/millwork units as follows and in accordance with the detailed drawings.
- .2 Fabricate cabinetwork to applicable AWMAC quality standards except where otherwise indicated on the drawings.
- .3 Fabricate and assemble cabinetwork items in fabricator's shop. Deliver to site in size easily handled and to ensure passage through building openings.
- .4 Verify dimensions on site before commencing fabrication.
- .5 Set nails and countersink screws apply plain wood filler to indentations, sand smooth and leave ready to receive shop finish.
- .6 Provide for built-in mechanical and electrical services and other equipment. Verify locations before cutting or drilling and allow suitable tolerances where required. Check shop drawings for such items. Where design requires services built-in during fabrication, employ a qualified technician and provide appropriate materials. Comply with governing codes.
- .7 Shop install cabinet hardware for doors, shelves and drawers, use countersunk screws.
- .8 Shelving to cabinetwork to be adjustable unless otherwise noted. Recess shelf support standards unless noted otherwise.

2.4 FINISHING

- .1 Factory finish all cabinetwork prior to delivery to site.
- .2 Appearance of finish of stained finish to be visibly free of flow lines, streaks, sags, blisters and other surface imperfections.
- .3 Clear finish wood to have concealed fastenings where possible, otherwise recess screws and bolts and plug holes with 6mm th. Matching wood plug. Plugged areas to be sanded smooth, ready to finish. Where finishing nails are used, nails are to be in straight lines and set-in for neat appearance. Apply coloured filler to match wood and leave ready to receive finish.
- .4 Provide temporary protection to factory finished cabinetwork during shipment. Ensure that method of protection does not damage finish.
- .5 Touch up marked or abraded finish to Consultants approval. Units which are damaged beyond acceptance standard shall be replaced at no extra cost to the owner.

PART 3 - EXECUTION

3.INSTALLATION

- .1 Do architectural woodwork to quality standards of AWMAC, except where specified otherwise.
- .2 Install prefinished millwork at locations shown on drawings. Position accurately, level, plumb straight.
- .3 Fasten and anchor millwork securely. Provide heavy duty fixture attachments for wall mounted cabinets.
- .4 Use draw bolts in countertop joints.
- .5 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.
- .6 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant.
- .7 Apply water resistant building paper over wood framing members in contact with masonry or cementitious construction.
- .8 Fit hardware accurately and securely in accordance with manufacturer's directions

3.4 CLEANING

- .1 Clean millwork and cabinet work inside cupboards and drawers and outside surfaces.

3.5 PROTECTION

- .1 Protect millwork and cabinet work from damage until final inspection.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1	Section 01 33 00	Submittal Procedures
.2	Section 01 45 00	Quality Control
.3	Section 01 74 21	Construction / Demolition Waste Management and Disposal
.4	Section 01 61 00	Common Product Requirements
.5	Section 06 10 00	Rough Carpentry
.6	Section 06 20 00	Finish Carpentry
.7	Section 06 40 00	Architectural Woodwork: Cabinet and base units.
.8	Section 07 92 00	Joint Sealing
.9	Section 08 70 05	Cabinet Hardware
.10	Section 09 00 00	Interior Finishes Colour Schedule
.11	Section 10 00 00	Manufactured Specialties

1.2 REFERENCES

.1	American National Standards Institute (ANSI)
.1	ANSI A208.2-02, Medium Density Fibreboard (MDF) for Interior Applications.
.2	American Society for Testing and Materials International, (ASTM)
.1	ASTM D 2832-92(R1999), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
.2	ASTM D 5116-97, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
.3	Canadian General Standards Board (CGSB)
.1	CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
.4	Canadian Standards Association (CSA International)
.1	CSA O112- Standards for Wood Adhesives.
.2	CSA O112.5-1.1-Series-M, Urea Resin Adhesives for Wood (Room- and High-Temperature Curing).
.3	CSA O112.7-1.1-Series, Resorcinol and Phenol-Resorcinol Resin Adhesives for Wood (Room- and Intermediate-Temperature Curing).
.4	CSA O121, Douglas Fir Plywood.

- .5 CAN/CSA O141, Softwood Lumber.
- .6 CSA O151-M1978(R1998), Canadian Softwood Plywood.
- .7 CSA O153, Poplar Plywood.
- .5 Environmental Choice Program (EPC)
 - .1 CCD-044, Adhesives.
 - .2 CCD-045, Sealants and Caulking Compounds.
 - .3 CCD-048, Surface Coatings Recycled Water-borne.
 - .4 CCD-047a, Paints - Surface Coatings.
 - .5 CCD-048b, Stains - Surface Coatings.
 - .6 CCD-048c, Varnishes - Surface Coatings.
- .6 National Electrical Manufacturers Association (NEMA)
 - .1 NEMA LD3, High Pressure Decorative Laminates

1.3 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheets in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Submit two copies of WHMIS MSDS – Material Safety Data Sheets in accordance with Section 01 33 00 – Submittal Procedures, Indicate VOC limits for adhesives, solvents and cleaners.
- .2 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Submit duplicate samples of joints, edging, cut-outs and postformed profiles.
- .3 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

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

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.

1.6 STORAGE AND PROTECTION

- .1 Deliver, handle, store and protect material of this Section in

accordance with Section 01 61 00 – Common Product Requirements.

- .2 Maintain relative humidity between 25% and 60% at 22°C during storage and installation.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert wood cut-offs from landfill by disposal into on-site wood recycling bin
- .2 Divert reusable materials for reuse at nearest used building materials facility or similar type facility.

- .3 Divert unused caulking, sealants, surface coatings and adhesive materials from landfill through disposal at a special wastes depot

1.8 WARRANTY

- 1 Warrant the work of this Section in accordance with GC12.3 but for the time periods specified following.
- .2 Contractor's Warranty: Warrant that the work of this section will not warp or delaminate for a period of two (2) years from the date of Substantial Completion of the contract. Make all necessary repairs and replacements at no cost to the owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- 1 Laminated plastic for flatwork: to NEMA LD 3.
 - .1 Type: General purpose.
 - .2 Grade: HGS.
 - .3 Size: 1.27 mm thick.
 - .4 Colour: multilayered, allow for 3 separate colours/patterns.
 - .5 Pattern: solid or printed pattern.
 - .6 Finish: furniture or textured.
- .2 Laminated plastic for post forming work: to NEMA LD 3.
 - .1 Type: Post forming.
 - .2 Grade: HGP.
 - .3 Size: 1.016 mm thick.
 - .4 Colour: multilayered, allow for 3 separate colours/patterns.
 - .5 Pattern: solid or printed pattern.
 - .6 Finish: furniture or textured
- .3 Laminated plastic for backing sheet: to NEMA LD 3.

- .1 Type: Backer.
- .2 Grade: BKH.
- .3 Size: not less than 0.5 mm thick or same thickness as face laminate.
- .4 Colour: same colour as face laminate.
- .4 Plywood core: Douglas Fir Plywood to CSA O151 Softwood Plywood solid two sides, only where indicated.
 - .1 Douglas Fir plywood for countertops with sinks.
- .5 Core: meeting CAN3.0.188.1-M78 Grade R DH, sanded faces, of thickness indicated.
 - .1 Particleboard Type DH for countertops without sinks.
- .6 Laminated plastic adhesive: urea resin adhesive to CSA O112.5, contact adhesive to CAN/CGSB-71.20, resorcinol resin adhesive to CSA O112.7 or polyvinyl adhesive to CSA O112.4
- .7 Sealer: water resistant sealer or glue acceptable to laminate manufacturer.
- .8 Sealants, Section 07900/ Sealants.
- .9 Draw bolts and splines: as recommended by fabricator.
- .10 Solid Surfaces:
 - .1 Formica solid Surfacing or Quartz Caesarstone as noted in Section 09 00 00 Interior Finishes Colour Schedule and as per drawings. All substitutions must be approved by Architect prior to tender close.

2.2 FABRICATION

- .1 Comply with NEMA LD 3, Annex A.
- .2 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.
- .3 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .4 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 2400 mm. Keep joints 600 mm from sink cut-outs.
- .5 Form shaped profiles and bends as indicated, using post forming grade laminate to laminate manufacturer's instructions.
- .6 Use straight self-edging laminate strip for flatwork to cover

exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

- .7 Apply laminate backing sheet to reverse side of core of plastic laminate work.
- .8 Apply plastic laminate to cover underside of countertop edge to match countertop.

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 work plumb, true and square, neatly scribed to adjoining surfaces.
- .2 Make allowances around perimeter where fixed objects pass through or project into laminated plastic work to permit normal movement without restriction.
- .3 Use draw bolts and splines in countertop joints. Maximum spacing 450 mm o.c., 75 mm from edge. Make flush hairline joints.
- .4 Provide cut-outs for inserts, grilles, appliances, outlet boxes and other penetrations. Round internal corners, chamfer edges and seal exposed core.
- .5 At junction of laminated plastic counter back splash and adjacent wall finish, apply small bead of sealant.
- .6 Site apply laminated plastic to units as indicated. Adhere laminated plastic over entire surface. Make corners with hairline joints. Use full sized laminate sheets. Make joints only where approved.
- .7 For site application, offset joints in plastic laminate facing from joints in core.

3.3 PROTECTION

- .1 Cover finished laminated plastic veneered surfaces with heavy

kraft paper or put in cartons during shipment. Protect installed laminated surfaces by approved means. Do not remove until immediately before final inspection.

3.4 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Perform care and cleaning with NEMA LD 3, Annex B.
- .3 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.

3.5 SCHEDULE

- .1 Plastic Laminate to Consultant's selection as noted in Section 09 00 00 Interior Finishes Colour Legend

END OF SECTION

PART 1 - GENERAL

<u>1.1 RELATED SECTIONS</u>	.1	Section 01 33 00 - Submittal Requirements
	.2	Section 04 05 19 - Masonry Anchorage and Reinforcing
	.3	Section 05 41 00 - Structural Metal Stud Framing
	.4	Section 07 27 00 - Air Barriers
	.5	Section 07 52 00 - Modified Bituminous Membrane Roofing
<u>1.2 REFERENCES</u>	.1	American Society for Testing and Materials International (ASTM)
	.1	ASTM E 96/E 96M-05, Standard Test Methods for Water Vapour Transmission of Materials.
	.2	ASTM C 612-04 Standard Specification for Mineral Fibre Block and Board Thermal Insulation
	.2	Canadian General Standards Board (CGSB)
	.1	CGSB 71-GP-24M-77(R1983), Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.
	.3	Underwriters Laboratories of Canada (ULC)
	.1	CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
	.2	CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre for Buildings.
	.4	Health Canada/Workplace Hazardous Materials Information System (WHMIS)
	.1	Material Safety Data Sheets (MSDS).
<u>1.3 SUBMITTALS</u>	.1	Product Data:
	.1	Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
	.2	Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00.
	.2	Manufacturer's Instructions:
	.1	Submit manufacturer's installation instructions.
<u>1.4 QUALITY ASSURANCE</u>	.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 Convene pre-installation meeting one week prior to beginning on-site installations.
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordinate with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 INSULATION

- .1 Cavity Wall Insulation:
 - .1 Mineral fibreboard Thermal Insulation to CAN/ULC-S702, ASTM C612.
 - .2 Type: 2.
 - .3 Density: 70 kg/m3
 - .4 Thickness: as indicated.
 - .5 Size: 610 x 1219 mm.
 - .6 Edges: square.
 - .7 Thermal Resistance: 4.2 R Value/inch
 - .8 Acceptable Product: ROCKWOOL Cavity Rock
- .2 Foundation insulation:
 - .1 Extruded polystyrene (XPS) to CAN/ULC-S701, ASTM C578.
 - .2 Type: 4.
 - .3 Compressive strength: 30 psi.
 - .4 Thickness: as indicated.
 - .5 Size: 600 x 2400mm.
 - .6 Edges: ship lapped.
 - .7 Thermal Resistance: 5.0 Value/inch
 - .8 Acceptable Product: Dow, Styrofoam SM

- .3 Concrete Faced Insulation:
 - .1 Standard of Acceptance: Tech-Crete 100 mm, R5 per inch (RSI 0.88) with 8mm latex modified concrete facing. Panel thickness 4-5/16", R20 with tongue & groove joint on 4 ft (1200mm) side and butt edge on 2 ft (600mm top edge)

2.2 ADHESIVE

- .1 Adhesive (for polystyrene): to CGSB 71-GP-24, Type 1, compatible to and as recommended by manufacturer of insulating board.
- .2 VOC limits as per 01 35 21.

2.3 ACCESSORIES

- .1 Mechanical Wall Fasteners: Purpose made plastic, friction fit type designed to hold insulation in place as part of masonry wall tie system. Refer to Section 04 05 19.
- .2 Insulation clips: impale type, preformed 50 x 50 mm Cold Rolled Carbon Steel 0.8mm thick, adhesive back, spindle of 2.5 mm dia. annealed steel, length to suit insulation, 25mm dia. washers of self locking type.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

- .1 Examine substrates and immediately inform Consultant 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.

3.3 WORKMANSHIP

- .1 Install insulation after building substrate materials are dry and after installation of air vapour barrier.
- .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 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN4-S604 type A chimneys and

CAN/CGA-B149.1 and CAN/CGA-B149.2 type B and L vents.

- .5 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.
- .6 Offset both vertical and horizontal joints in multiple layer applications.
- .7 Do not enclose insulation until it has been inspected and approved by Consultant.

3.4 PERIMETER FOUNDATION INSULATION

- .1 Exterior application: extend boards 1500 mm minimum below finish grade as indicated. Install on exterior face of perimeter foundation wall with adhesive.
- .2 Under slab application: extend boards as indicated in from perimeter foundation wall where indicated. Lay boards on level compacted fill. Horizontal return is a minimum of 600mm if not noted.

3.5 CAVITY WALL INSULATION

- .1 Install mineral fibre insulation boards on outer surface of inner wythe wall cavity over air vapour barrier membrane.
- .2 Place boards in a method to maximize contact with bedding. Stagger end joints. Butt edges and ends tight to adjacent boards and to protrusions.
- .3 Fit insulation boards neatly around wall ties and Z girts.
- .4 Fit insulation boards neatly within perimeter roof beam flanges as detailed.
- .4 At perimeter of windows install additional layers of insulation as indicated to provide minimum R value of 8.4 to curtain wall thermal break and back aluminum section framing.
- .5 Install over impaling clips to securely hold boards in place or integrate with masonry ties and locking face plate.

3.6 SOFFIT INSULATION

- .1 Install boards as noted in 3.5 above.
- .2 Mechanically fasten with mechanical fasteners complete with plastic washers.

3.7 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 07 21 13 – Board Insulation
- .3 Section 07 21 19 – Foamed-in-Place Insulation
- .4 Section 07 26 00 - Vapour Retarders
- .5 Section 07 27 00 - Air Barriers - Performance
- .6 Section 07 84 00 - Fire Stopping
- .7 Section 09 21 16 - Gypsum Board Assemblies
- .8 Section 09 22 16 - Non-structural Metal Framing
- .9 Division 23 - Insulation for Mechanical Work

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 553-02, Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA B111, Wire Nails, Spikes and Staples.
- .3 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S604, Type A Chimneys.
 - .2 CAN/ULC-S702, Standard for Mineral Fibre Insulation.

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

1.4 QUALITY ASSURANCE

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Convene pre-installation meeting one week prior to beginning on-site installations.
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordinate with other building subtrades.
 - .4 Review manufacturer's installation instructions and

<u>1.5 WASTE MANAGEMENT AND DISPOSAL</u>	.1	warranty requirements. Remove from site and dispose of packaging materials at appropriate recycling facilities.
	.2	Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

PART 2 - PRODUCTS

<u>2.1 INSULATION</u>	.1	Acoustic Insulation
	.1	Batt and blanket mineral fibre ASTM C665 CAN/ULCS702
	.2	Type: 1.
	.3	Thickness: to suit steel stud dimensions
	.4	Non Combustible in accordance with CAN/ULC S114 and ASTM E136
	.5	Flame spread less than 25, smoke development 50
	.6	Width purpose made for fitting between studs.
	.7	Acceptable Products:
	.1	CGC Thermafibre SAFB
	.2	ROCKWOOL: AFB
<u>2.2 ACCESSORIES</u>	.3	CertainTeed: Certasound
	.4	Owens Corning: Quietzone
	.1	Insulation clips:
	.1	Impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.

PART 3 - EXECUTION

<u>3.1 MANUFACTURER'S INSTRUCTIONS</u>	.1	Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
<u>3.2 INSULATION INSTALLATION</u>	.1	Install insulation to maintain continuity acoustic protection to building elements and spaces and to ASTM C 1320.
	.2	Install insulation within framing members tightly fit but not compressed.

- .3 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .4 Do not compress insulation to fit into spaces.
- .5 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 Type A chimneys and CAN/CGA-B149.1 and CAN/CGA-B149.2 Type B and L vents.
- .6 Do not enclose insulation until it has been inspected and approved by Consultant.

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 requirements for application of spray foam insulation:
 - .1 Applied around exterior exhaust vent duct plenums penetrating exterior walls and window assemblies.
 - .2 Apply to the back of poured concrete upstand walls and curbs to maintain thermal separation.
 - .3 Apply as required where other equivalent R-value installations are impractical

1.2 RELATED SECTIONS

- .1 Section 07 21 13 - Board Insulation
- .2 Section 07 27 00 - Air Barriers
- .3 Section 08 11 00 - Metal Doors and Frames
- .4 Section 08 11 16 - Aluminum Doors and Frames
- .5 Section 08 44 13 - Glazed Aluminum Curtain Walls
- .6 Section 08 50 00 - Aluminum Windows
- .7 Division 26

1.3 REFERENCES

- .1 Green Seal Environmental Standards
 - .1 Standard GC-03-93, Anti-Corrosive Paints.
 - .2 Standard GS-11-97, Architectural Paints.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S101, Fire Endurance Tests of Building Construction and Materials.
 - .2 CAN/ULC-S102, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .3 CAN/ULC-S705.1, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Material Specification.
 - .4 CAN/ULC-S705.2, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Application.
 - .5 CAN/ULC S770, - Standard Test Method for Determination of Long-term Thermal Resistance of Closed-Cell Thermal Insulating Foams.
 - .6 CAN/ULC S774, - Standard Laboratory Guide for the Determination of Volatile Organic Compound Emissions from Polyurethane Foam.
 - .7 Canadian Construction Materials Centre (CCMC) Evaluation Reports
 - .8 Canadian Construction Materials Centre (CCMC)

Technical Guide, Air Barrier Systems for Exterior Walls of
Low-Rise Buildings

- .4
 - .1 ASTM C411, - Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - .2 ASTM C518, - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - .3 ASTM C1338, - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
 - .4 ASTM D1621, - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics.
 - .5 ASTM D1622, - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
 - .6 ASTM D1623, - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics (Type C sample).
 - .7 ASTM D2126, - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
 - .8 ASTM D2369, Standard Test Method for Volatile Content of Coatings.
 - .9 ASTM D2842, - Standard Test Method for Water Absorption of Rigid Cellular Plastics.
 - .10 ASTM D6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
 - .11 ASTM E96/E96, - Standard Test Methods for Water Vapor Transmission of Materials.

1.4 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets.
- .3 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Test reports: submit certified test reports for insulation from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 - .2 Submit test reports in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.

.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

.4 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.
.4 Provide information on recycled contents of materials as per Section 01 61 00 – Product Requirements

1.5 QUALITY ASSURANCE

.1 Applicators to conform to CUFCA Quality Assurance Program.

.2 Qualifications:

.1 Installer: person specializing in sprayed insulation installations with 5 years documented experience approved by manufacturer.

.2 Manufacturer: company with minimum 5 years experience in producing of material used for work required for this project, with sufficient production capacity to produce and deliver required units without causing delay in work.

.3 Mock-up:

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

.2 Construct mock-up of typical wall application and application around window and door openings.

.3 Mock-up may be part of finished work.

.4 Allow 24 hours for inspection of mock-up by Consultant before proceeding with sprayed insulation work.

.4 Convene pre-installation meeting one week prior to beginning on-site installations.

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordinate with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.5 Health and Safety Requirements: worker protection:

.1 Protect workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations:

.2 Workers must wear protective clothing when applying foam insulation.

.3 Workers must not eat, drink or smoke while applying foam insulation.

1.6 DELIVERY,
STORAGE AND
HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance w.th Section 01 61 00 - Common Product Requirements
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.7 SITE CONDITIONS

- .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.
- .5 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-S705.1-01 including amendment 1&2.
 - .1 Closed cell, medium density, spray-applied rigid polyurethane foam insulation and air barrier system.
 - .2 Long Term Thermal resistance: Min. 1.95 RS1/50mm (R11.07)
 - .3 Flame Spread Rating: <500, tested in conformance with CAN/ULC S102/S127
 - .4 Perm rating: to ASTM E-96, 37-55ng/Pa.s.m2/ 50mm
 - .5 Acceptable products:
 - .1 BASF Walltite ECO v.2 (CCMC 13530-L)
 - .2 Polarfoam PF-7300-0 Soya (CCMC 13244-L)
 - .3 Icynene Proseal (CCMC 13683-L)
 - .4 Accella Foamsulate ECO (CCMC 13583-R)
- .2 Primers: in accordance with manufacturer's recommendations for surface conditions. Maximum VOC limit as per Section 01 61 00 Product Requirements

- .3 Fire rated coatings compatible with spray applied insulation shall be applied to meet fire rating requirements as noted

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 APPLICATION

- .1 Apply insulation to clean surfaces in accordance with CAN/ULC-S705.2 compliance with the spray polyurethane Foam Alliance and manufacturer's printed instructions.
- .2 Use primer where recommended by manufacturer.
- .3 Apply spray foam insulation directly to the interior faces of all exterior poured concrete curbs and upstands, to the underside for floor slabs at exterior soffit locations, around exhaust duct plenum boxes penetrating exterior walls and where indicated on the drawings.
- .4 Apply after installation of anchorage ties and supports, and galvanized "Z" girt framing for anchorage of cladding systems.
- .5 Apply in maximum 50mm thickness per pass. On initial application thickness of first pass shall be no more than 25mm. Allow application of spray foam to cure and cool prior to application of additional layers of insulation as per manufacturer's recommendations to achieve total thickness to meet thermal values specified.
- .6 Apply sprayed foam insulation in total thickness to achieve a minimum R value of 20 on wall areas and 30 on soffit areas unless indicated otherwise.
- .7 Apply spray foam insulation around supply and exhaust ductwork penetrations through exterior walls. The work of this section is to seal and thermally protect the connection of ductwork to the exterior wall. Apply insulation after ductwork and ductwork insulation is in place.

- .8 Apply spray foam insulation to back of window panel/spandrel panel assemblies where indicated on drawings at junctions with concrete roof and floor slabs.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation at stages listed.
 - .1 After delivery and storage of products and when preparatory work and mock-up is completed but before general installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of work, after cleaning is carried out.
 - .4 Provide written report for each site review.

3.4 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures
 - .2 Section 05 41 00 – Structural Metal Stud Framing
 - .3 Section 07 21 13 – Blanket Insulation
 - .4 Section 07 21 19 – Foamed-in-Place Insulation
 - .5 Section 07 21 29.03 – Sprayed Insulation - Polyurethane Foam
 - .6 Section 07 27 00 – Air Barriers
 - .7 Section 07 52 00 – Modified Bituminous Membrane Roofing
 - .8 Section 07 92 00 – Joint Sealants
 - .9 Section 09 21 16 – Gypsum Board Assemblies
-
- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.
 - .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM E1745 Standard Specifications for Plastic Water Vapour Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
 - .2 ASTM E154 Standard Test Methods for Water Vapour Retarders Used in Contact with Earth Under Concrete Slabs
 - .3 ASTM E96 Standard Test Methods for Water Vapour Transmission of Materials
 - .4 ASTM E1643 Standard Practice for Installation of Water Vapour Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
 - .5 ASTM F1249-01 Standard Test Method for Water Vapour Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

1.2 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include:
 - .1 Product characteristics.
 - .2 Performance criteria.
 - .3 Limitations.
- .3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).

- .4 Quality assurance submittals:
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Instructions: submit manufacturer's installation instructions and comply with written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.
- 1.3 QUALITY ASSURANCE
- .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.
 - .2 Mock-Ups:
 - .1 Submit mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct mock-up of sheet vapour barrier installation including one lap joint, and termination at perimeter. Mock-up may be part of finished work.
 - .3 Mock-up will be used to judge workmanship, substrate preparation, and material application.
 - .4 Locate where directed.
 - .5 Allow 24 hours for inspection of mock-up by Consultant before proceeding with vapour barrier work.
 - .3 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.
- 1.4 DELIVERY, STORAGE AND HANDLING
- .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 SHEET VAPOUR BARRIER

- .1 Plastic Vapour Retarder:
 - .1 Performance Based Specification: Vapour Retarder Membrane must meet or exceed all requirements of ASTM E1745 Classes A, B and C
 - .1 Maximum Permeance ASTM E96: 0.018 Pe Perms
 - .2 Water Vapour Transmission Rate ASTM F1249 calibrated to ASTM E96 (water method): 0.007 grains/ft2/hr
 - .3 Resistance to Organisms and Substrates in Contact with Soil ASTM E154, Section 13: 0.027 Perms
 - .4 Tensile Strength ASTM E154, Section 9: 84 lbs force/inch
 - .5 Puncture Resistance ASTM D1709, Method B: 4,335 grams
 - .6 Water Vapour Retarder ASTM E1745: meets or exceeds Class A, B, & C
 - .7 Thickness of retarder (plastic) ACI 302.1R-96: Not less than 10 mils
 - .2 Acceptable Material
 - .1 Perminator/10 mil by W.R. Meadows.

2.2 ACCESSORIES

- .1 Joint sealing tape: air resistant pressure sensitive adhesive tape, high density polyethylene tape type recommended by vapour barrier manufacturer, minimum 100mm wide for lap joints and perimeter seals.
- .2 Pipe Boots: Construct pipe boots from vapour barrier material and pressure sensitive tape per manufacturer's instruction.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Examine surfaces to receive membrane. Notify architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.2 SURFACE PREPARATION

- .1 Prepare surfaces in accordance with manufacturer's instructions.

3.3 INSTALLATION

- .1 Ensure services are installed and inspected prior to installation of retarder.
- .2 Installation shall be in accordance with manufacturer's

instructions and ASTM E1643-98.

- .3 Install sheet vapour retarder to form continuous retarder. All joints, penetrations and perimeter to be sealed in strict accordance to manufacturer's recommendations.
- .4 Use sheets of largest practical size to minimize joints.
- .5 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.
- .6 Seal all penetrations (including pipes) with manufacturer's pipe boot.
- .7 No penetration of the vapour barrier is allowed except for permanent utilities.
- .8 Repair damaged areas by cutting patches of vapour barrier, overlapping damaged area 6 inches and taping all four sides with tape.

3.4 PERIMETER SEALS

- .1 Seal perimeter of sheet vapour barrier as follows:
 - .1 Return vapour retarder membrane up foundation and secure in place with continuous bead of caulking.
 - .2 Install insulating break continuous to suit depth of perimeter slab.
 - .3 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.5 LAP JOINT SEALS

- .1 Seal lap joints of sheet vapour barrier as follows:
 - .1 Overlay adjacent sheets by 150mm and apply continuous length of manufacturer's proprietary 100mmwide lap tape.
 - .2 Smooth out folds and ripples occurring in sheet and repair any penetration with patch of membrane material and proprietary tape.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

7PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Materials and requirements for wall air/ vapour barrier systems.
 - .1 Applied to exterior face of exterior wall sheathing, concrete block and poured concrete back-up walls to provide a continuous air/vapour barrier membrane.
 - .2 Thru-wall flashings in masonry veneer walls.
 - .3 Underlayment for sheet metal flashing work, and aluminum window sills.
 - .4 Perimeter membrane to window and door openings applied over wood blocking to provide transition membrane between wall and windows and doors.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 04 05 00 - Common Work Results for Masonry
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .4 Section 04 05 23 - Masonry Accessories
- .5 Section 07 21 13 - Board Insulation
- .6 Section 07 21 19 – Foamed-in-Place Insulation
- .7 Section 07 26 00 – Vapour Retarder-Floor Slab
- .8 Section 07 52 00 - Modified Bituminous Membrane Roofing
- .9 Section 07 62 00 - Sheet Metal Flashing and Trim

1.3 REFERENCES

- .1 Canadian Construction Documents Committee
 - .1 CCDC 5B-2010 Construction Management Contract-for Services and Construction
- .2 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

1.4 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Existing Substrate Condition: report deviations, as described in PART 3 -EXAMINATION in writing to Consultant.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

- .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
- .4 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 QUALITY ASSURANCE

.1 Qualifications:

- .1 Applicator: company specializing in performing work of this section with minimum five years documented experience with installation of air/vapour barrier systems.
 - .1 Completed installation must be approved by the material manufacturer.
- .2 Applicator: company:
 - .1 Currently licensed by National Air Barrier Association.
 - .2 Must maintain their license throughout the duration of the project.
 - .3 The Owner may appoint an independent Air Barrier/Building Envelope Inspector. The cost of inspection shall be paid by the Owner.

.2 Mock-Up:

- .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
- .2 Construct typical exterior wall panel, 3 m long by 3 m wide, incorporating window, insulation, building corner condition, junction with roof system thru wall flashing and masonry wall tie; illustrating materials interface and seals.
- .3 Locate where directed.
- .4 Mock-up may not remain as part of finished work.
- .5 Allow 24 hours for inspection of mock-up by Consultant before proceeding with air/vapour barrier Work.

.3 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.

- .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
- .2 Twice during progress of Work at 25% and 60% complete.
- .3 Upon completion of Work, after cleaning is carried out.

1.6 DELIVERY, STORAGE AND HANDLING

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

	.3	Avoid spillage: immediately notify Consultant if spillage occurs and start clean up procedures.
	.4	Clean spills and leave area as it was prior to spill.
<u>1.7 WASTE MANAGEMENT AND DISPOSAL</u>	.1	Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
	.2	Place materials defined as hazardous or toxic waste in designated containers.
	.3	Ensure emptied containers are sealed and stored safely for disposal away from children.
<u>1.8 AMBIENT CONDITIONS</u>	.1	Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.
	.2	Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
	.3	Maintain temperature and humidity recommended by materials manufactures before, during and after installation.
	.4	Perform moisture testing of concrete surfaces to confirm substrate meets requirements of manufacturer prior to application.
<u>1.9 SEQUENCING</u>	.1	Sequence work to permit installation of materials in conjunction with related materials and seals. All envelope trades are to cooperate in the coordination and realization of a complete integrated air barrier membrane.
<u>1.10 WARRANTY</u>	.1	Provide three-year warranty under provisions of Section 01 78 00 - Closeout Submittals and in accordance with General Conditions (GC) CCDC 5B GC 12.3.
	.2	Warranty: include coverage of installed sealant and sheet materials which: .1 Fail to achieve air tight and watertight seal. .2 Exhibit loss of adhesion or cohesion. .3 Do not cure.

PART 2 - PRODUCTS

2.1 SHEET MATERIALS

- .1 Air Barrier Membrane: Reinforced SBS Modified Bitumen self-adhesive composite membrane, nom. 1.5mm thick or rubberized asphalt self-adhesive composite membrane nom. 1 mm thick.
.1 Acceptable products: Non Vapour Type Membrane self-adhesive as follows: Blueskin SA by Henry Company, Perm-A-Barrier by gcp applied technologies, Sopraseal Stick 1100 by Soprema, ExoAir 110 by Tremco.
- .2 Thru-Wall Flashing Membrane: Reinforced SBS Modified Bitumen self-adhesive composite membrane, laminated to a cross-laminate, high-density polyethylene film with a siliconized release liner. nom. 1.0mm thick
.1 Acceptable products: Blueskin TWF.
- .3 Primer: synthetic rubber primer and one-part thermoplastic rubber based sealant for Self-Adhesive membrane as recommended by manufacturer of membrane.
.1 Maximum VOC's as per 01 35 21.
- .4 Adhesive: compatible with sheet seal membrane and substrate, permanently non-curing.
.1 Maximum VOC's 50g/L.
- .5 Sealant around Brick Tie Penetrations: Butyl Sealant or trowel applied liquid air/vapour barrier membrane synthetic, rubber based adhesive compatible with sheet seal membrane and substrate, permanently non-curing.
.1 Sealants as per 07 92 00 Joint Sealants.
- .6 Metal flashing supports: 26 GA (0.55mm) zinc coated steel commercial quality to ASTM A526M with Z275 designated zinc coating.
- .7 Provide the above materials in either summer grade (above 5 degrees C) or winter grade (between -5 to 5 degrees C) applications to suit installation temperatures.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

<u>3.2 GENERAL</u>	.1	Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.
<u>3.3 EXAMINATION</u>	.1	Verify that surfaces and conditions are ready to accept work of this section.
	.2	Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.
	.3	Report unsatisfactory conditions to Consultant in writing.
	.4	Do not start work until deficiencies have been corrected.
	.1	Beginning of Work implies acceptance of conditions.
<u>3.4 PREPARATION</u>	.1	Remove loose or foreign matter, which might impair adhesion of materials.
	.2	Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions.
	.3	Ensure substrates are free of surface moisture prior to application of self-adhesive membrane and primer.
	.4	Ensure metal closures are free of sharp edges and burrs.
<u>3.5 INSTALLATION</u>	.1	Install materials in accordance with manufacturer's instructions.
	.2	Prime substrate to manufacturer's recommendations and allow to dry sufficiently. Two coats of primer may be required to achieve proper adhesion of membrane. Ensure all primed surfaces receive membrane application in the same day. Apply primer beyond edges of sheet to be installed minimum 150mm and re-coat edge when applying adjacent sheets.
	.3	Apply membrane complete and continuous to prepared substrate in an overlapping shingle fashion and in according to manufacturer's recommendations. Lap membrane joints min. 150 mm at end and side laps. Stagger all vertical joints.
	.4	Position membrane for alignment with protective film in place. Roll back, remove protective film and press firmly in place. When membrane is entirely in place, roll firmly into substrate to ensure full contact. Cut membrane neatly around ties to form a tight seal. Seal area around ties and any projections with sealant and seal end of membrane to substrate at end of the day's work.

- .5 Maintain environmental conditions recommended by manufacturer.
- .6 Return membrane over wood blocking at windows and doors into opening prior to window / door installation. Extend membrane into window and door openings as indicated. Lap joints to shed water to the exterior starting at the sill flashing.
- 7 At curtain wall window framing, Window contractor to provide membrane strip sealed into window perimeter framing. The work of this section shall included sealing window membrane to wall membrane for continuous seal.
- .8 At the end of each day's work seal the top edge of the membrane where it meets the substrate using liquid air seal mastic. Trowel apply a feathered edge to seal termination and shed water.
- .9 Membrane applied to the underside of substrate surfaces shall receive special attention on application to ensure maximum surface area adhesion is obtained.

3.6 THRU-WALL FLASHING

- .1 Install materials in accordance with manufacturer's instructions.
- .2 Install flashings over openings in exterior walls.
- .3 Install flashings in masonry in accordance with CAN3-A371-M84 and as specified herein.
- .4 Install flashings under exterior masonry and siding resting on foundation walls, slabs, concrete curbs, shelf angles, and steel angles over openings.
- .5 Install flashings under weep hole courses and as indicated.
- .6 In double wythe masonry walls, veneered walls, and siding clad walls carry flashings from front edge of masonry or siding under outer wythe, then up backing not less than 200mm, bond to backing using manufacturer's recommended adhesive.
- .7 Where required and detailed provide metal flashing support to adhere thru wall flashing to and span over gaps and voids.
- .8 Lap joints 150mm and seal full overlap with adhesive.
- .9 Turn up ends of flashings at ends to form end dams (i.e., at sills of openings/windows).

- .10 Install over horizontal firestops.
- .11 Install flashings in other locations indicated.

3.7 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.8 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.9 PROTECTION OF WORK

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 05 50 00 - Metal Fabrications.
- .2 Section 07 21 13 - Board Insulation.
- .3 Section 07 62 00 - Sheet Metal Flashing and Trim
- .4 Section 07 92 00 - Sealants

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A 653/A 653M-02a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM A 792/A 792M-02, Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .3 ASTM D 523-89(1999), Test Method for Specular Gloss.
 - .4 ASTM D 822-01, Standard Practice, For Conducting Test on Paint and Related Coatings and Materials Using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
 - .5 ASTM D 2832-92 (1999), Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-93.1-M85, Sheet, Aluminum Alloy, Prefinished, Residential.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA S136-01, North American Specification for the Design of Cold-Formed Steel Structural Members.
 - .2 CSA S136.1-01, Commentary on North American Specification for the Design of Cold-Formed Steel Structural Members.

1.3 SYSTEM DESCRIPTION

- .1 Design Requirements
 - .1 Design metal panel wall system in accordance with CSA S136.
 - .2 Design metal panel wall to provide for thermal movement of component materials caused by ambient temperature range of -35 to +70 degrees C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.
 - .3 Include expansion joints to accommodate movement in wall system and between wall system and building structure, caused by structural movements, without permanent distortion, damage to infills, racking of joints, breakage of seals, or water penetration.
 - .4 Design members to withstand dead load and wind loads calculated in accordance with NBC and applicable local regulations, to maximum allowable deflection of 1/180th of span.
 - .5 Provide for positive drainage of condensation occurring within wall construction and water entering at joints, to exterior face of wall in accordance with NRC "Rain Screen Principles".
 - .6 Design wall system to accommodate specified erection tolerances of structure.
 - .7 Design wall system to allow for movement of air between exterior and interior side of metal cladding.

1.4 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
 - .1 Caulking and sealant materials during application and curing.
 - .2 Finishing materials.
 - .3 Isolation coatings.
- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate dimensions, wall openings, head, jamb, sill and mullion detail, materials and finish, anchor details, compliance with design criteria and requirements of related work.
 - .3 Ensure each shop drawing submitted has been stamped by licensed professional engineer registered in Ontario.
- .3 Samples:

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit duplicate 600 x 600 mm samples of wall system, representative of materials, finishes and colours.

- .4 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.
- .5 Manufacturers' Field Reports: Submit copies of manufacturers field reports.

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 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.
- .5 Divert unused paint and joint sealer material from landfill to official hazardous material collections site approved by Consultant.
- .6 Do not dispose of unused paint and joint sealer materials into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

The following manufacturers of metal siding are approved:

- .1 **PM-** (Metal Siding)
 - .1 Vicwest, 362 Lorne Avenue East
Stratford, ON N5A 6S4
 - .2 Ideal Roofing, 1481 Michael Street,
Ottawa, ON, K1B3R2
 - .3 Agway Metals 170 Delta Park Blvd. Brampton, Ontario.
L6T 5T6

2.2 SHEET METAL SIDING PANEL MATERIALS

- .1 **PM-1** (Metal Siding) -Factory preformed 37mm deep profile, 406 and wide coverage, .024 minimum base metal thickness.
Standard of acceptance:

2.2 ACCESSORIES

- .1 Accessories: cap flashings, drip flashings, internal corner flashings, copings and closures for head, jamb, sill and corners, of same material, 0.5mm thickness and finished to match exterior cladding, brake formed to shape.
- .2 Sub-girts: of 1.3mm minimum base metal thickness, structural quality steel to ASTM A 653, with Z275 zinc coating, profile as indicated to accept exterior sheet with structural attachment by thermal clip to building frame.
- .3 Fasteners: Purpose made prefinished to match siding colour, #14 x 25mm Prisma sheet metal screws.
- .4 Semi-Rigid insulation: as per Section 07 21 13.
- .5 Sealants: as per Section 07 92 00.
- .6 Gaskets: closed cell polyurethane foam, adhesive on two sides, release paper protected.
- .7 Touch-up paint: as recommended by panel manufacturer.
- .8 Isolation coating: alkali resistant bituminous paint.

- .9 Provide manufacturer's standard accessories and other items essential to completeness of standing seam roof installation. Provide all components required per the approved shop drawings for a complete metal roof system to include panels, clips, gable clips, fasteners, trims/flashings, closures, fillers, sealants and any other required items.

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 Protect metal surfaces in contact with concrete, masonry mortar, plaster or other cementitious surface with isolation coating.
- .2 Sub-girts to be in contact with spray foam insulation shall be primed with isolation coating as recommended by spray foam insulation manufacturer.

3.3 INSTALLATION (FIELD ASSEMBLED)

- .1 Install sub-girts over external sheathing and secure to metal studs using self tapping screws. Install horizontally at spacing to suit metal siding sub-framing layout.
- .2 Install sub-girts over concrete block surfaces using self tapping concrete screws and anchors. Install horizontally at spacing to suit metal siding sub-framing layout.
- .3 Install vertical galv. metal furring over sub-girts and insulation at spacing to suit cladding fastener spacing and panel layout/
- .4 Install exterior finish cladding to internal sub-girts with fasteners.
- .5 Ensure continuity of "pressure equalization" of rain screen principle.
- .6 Provide alignment bars, brackets, clips, inserts, shims as required to securely and permanently fasten wall system to building structure.

3.4 TRIMS & PANEL JOINTS

- .1 Construct trims and panel joints as indicated.
- .2 Use cover sheets, of brake formed profile, of same material

and finish as adjacent material.

- .3 Use mechanical fasteners to secure sheet materials.
- .4 Assemble and secure wall system to structural frame so stresses on sealants are within manufacturers' recommended limits.

3.5 CONSTRUCTION

- .1 Site Tolerances:
 - .1 Maintain following installation tolerances:
 - .1 Maximum variation from plane or location shown on approved shop drawings: 10 mm/m of length and up to 20 mm/100 m maximum.
 - .2 Maximum offset from true alignment between two adjacent members abutting end to end, in line: 0.75 mm.

3.6 FIELD QUALITY CONTROL

- .1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.
- .2 Manufacturer's field services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .3 Schedule site visits to review Work at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.
- .4 Obtain reports within three days of review and submit.

3.7 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Wash down exposed interior and exterior surfaces using solution of mild domestic detergent in warm water, applied with

soft clean wiping cloths. Wipe interior surfaces clean as part of final clean-up.

- .3 Remove excess sealant with recommended solvent.
- .4 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 for modified bituminous roofing as indicated on drawings. The system noted is a Soprema Adhered System using one manufacturers product line to provide a complete proprietary roof system. All alternatives must provide a similarly complete proprietary system and provide a single system warranty. *All systems are subject to manufacturer technical review by technical representative. A 3rd party roofing consultant is required to document and confirm installation of complete adhered roof area and verify compliance with entire roof system.*

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 45 00 - Quality Control.
- .3 Section 01 78 00 - Closeout Submittals.
- .4 Section 06 10 00 - Rough Carpentry
- .5 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .6 Section 07 72 69 - Roof Anchors and Safety Restraints.
- .7 Section 07 92 00 - Joint Sealants.
- .8 Division 22 - Plumbing Specialties and Accessories: drains

1.3 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM C 1177/C 1177M, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - .2 ASTM D 41-05, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
 - .3 ASTM D 312-00, Asphalt Used in Roofing.
 - .4 ASTM D 2178, Asphalt Glass Felt Used in Roofing and Waterproofing.
 - .5 ASTM D 6162, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
 - .6 ASTM D 6163, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
 - .7 ASTM D 6164, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
- .2 Canadian Roofing Contractors Association (CRCA).
 - .1 CRCA Roofing Specifications Manual-1997.
- .3 Canadian Standards Association (CSA International).
 - .1 CAN/CSA-A123.3, Asphalt Saturated Organic Roofing

Felt.

- .2 CAN/CSA-A123.4, Asphalt for Use in Construction of Built-Up Roof Coverings and Waterproofing Systems.
- .3 CSA A231.1, Precast Concrete Paving Slabs.
- .4 CSA O121, Douglas Fir Plywood.
- .5 CSA O151, Canadian Softwood Plywood.
- .6 CSA A123.21, Standard Test Method for Wind Uplift Resistance of Membrane Roofing Systems

- .4 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .5 Factory Mutual (FM Global).
 - .1 FM Approvals - Roofing Products.
 - .2 FM 4470 for Fastener Types and sizes
- .6 Health Canada / Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .7 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .8 Underwriters Laboratories' of Canada (ULC).
 - .1 CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .2 CAN/ULC-S704, Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
 - .3 CAN/ULC-S706, Standard for Wood Fibre Thermal Insulation for Buildings.

1.4 PERFORMANCE REQUIREMENTS

- .1 Compatibility between components of roofing system is essential. Provide written declaration to Consultant stating that materials and components, as assembled in system, meet this requirement.

1.5 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit two copies of most recent technical roofing components data sheets describing materials' physical properties.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets.
- .4 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

- .5 Indicate flashing, control joints, tapered insulation details.
- .6 Provide layout for tapered insulation.
- .7 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.
- .8 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
- .9 Manufacturer's field report: in accordance with Section 01 45 00 - Quality Control.
- .10 Reports: indicate procedures followed, ambient temperatures and wind velocity during application.
- .11 Submit product data highlighting the SRI value of roofing materials as per 01 35 21.

1.6 QUALITY ASSURANCE

- .1 Submit laboratory test reports in accordance with Section 01 45 00 - Quality Control.
- .2 Submit laboratory test reports certifying compliance of bitumen and membrane with specification requirements.
- .3 Convene pre-installation meeting one week prior to beginning waterproofing Work, with roofing contractor's representative and Consultant to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
- .4 Contractors must be members in good standing of the Ontario or Canadian Roofing Contractors Association (ORCA or CRCA) and/or have been established as a roofing contractor for a minimum of 5 years, and shall be recognized as a qualified SBS Modified Bitumen Membrane installer.
- .5 Roofing work shall be performed only by experienced and qualified applicators in accordance with Manufacturer's recommendations and best trade practices. Replace all work that results from inferior products or workmanship as directed by the Consultant.
- .6 Installer qualifications: Engage an experienced installer to perform work of this section who is specialized in installing roofing similar to that required for this project, who is approved, authorized or licensed by the roofing system manufacturer to

install the manufacturer's product and who is eligible to receive the standard roofing manufacturer's warranty.

- .7 The roofing contractor and his subcontractors, throughout the bid and installation periods, must own a business license and must be officially recognized as an approved contractor by the roofing product manufacturer. Only skilled tradespersons, officially employed by a roofing contractor operating adequate and necessary equipment, will be authorized to perform all roofing work.
- .8 Employ only skilled tradesmen who have successfully completed a course of instruction provided by the material manufacturer and are experienced in this work.
- .9 Upon request by the Consultant, submit evidence of previously completed projects of a similar nature.

1.7 FIELD QUALITY CONTROL

- .1 The Owner may appoint an independent Waterproofing/Roofing inspector to conduct inspections and tests to ensure compliance with specification requirements. The cost of the inspection and testing shall be paid by the Owner.
- .2 Provide a minimum two working days notice to the Consultant and Roofing Inspector of commencement of each phase of the work and provide them with manufacturer's literature on materials and installation upon request.
- .3 On completion of the roofing, conduct in the presence of and under the direction of the Roofing Inspector, a flood test of that portion of the work.
- .4 After installation, provide certification, signed by the roofing material manufacturer, that all items have been installed in accordance with the shop drawings and the manufacturer's specifications and details.
- .5 Cooperate with the Roofing Inspector and Consultant and afford all facilities necessary to permit full inspection of the work and testing of materials prior to and during their use and during the warranty period.

1.8 HEALTH AND SAFETY

- .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.9 STORAGE AND HANDLING

- .1 Provide and maintain dry, off-ground weatherproof storage.
- .2 Store rolls of felt and membrane in upright position. Store

membrane rolls with selvage edge up.

- .3 Remove only in quantities required for same day use.
- .4 Place plywood runways over completed Work to enable movement of material and other traffic.
- .5 Store sealants at +5 degrees C minimum.
- .6 Store insulation protected from daylight and weather and deleterious materials.
- .7 Handle roofing materials in accordance with manufacturer's written directives, to prevent damage or loss of performance.
- .8 Store and manage hazardous materials in accordance with Section 01 47 15 - Sustainable Requirements: Construction.
- .9 All materials will be delivered and stored in conformance with the requirements described in the manufacturer's product manual; they must remain in their original packaging with manufacturer's name and product standards.

1.10 PROTECTION

- .1 Fire Extinguishers: maintain one cartridge operated type or stored pressure rechargeable type with hose and shut-off nozzle, ULC labeled for A, B and C class protection. Size 9 kg on roof per torch applicator, within 6 m of torch applicator.
- .2 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.11 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.

- .6 Clearly label location of salvaged material's storage areas and provide barriers and security devices.
- .7 Ensure emptied containers are sealed and stored safely.
- .8 Divert unused metal materials from landfill to metal recycling facility as approved by Consultant.
- .9 Unused adhesive, sealant and asphalt materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
- .10 Dispose of unused adhesive material at official hazardous material collections site approved by Consultant.
- .11 Dispose of unused sealant material at official hazardous material collections site approved by Consultant.
- .12 Dispose of unused asphalt material at official hazardous material collections site approved by Consultant.
- .13 Divert unused gypsum materials from landfill to recycling facility as reviewed by Consultant.
- .14 Fold up metal banding, flatten and place in designated area for recycling.

1.12 ENVIRONMENTAL REQUIREMENTS

- .1 Do not install roofing when temperature remains below -18 degrees C for torch application, or -5 degrees C to manufacturers' recommendations for mop application.
- .2 Minimum temperature for solvent-based adhesive is -5 degrees C.
- .3 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.
- .4 Conduct moisture tests of concrete slabs prior to application to confirm subsurface is acceptable to membrane manufacturer.

1.13 WARRANTY

- .1 Provide manufacturer's warranty stating that the membrane and membrane flashing will remain in a watertight condition and will not leak as a result of faulty materials for a period of 10 years from the date of substantial performance of the contract. The scope of the warranty shall include all material and labour

to return the membrane to a weathertight condition.

- .2 Contractor hereby warrants that modified bituminous roofing and membrane flashings will stay in place and remain leakproof in accordance with the Subcontract Conditions (SCC), but for two years from the date of substantial performance of the contract. Make all necessary repairs and replacements within 48 hours of receipt of written notification.
- .3 Distortion or **unusual** regular patterning of the roof membrane within 18 months of installation will be examined by the installing trade at their own expense. Cooperate with 3rd Party roofing consultant and determine a course of action to eliminate further membrane distortion at own cost and to 3rd party consultant's requirements. Warranty to be extended for watertightness for additional 4 years if no other remedial work is taken.

PART 2 – PRODUCTS

2.1 DECK COVERING

- .1 Glass mat gypsum sheathing board to ASTM C 1177, exterior grade sheathing formulated to be water-resistant, thickness 6mm, board size 1220 x 2440mm.
 - .1 Acceptable materials:
 - .1 "Dens-Deck" by Georgia Pacific.
 - .2 "Securoc" by CGC or approved equal.
 - .3 Alternates recommended and warranted by the manufacturer and installing trade will be considered on an individual basis

2.2 ADHESIVES

- .1 Two component, quick setting, low expansion foam urethane adhesive that can be applied at any temperature. DUOTACK 365

2.3 DECK PRIMER

- .1 Asphalt primer: to CGSB 37-GP-9Ma.

2.4 VAPOUR BARRIER

- .1 Self-adhesive air/vapour barrier modified bitumen membrane.
 - .1 W.R. Meadows - AIR SHIELD LM
 - .2 SOPREMA/SOPRAVAP 'R'
 - .3 Henry Company/VAPOUR BLOC SA

2.5 MEMBRANE

- .1 Base sheet: SOPRAPHIX BASE 630 or approved equal
 - .1 Type 1, mechanically fastened.
 - .2 Class C - plain surfaced.
 - .3 Grade heavy duty service.

	.4	Top and bottom surfaces:
	.1	Thermofusible plastic film/sanded.
	.2	Cap sheet membrane: SOPRAPHIX CAP 660.
	.1	Type 1, torch applied.
	.2	Class A-granule surfaced.
	.1	Colour for granular surface: Light gray.
	.3	Grade heavy duty service.
	.4	Bottom surface thermofusible.
	.3	Roof Membrane Base & Cap Flashing:
	.1	SOPRAFLASH/FLAM STICK & SOPRALENE FLAM 250GR or approved equal
	.2	Heavy duty.
	.3	Thermofusible plastic film /top silicone plastic release film.
2.6 ISOCYANURATE (URETHANE) INSULATION	.1	To CAN/ULC-S704.
	.1	SOPRAISO 150-R5.56/inch closed cell polyisocyanurate foam flat insulation board laminated on both sides' w/fiberglass yarn reinforced organic paper. 3 layers as noted. Provide tapered insulation and crickets to suit slopes on drawings. Provide prefab sump board drains where required. Soprema as Standard of Acceptance. Option 1: closed cell zero ODP polyisocyanurate foam core integrally laminated to perforated glass reinforced mat. Johns Manville Energy 3 R5.7/inch.
2.7 SEALERS	.1	Sealants: Caulking - see Section 07 92 00 - Joint Sealing.
2.8 WALKWAYS	.1	Walkways to consist of one additional ply of cap sheet membrane. Contrasting colour from field membrane as selected by Consultant.
2.9 FASTENERS	.1	Covering to steel deck: No. 14 flat head, self tapping, Type A or AB, cadmium plated screws complete with 50 mm diameter washers. SOPRAPHIX FASTENERS/PLATES
	.2	Base sheet to deck: coated insulation fasteners and galvanized plates must meet CSA a-123.21(14) and FM 4470 Standard Approval for wind uplift and corrosion resistance, as recommended by insulation manufacturer. SOPRAPHIX FASTENER/PLATES.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- .1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual Provincial Roofing Association Manual, particularly for fire safety precautions, and to FM ULC.
- .2 Do priming for asphalt roofing in accordance with manufacturer's requirements.
- .3 The interface of the walls and roof assemblies will be fitted with durable rigid material sheet metal providing connection point for continuity of air barrier.
- .4 Assembly, component and material connections will be made in consideration of appropriate design loads, with reversible mechanical attachments.

3.2 EXAMINATION OF ROOF DECKS

- .1 Inspect with Consultant deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.
- .2 Prior to beginning of work ensure:
 - .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
 - .2 Curbs have been built.
 - .3 Roof drains have been installed at proper elevations relative to finished roof surface.
 - .4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.
- .3 Do not install roofing materials during rain or snowfall.

3.3 PROTECTION

- .1 Cover walls, walks and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of Work.
- .3 Clean off drips and smears of bituminous material immediately.
- .4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.
- .5 Protect roof from traffic and damage.
- .6 At end of each day's work or when stoppage occurs due to

inclement weather, provide protection for completed Work and materials out of storage.

- .7 Metal connectors and decking will be treated with rust proofing or galvanization.

3.4 DECK COVERING

- .1 Adhesive apply glass mat gypsum to steel deck.
- .2 Place with long axis of each sheet transverse to steel deck ribs, with end joints staggered and fully supported on ribs.

3.5 VAPOUR BARRIER

- .1 Adhere self-adhesive air vapour barriers as per manufacturer's instructions.
- .2 A/V barrier as per Section 07 27 00 or as per proprietary roofing system components.

3.6 EXPOSED MEMBRANE ROOFING APPLICATION

- .1 Insulation: mechanically fastened application:
 - .1 Mechanically fasten insulation using screws and pressure distribution plates sufficient to secure boards in place during build up of roof profile.
 - .2 Place boards in parallel rows with ends staggered, and in firm contact with one another.
 - .3 Cut end boards to suit.
- .2 Tapered insulation application:
 - .1 Install tapered insulation as top insulation layer, in accordance with shop drawings. Stagger joints between layers 150 mm minimum.
- .4 Base sheet application:
 - .1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
 - .2 Unroll and embed base sheet and secure with screws and pressure plates to suit CSA A123.21(14) for the specific region. Comply with FM 4470 for fastener type and size.
- .5 Cap sheet application:
 - .1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.
 - .2 Unroll and torch embed cap sheet.
- .6 Flashings:
 - .1 Complete installation of flashing base sheet stripping

- prior to installing membrane cap sheet.
- .2 Refer to manufacturer's instructions for sequence and installation requirements specific to self-adhesive or weldable base sheet on flashings and parapets.
- .3 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal by self adhering or torch welding.
- .4 Lap flashing cap sheet to membrane cap sheet 250 mm minimum and torch weld.
- .5 Provide 75 mm minimum side lap and seal.
- .6 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.
- .7 Seal overlaps at the end of each workday.
- .8 Do work in accordance with manufacturer's recommendations Section 07 62 00 - Sheet Metal Flashing and Trim.

- .7 Roof penetrations:
 - .1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details.

3.7 WALKWAYS

- .1 Walkways to consist of one additional ply of cap sheet membrane. Contrasting colour: Dark Grey.

3.8 FIELD QUALITY CONTROL

- .1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Consultant.
- .2 Costs of tests will be paid by Owner.

3.9 CLEANING

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by work of this section.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Materials and installation for modified bituminous roofing as indicated on drawings. The system noted is a Soprema Adhered System using one manufacturers product line to provide a complete proprietary roof system. All alternatives must provide a similarly complete proprietary system and provide a single system warranty. *All systems are subject to manufacturer technical review by technical representative. **A 3rd party roofing consultant is required to document and confirm installation of complete adhered roof area and verify compliance with entire roof system.***

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 45 00 - Quality Control.
- .3 Section 01 78 00 - Closeout Submittals.
- .4 Section 06 10 00 - Rough Carpentry
- .5 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .6 Section 07 72 69 - Roof Anchors and Safety Restraints.
- .7 Section 01 81 19 - Indoor Air Quality Requirements
- .8 Section 07 92 00 - Joint Sealants.
- .9 Division 22 - Plumbing Specialties and Accessories: drains

1.3 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM C 1177/C 1177M-01, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - .2 ASTM D 41-94(2002) e1, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
 - .3 ASTM D 312-00, Asphalt Used in Roofing.
 - .4 ASTM D 448-03, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
 - .5 ASTM D 2178-97a, Asphalt Glass Felt Used in Roofing and Waterproofing.
 - .6 ASTM D 6162-00a, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
 - .7 ASTM D 6163-00e1, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
 - .8 ASTM D 6164-00, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
- .2 Canadian Roofing Contractors Association (CRCA).
 - .1 CRCA Roofing Specifications Manual-1997.
- .3 Canadian Standards Association (CSA International).
 - .1 CAN/CSA-A123.3, Asphalt Saturated Organic Roofing Felt.

- .2 CAN/CSA-A123.4, Asphalt for Use in Construction of Built-Up Roof Coverings and Waterproofing Systems.
- .3 CSA A231.1, Precast Concrete Paving Slabs.
- .4 CSA O121-M1978, Douglas Fir Plywood.
- .5 CSA O151-M1978, Canadian Softwood Plywood.
- .6 CSA A123.21-14 Standard Test Method for Wind Uplift Resistance of Membrane Roofing Systems

- .4 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).

- .5 Factory Mutual (FM Global).
 - .1 FM Approvals - Roofing Products.
 - .2 FM 4470 for Fastener Types and sizes

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

- .7 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).

- .8 Underwriters Laboratories of Canada (ULC).
 - .1 CAN/ULC-S701-01, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .2 CAN/ULC-S704-2001, Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
 - .3 CAN/ULC-S706-02, Standard for Wood Fibre Thermal Insulation for Buildings.

1.4 PERFORMANCE REQUIREMENTS

- .1 Compatibility between components of roofing system is essential. Provide written declaration to Consultant stating that materials and components, as assembled in system, meet this requirement.

- .2 Environmental Requirements:
 - .1 Provide roof insulation containing a combined minimum post-consumer and pre-consumer recycled content of 40%
 - .2 Provide adhesives, sealants, and sealant primers with VOC quantities lower than stated in SCAQMD Rule#1168, current edition
 - .3 Provide primers, paints, sealers, coatings and wood finishes with VOC quantities lower than limits stated in Green Seal's Standards GS-3 and GS-11 and SCAQMD Rule#1113, current editions

1.5 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit two copies of most recent technical roofing components data sheets describing materials' physical properties.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets.
- .4 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .5 Indicate flashing, control joints, tapered insulation details.
- .6 Provide layout for tapered insulation.
- .7 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.
- .8 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
- .9 Manufacturer's field report: in accordance with Section 01 45 00 - Quality Control.
- .10 Reports: indicate procedures followed, ambient temperatures and wind velocity during application.

1.6 QUALITY ASSURANCE

- .1 Submit laboratory test reports in accordance with Section 01 45 00 - Quality Control.
- .2 Submit laboratory test reports certifying compliance of bitumen's and membrane with specification requirements.
- .3 Convene pre-installation meeting one week prior to beginning waterproofing Work, with roofing contractor's representative and Consultant to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
- .4 Contractors must be an established as a commercial/industrial roofing contractor for a minimum of 5 years, and shall be recognized as a qualified SBS Modified Bitumen Membrane installer. Provide the 2-year standard form of warranty available through the Association.
- .5 Roofing work shall be performed only by experienced and qualified applicators in accordance with Manufacturer's recommendations and best trade practices. Replace all work that results from inferior products or workmanship as directed by the Consultant.

- .6 Installer qualifications: Engage an experienced installer to perform work of this section who is specialized in installing roofing similar to that required for this project, who is approved, authorized or licensed by the roofing system manufacturer to install the manufacturer's product and who is eligible to receive the standard roofing manufacturer's warranty.
- .7 The roofing contractor and his subcontractors, throughout the bid and installation periods, must own a business license and must be officially recognized as an approved contractor by the roofing product manufacturer. Only skilled tradespersons, officially employed by a roofing contractor operating adequate and necessary equipment, will be authorized to perform all roofing work.
- .8 Employ only skilled tradesmen who have successfully completed a course of instruction provided by the material manufacturer and are experienced in this work.
- .9 Upon request by the Consultant, submit evidence of previously completed projects of a similar nature.
- .10 Cooperate with 3rd Party Roofing consultant and coordinate timely access and ensure unobstructed and continuous review of installation as schedule of work proceeds. Include review by roof manufacturers technical representative and verify installation methods, weather conditions, crew experience and quantities and reactions of adhesives and staging of work is to manufacturer specifications. Technical representative for the manufacturer is to confirm in written reports based on daily staging that all installed areas are in compliance with system specifications.
- .11 Work that is not observed by either party will be subject to spot removal to satisfy the 3rd part reviewer of the applications adequacy and conformance to specifications.

1.7 FIELD QUALITY CONTROL

- .1 The Owner will appoint an independent Waterproofing/Roofing inspector to conduct inspections and tests to ensure compliance with specification requirements. The cost of the inspection and testing shall be paid by the Owner.
- .2 Provide a minimum two working days notice to the Consultant and Roofing Inspector of commencement of each phase of the work and provide them with manufacturer's literature on materials and installation upon request. *Work proceeding without consultant review will be subject to incremental removal at the installers cost.*
- .3 On completion of the roofing, conduct in the presence of and under the direction of the Roofing Inspector, a flood test of that portion of the work.
- .4 After installation, provide certification, signed by the roofing material manufacturer, that all items have been installed in accordance with the shop drawings and the manufacturer's specifications and details.

- .5 Cooperate with the Roofing Inspector and Consultant and afford all facilities necessary to permit full inspection of the work and testing of materials prior to and during their use and during the warranty period. Refer to .2 above for work that proceeds without 3rd party review.

1.8 HEALTH AND SAFETY

- .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.9 STORAGE AND HANDLING

- .1 Provide and maintain dry, off-ground weatherproof storage.
- .2 Store rolls of felt and membrane in upright position. Store membrane rolls with selvage edge up.
- .3 Remove only in quantities required for same day use.
- .4 Place plywood runways over completed Work to enable movement of material and other traffic.
- .5 Store sealants at +5 degrees C minimum.
- .6 Store insulation protected from daylight and weather and deleterious materials.
- .7 Handle roofing materials in accordance with manufacturer's written directives, to prevent damage or loss of performance.
- .8 Store and manage hazardous materials in accordance with Section 01 requirements.
- .9 All materials will be delivered and stored in conformance with the requirements described in the manufacturer's product manual; they must remain in their original packaging with manufacturer's name and product standards.

1.10 PROTECTION

- .1 Fire Extinguishers: maintain one cartridge operated type or stored pressure rechargeable type with hose and shut-off nozzle, ULC labeled for A, B and C class protection. Size 9 kg on roof per torch applicator, within 6 m of torch applicator.
- .2 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.11 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

- .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste.
- .5 Place materials defined as hazardous or toxic in designated containers.
- .6 Handle and dispose of hazardous materials in accordance with CEPA , TDGA , Regional and Municipal regulations.
- .7 Clearly label location of salvaged material's storage areas and provide barriers and security devices.
- .8 Ensure emptied containers are sealed and stored safely.
- .9 Divert unused metal materials from landfill to metal recycling facility as approved by Consultant.
- .10 Unused adhesive, sealant and asphalt materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
- .11 Dispose of unused adhesive material at official hazardous material collections site approved by Consultant.
- .12 Dispose of unused sealant material at official hazardous material collections site approved by Consultant.
- .13 Dispose of unused asphalt material at official hazardous material collections site approved by Consultant.
- .14 Divert unused gypsum materials from landfill to recycling facility as reviewed by Consultant.
- .15 Fold up metal banding, flatten and place in designated area for recycling.

1.12 ENVIRONMENTAL REQUIREMENTS

- .1 Do not install roofing when temperature remains below -18 degrees C for torch application, or -5 degrees C to manufacturers' recommendations for mop application.
- .2 Minimum temperature for solvent-based adhesive is -5 degrees C.
- .3 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

- .4 Conduct moisture tests of concrete slabs prior to application to confirm subsurface is acceptable to membrane manufacturer.

1.13 WARRANTY

- .1 Provide manufacturer's warranty stating that the membrane and membrane flashing will remain in a watertight condition and will not leak as a result of faulty materials for a period of 10 years from the date of substantial performance of the contract. The scope of the warranty shall include all material and labour to return the membrane to a weathertight condition.
- .2 Contractor hereby warrants that modified bituminous roofing and membrane flashings will stay in place and remain leakproof in accordance with General Conditions (GC) - CCDC GC 12.3, but for two years from the date of substantial performance of the contract. Make all necessary repairs and replacements within 48 hours of receipt of written notification.
- .3 Distortion or **unusual** regular patterning of the roof membrane within 18 months of installation will be examined by the installing trade at their own expense. Cooperate with 3rd Party roofing consultant and determine a course of action to eliminate further membrane distortion at own cost and to 3rd party consultant's requirements. Warranty to be extended for watertightness for additional 4 years if no other remedial work is taken.

PART 2 - PRODUCTS

2.1 ADHESIVES

- .1 Insulation Adhesive, two component, quick setting, low expansion foam urethane adhesive that can be applied in any temperature as specified by the manufacturer
- .2 Acceptable Product; Duotack365 by Soprema.

2.2 INSULATION SUBSTRATE OVERLAY

- .1 Bituminous Board, Semi-rigid roofing support panel composed of mineral-reinforced asphaltic core between two asphalt saturated fiberglass liners. Length 1.2 m (3.9ft.) width of 1.5 m (4.92 ft) and thickness of 3.2 mm(.12in)
- .2 Acceptable product SopraBoard by Soprema.

2.3 VAPOUR RETARDER

- .1 Self adhesive air/vapour barrier modified bitumen membrane composed of SBS modified bitumen. The top surface is a tri-laminated woven polyethylene. A silicone release film covers the self-adhesive under face. Width of membrane 1140mm, water vapour permeability 0.016 perm.
- .1 Acceptable Products: Soprapap'R by Soprema for steel decks.

2.4 MEMBRANE

- .1 Base sheet: Sopralene Flam 180 from Soprema
 - .1 Type 1, for exposed roofing applications.
 - .2 Class C - plain surfaced.
 - .3 Grade heavy duty service.
 - .4 Top and bottom surfaces:
 - .1 polyethylene /polyethylene.
 - .5 ULC certification: Class A.
- .2 Cap sheet membrane: Sopralene Flam 250 GR
 - .1 Type 1, for exposed roofing applications
 - .2 Class A-granule surfaced.
 - .1 Colour for granular surface: White or light grey.
 - .3 Grade heavy duty service.
 - .4 Bottom surface polyethylene.
 - .5 ULC certification: Class A.
- .3 Roof Membrane Base Flashings:
 - .1 Sopraflash/Flam Stick & Sopralene Flam250 GR HD GR or approved equal.
 - .2 Heavy Duty
 - .3 Thermofusible plastic film /top silicone plastic release film.

2.5 INSULATION

- .1 Roof Insulation: Polyisocyanurate Insulation Boards: to ASTM C 1289-02 Type II, Class I, Grade 2 and CAN/ULC S 704, Type 3, Class 2 (See CCMC Evaluation Report 13058-L). Board Size: 1220mm x 2440mm, (LTR) R value of 5.7 per 38mm with number of layers as noted on drawings for a total thickness indicated.
 - .1 Insulation manufacturing shall utilize an environmentally compliant blowing agent containing pentane hydrocarbon to enhance the thermal performance of the foam insulation. This hydrocarbon shall have zero ozone depletion potential and conform to the Montreal Protocol established in 1987.
 - ..2 **Acceptable Product:** SOPRA-ISO 150 or as noted-R5.7/inch (RSA 1.00) as Standard of Acceptance.
- .2 Tapered Insulation: Polyisocyanurate Insulation Boards or rigid mineral wool as per Roof Insulation Boards, tapered to provide drainage slopes as indicated on drawings.
- .3 Parapet Insulation:
 - .1 Polyisocyanurate Insulation Boards complete with a protection board mechanically fastened over the vertical insulation. as per Roof Insulation Board Size: 1220mm x 2440mm, 75mm thickness, R value of 17.1
- .4 If alternative insulation is proposed for approval provide recover board as part of assembly to permit application of bituminous membrane roofing over such as Sopraboard -3.2mm insulation coverboard

2.6 SEALERS

- .1 Plastic cement: asphalt, to CAN/CGSB-37.5.
- .2 Sealing compound: to CAN/CGSB-37.29, rubber asphalt type.
- .3 Sealants: Caulking - see Section 07 92 00 - Joint Sealants.

2.7 WALKWAYS

- .1 Walkways to consist of one additional ply of cap sheet membrane. Colour to be different from field membrane as selected by Consultant.

2.8 CARPENTRY

- .1 Refer to Section 06 10 00 - Rough Carpentry.

PART 3 – EXECUTION

3.1 WORKMANSHIP

- .1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual and Ontario Roofing Association Manual, particularly for fire safety precautions.
- .2 Do priming for roofing in accordance with manufacturer's instructions.
- .3 The interface of the walls and roof steel deck assemblies will be fitted with durable rigid material plywood providing connection point for continuity of air barrier at roof chute enclosures.
- .4 Assembly, component and material connections will be made in consideration of appropriate design loads.

3.2 EXAMINATION OF ROOF DECKS

- .1 Inspect with Consultant deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.
- .2 Prior to beginning of work ensure:
 - .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
 - .2 Curbs have been built.
 - .3 Roof drains have been installed at proper elevations relative to finished roof surface.

.4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.

.3 Do not install roofing materials during rain or snowfall.

3.3 PROTECTION

.1 Cover walls, walks and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of Work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.

.5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Consultant.

.6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.

.7 Metal connectors and decking will be treated with rust proofing or galvanization.

3.4 VAPOUR BARRIER

.1 Apply self adhering vapour barrier membrane to primed wood, steel and concrete surfaces as per manufacturer's instructions.

3.5 INSULATION

.1 Installation of Insulation

.1 Adhere insulation by using specified adhesive in continuous strips spaced as per CSA calculation for Wind Uplift.

.2 Place boards in parallel rows with ends staggered, and in firm contact with one another.

.3 Cut end boards to suit.

.4 [Lift boards at 10 square metre intervals and record adhesive pattern and adhesive for proper reaction and foaming. Photograph and locate on plan for discussion with roof consultant](#)

.2 Tapered insulation application:

.1 Install tapered insulation as top insulation layer, in accordance with shop drawings. Stagger joints between layers 150 mm minimum.

3.6 BITUMINOUS BOARD

.1 Installation of Bituminous Boards:

.1 Adhere bituminous boards by using specified adhesive in continuous strips spaced as per CSA calculation for Wind Uplift.

- .2 Place boards in parallel rows with ends staggered, and in firm contact with one another.
- .3 Cut end boards to suit.

3.7 EXPOSED MEMBRANE ROOFING APPLICATION

- .1 Base sheet application:
 - .1 Starting at low point on roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
 - .2 Unroll and torch base sheet onto bituminous board taking care not to burn membrane or its reinforcement.
 - .3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.
 - .4 Application to be free of blisters, fishmouths and wrinkles.
 - .5 Do membrane application in accordance with manufacturer's recommendations.
- .2 Cap sheet application:
 - .1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.
 - .2 Unroll and torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.
 - .3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.
 - .4 Application to be free of blisters, fishmouths and wrinkles.
 - .5 Do membrane application in accordance with manufacturer's recommendations.
- .3 Flashings:
 - .1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.
 - .2 Refer to manufacturer's instructions for sequence and installation requirements specific to self adhesive or weldable base sheet on flashings and parapets.
 - .3 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal by torch welding.
 - .4 Lap flashing cap sheet to membrane cap sheet 250 mm minimum and torch weld.
 - .5 Provide 75 mm minimum side lap and seal.
 - .6 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.
 - .7 Do work in accordance with manufacturer's recommendations Section 07 62 00 - Sheet Metal Flashing and Trim.
- .6 Roof penetrations:
 - .1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details.

3.8 WALKWAYS

- .1 Install contrast colour walkway membrane in accordance with manufacturer's instructions and as indicated.
 - .1 Apply primer to cap sheet membrane and torch apply, ensuring selvage edge is removed.

3.9 FIELD QUALITY CONTROL

- .1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Consultant.
- .2 Costs of tests will be paid by Owner.

3.10 CLEANING

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by work of this section.

END OF SECTION

PART 1 - GENERAL

<u>1.1 Related Sections</u>	.1	Section 01 33 00 - Submittal Procedures.
	.2	Section 04 21 13 – Brick Masonry
	.3	Section 06 10 00 - Rough Carpentry
	.4	Section 07 21 29.03 – Sprayed Insulation Polyurethane Foam
	.5	Section 07 27 00 – Air Barriers
	.3	Section 07 52 00 - Modified Bituminous Membrane Roofing
<u>1.2 References</u>	.1	The Aluminum Association Inc. (AA)
	.1	The Aluminum Sheet Metal Work in Building Construction-2000
	.2	AA DAF45-97, Designation System for Aluminum Finishes.
	.2	American Society for Testing and Materials (ASTM International)
	.3	Canadian Roofing Contractors Association (CRCA)
	.1	Roofing Specifications Manual-Current Version.
	.4	Canadian Standards Association (CSA International)
	.1	CSA A123.3, Asphalt Saturated Organic Roofing Felt.
	.2	CSA B111-1974, Wire Nails, Spikes and Staples.
<u>1.3 Samples</u>	.1	Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
	.2	Submit duplicate 50 x 50 mm samples of each type of sheet metal material, colour and finish.
<u>1.4 Waste Management and Disposal</u>	2	Remove from site and dispose of all packaging materials at appropriate recycling facilities.
	.3	Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
	.4	Place materials defined as hazardous or toxic in designated containers.
	.5	Ensure emptied containers are sealed and stored safely for disposal away from children.
	.6	Divert unused metal materials from landfill to metal recycling facility as approved by Consultant.
	.7	Unused paint and sealant material must be disposed of at an official hazardous material collections site as approved by Consultant.
	.8	Unused paint and sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

- .9 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 Prefinished Steel Sheet

- .1 Prefinished steel with factory applied silicone modified polyester.
 - .1 Class F1S.
 - .2 Colour from standard colour range. Allow for a maximum of three (3) separate colours throughout.
 - .3 Specular gloss: 30 units +/- 5 in accordance with ASTM D 523.
 - .4 Coating thickness: not less than 25 micrometres.
 - .5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D 822 as follows:
 - .1 Outdoor exposure period 1000 hours.
 - .2 Humidity resistance exposure period 1000 hours.

2.3 Accessories

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Plastic cement: to CAN/CGSB 37.5.
- .3 Underlay for metal flashing self-adhesive membrane composed of SBS modified bitumen and a polyethylene woven complex c/w primer.
 - .1 Acceptable products: Sopraseal stick 1100 by Soprema or Blueskin SA by Bakor.
- .4 Sealants: as per Section 07 92 00.
- .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, ring thread 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.

2.4 Fabrication

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details and as indicated.
- .2 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.
- .3 Hem exposed edges on underside 12 mm. Mitre and seal corners with sealant.
- .4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .5 Apply isolation coating to metal surfaces to be embedded in concrete

or mortar.

2.5 Metal Flashings

- .1 Form flashings, copings and fascia's noted **MF** to profiles indicated of 26 gauge, 0.457mm thick prefinished galvanized steel.
Form wide fascia capping noted as **CP** at horizontal line of Gym roof level to extent of East (Vertical runs at Lines 4 & 8) and West (Vertical runs at Lines 8 & 4) Gym roof edge with 24 gauge, .660mm thick prefinished galvanized steel.
 - .1 Prefinished steel for parapet caps, window sills and upstand noted as **MF** on drawings.
 - .1 **MF-1 & CP:** Ideal Roofing 10,000 Series Kynar, to match ID 8282 Black and ID2624 Bright Silver by locations noted on drawings and as per Section 07 46 13, Pre-Formed Metal Cladding/ Siding.

2.6 Reglets and Cap Flashings

- .1 Form recessed reglets sheet metal to be built-in concrete masonry work for base flashings as detailed in accordance with CRCA FL series details. Provide slotted fixing holes and steel/plastic washer fasteners. Cover face and ends with plastic tape.

PART 3 - EXECUTION

3.1 Installation

- .1 Install sheet metal work in accordance with CRCA FL series details, and 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 Counter flash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips, as detailed.
- .5 Lock end joints and caulk with sealant.
- .6 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.
- .7 Caulk flashing at reglet with sealant.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED
REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 45 00 - Quality Control
- .3 Section 01 56 00 - Temporary Barriers and Enclosures
- .4 Section 01 71 00 - Examination and Preparation
- .5 Section 01 74 11 - Cleaning
- .6 Section 01 78 00 - Closeout Submittals
- .7 Section 05 12 00 - Structural Steel
- .8 Section 07 84 00 - Fire Stopping

1.2 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .2 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN-ULC-S101-04, Standard Methods of fire Endurance Tests of Building Construction and Materials.
 - .2 CAN-ULC-S102-03, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND
INFORMATIONAL
SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets.
- .3 Samples: submit duplicate 300 x 300 mm size sample of exposed fireproofing for approval of texture and colour.
- .4 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Test Reports:
 - .1 Submit product data including certified copies of test reports verifying fireproofing applied to substrate as constructed on project will meet or exceed requirements of Specification.
 - .2 Submit test results in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
 - .3 For assemblies not tested and rated, submit proposals based on related designs using accepted fireproofing design criteria.
 - .2 Certificates: submit certificates signed by manufacturer

certifying that materials comply with specified performance characteristics and physical properties.

.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

.4 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company and installer specializing in sprayed-on fireproofing with 5 years documented experience and approved by manufacturer.
- .2 Site Meetings:
 - .1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations, with contractor's representative to:
 - .1 Verify Project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver packaged materials in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.
- .2 Storage and Protection:
 - .1 Store materials indoors in dry location.
 - .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
 - .3 Damaged or opened containers will be rejected.
 - .4 Packaging to indicate shelf-life and materials to be applied prior to expiration of shelf-life.
 - .5 Provide temporary enclosures to prevent spray from contaminating air beyond application area.
 - .6 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of fireproofing materials.
- .3 Waste Management and Disposal:

	.1	Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
<u>1.6 AMBIENT CONDITIONS</u>	.1	At temperatures less than 5 degrees C, ensure that 5 degrees C air and substrate temperature is maintained during and for 24 hours after application. Ensure that natural ventilation to properly dry the fireproofing during and subsequent to its application is provided. In enclosed areas lacking openings for natural ventilation, ensure that interior air is circulated and exhausted to the outside.
	.2	Maintain relative humidity within limits recommended fireproofing manufacturer.
	.3	Ensure that natural ventilation to properly dry fireproofing during and subsequent to its application is provided.
	.4	In enclosed areas lacking openings for natural ventilation, provide minimum of 4 air exchanges per hour by forced air circulation.
<u>PART 2 - PRODUCTS</u>		
<u>2.1 MATERIALS</u>	.1	Sprayed fireproofing: ULC certified cementitious or asbestos-free mineral fibre fireproofing qualified for use in ULC Designs specified and fungus resistant for 28 days.
	.2	Curing compound: type recommended by fireproofing manufacturer, qualified for use in ULC Designs specified.
	.3	Sealer: type recommended by fireproofing manufacturer, qualified for use in ULC Design specified.
	.1	Colour: TBD.
	.4	Fireproofing: minimum dry density and cohesion/adhesion properties as follows: .1 Fireproofing for structural components concealed above ceiling, or within wall, chase, or furred space per ULC Design No. F818 to provide one hour rating. .2 Ensure spray-applied fireproofing: does not crack, spall or delaminate under downward deflection conditions over 3 m clear span. .3 Minimum compressive strength: 48 kPa. .4 Spray-Applied fireproofing material: not contribute to corrosion of test panels. .5 Dust removal: not exceed 0.25 gram per square meter.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

- .1 Substrate: free of material, which would impair bond.
- .2 Verify that painted substrates are compatible and have suitable bonding characteristics to receive fireproofing.
- .3 Remove incompatible materials.
- .4 Ensure that items required to penetrate fireproofing are placed before installation of fireproofing.
- .5 Ensure that ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is completed.

3.3 APPLICATION

- .1 Apply bonding adhesive or primer to substrate if recommended by manufacturer.
- .2 Apply fireproofing to correspond with tested assemblies, or acceptable calculation procedures to provide following fire resistance ratings.

<u>Rating</u>	<u>Location</u>	<u>Rating</u>	<u>ULC</u>
	Ground Floor Columns supporting 2 nd Floor	1 HR	F818
	Columns supporting roof	N/R	-
	Floor decks	1 HR	F818
	Floor supports	1 HR	F818
	Roof decks	N/R	-
	Roof supports	N/R	-

- .3 Apply fireproofing over substrate, building up to required thickness to cover substrate with monolithic blanket of uniform density and texture.

- .4 Apply fireproofing directly to open web joists without use of expanded lath.
- .5 Steel beams which are W410 or deeper are to be addressed in one of the following manners unless shown on drawings as being clad with drywall:
 - .1 No primer paint on the web.
 - .2 Special primer approved for use with fire protection, or:
 - .3 Metal lath affixed to the web to hold fire protection.
- .6 Tamp smooth, surfaces visible in finished work.
- .7 Apply curing compound to surface of cementitious fireproofing as required by manufacturer.
- .8 Apply sealer to surface of mineral fibre fireproofing as required by manufacturer in ceiling plenums and as indicated.

3.4 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions. At a minimum allow for site visit to occur on day one of installation at 30%, 60% and 100% completion.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.5 PATCHING

- .1 Patch damage to fireproofing caused by testing or by other trades before fireproofing is concealed, or if exposed, before final inspection.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Clean surfaces not indicated to receive fireproofing of sprayed material within 24 hours period after application.
- .3 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 The work of this Section includes all material, equipment, tools, and labour required to supply and install fire stopping materials to maintain noted fire separations.
- .2 Fire stopping of mechanical and electrical service penetrations are the responsibility of the mechanical and electrical trades. Mechanical, plumbing, fire protection, and electrical shall each be responsible for fire stopping their service penetrations. Refer to mechanical and electrical specifications for additional requirements.

1.2 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-In-Place Concrete
- .2 Section 04 22 00 - Concrete Unit Masonry
- .3 Section 03 45 00 – Architectural Precast Concrete
- .4 Section 05 41 00 - Structural Metal Stud Framing
- .5 Section 07 21 13 - Board Insulation
- .6 Section 07 21 16 - Blanket Insulation
- .7 Section 07 92 00 - Joint Sealants
- .8 Section 08 44 13 - Glazed Aluminum Curtain Walls
- .9 Section 09 21 16 - Gypsum Board Assemblies
- .10 Section 09 22 16 - Non-structural Metal Framing
- .11 Division 22
- .12 Division 23
- .13 Division 26
- .14 Division 27

1.3 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .2 Test Requirements: CAN/ULC-S115-11, "Standard Method of Fire Tests of Through Penetration Fire Stops".
- .3 Underwriters Laboratories of Canada (ULC) of Scarborough runs CAN/ULC-S115-11 under their designation of ULC-S115-11 and publishes the results in their "FIRE RESISTANCE RATINGS DIRECTORY" that is updated annually.
- .4 Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually. UL tests that meet the requirements of ULC-S115-M are given a cUL listing and are published by UL in their "Products Certified for Canada (cUL) Directory".

Omega Point Laboratories runs ASTM E-814 and publishes the results annually in their "Omega Point Laboratories Directory"

- .5 Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems". These test requirements provide more guidelines for testing moving joints than that given in CAN4-S115-M. UL tests that meet the requirements of ULC-S115-M are given a cUL listing and are published by UL in their "Products Certified for Canada (cUL) Directory"
- .6 Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Fire Stops."
- .7 Test Requirements: ASTM E 2307, "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus"
- .8 International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- .9 CAN/ULC-S102-M, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .10 ASTM D6904, "Standard Practice for Resistance to Wind Driven Rain for Exterior Coatings Applied on Masonry"
- .11 ASTM C 679, "Standard Test Method for Tack-Free Time of Elastomeric Sealants"
- .12 All major building codes: NBC, OBC
- .13 NFPA 101 - Life Safety Code
- .14 Canadian Electrical Code

1.4 DEFINITIONS

- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings. Fire stop material also refers to assemblies intended to close off openings and gaps in the floor slabs and between wall assemblies and the edges of floor slabs to maintain fire separations between floor levels.

- .2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.
- .4 Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.
 - .1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.5 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets.
- .3 Shop Drawings:
 - .1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.
 - .2 Construction details should accurately reflect actual job conditions.
- .4 Samples:
 - .1 Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
- .2 Submit certified test reports from approved

independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.

- .3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .4 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
- .5 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.
- .6 Manufacturer's engineering judgment identification number and drawing details when no ULC or cUL system is available for an application. Engineered judgment must include both project name and contractor's name who will install firestop system as described in drawing.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company specializing in fire stopping installations with 5 years documented experience approved by manufacturer. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary training to install manufacture's products per specified requirements.
 - .2 A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.
 - .3 The work is to be installed by a contractor with at least one of the following qualifications:
 - FM 4991 Approved Contractor
 - UL Approved Contractor
 - Product Manufacturer's Accredited Fire Stop Specialty Contractor
- .2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Consultant to:
 - .1 Verify project requirements.

- .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
 - .3 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
 - .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.
 - .4 Firestop System installation must meet requirements of CAN/ULC-S115-11 or UL 2079 tested assemblies that provide a fire rating as shown in Section 2.03 Clauses 18, 19 & 20 below.
 - .5 Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
 - .6 For those firestop applications that exist for which no ULC or cUL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar ULC or cUL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council
- 1.7 DELIVERY,
STORAGE AND
HANDLING
- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance w.th Section 01 61 00 - Common Product Requirements
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC or cUL markings.
 - .2 Storage and Protection:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective, damaged or expired materials with

- new.
 - .3 Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- .1 Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- .2 Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- .3 Firestopping Materials are either "cast-in-place" (integral with concrete placement) or "post installed." Provide cast-in-place firestop devices prior to concrete placement.
- .4 Provide a round fire-rated cable management device whenever cables penetrate fire rated walls, where frequent cable changes and additions may occur. The fire-rated cable management device shall consist of a corrugated steel tube with zinc coating, contain an inner plastic housing, intumescent material rings, and inner fabric smoke seal membrane. The length of the sleeve shall be 315mm. The fire-rated cable management device shall contain integrated intumescent firestop wrap strip materials sufficient to maintain the hourly rating of the barrier being penetrated
- .5 The fire-rated cable management device shall contain a smoke seal fabric membrane or intumescent firestop plugs sufficient to achieve the L-Rating requirements of the barrier type. Install device per the manufacturer's published installation instructions.
- .6 Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with

CAN/ULC-S115-11

- .1 F-Rating: Not less than the fire-resistance rating of the wall construction being penetrated.
- .7 Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with CAN/ULC-S115-11.
 - .1 F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
 - .2 T-Rating: when penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
- .8 Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
 - .1 L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.
- .9 Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of 0 as determined by ASTM G21.
- .10 Rain and water resistance: provide perimeter joint sealant tested in accordance with ASTM D 6904 with less than 1 hour tack free time as tested in accordance with ASTM C 679.
- .10 Fire-resistance rating of installed fire stopping assembly in accordance with NBC and OBC.
- .11 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .12 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .13 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.
- .14 Sealants for vertical joints: non-sagging.

2.2 MATERIALS

- .1 Subject to compliance with through penetration firestop systems and joint systems listed in the U.L.C Fire Resistance Directory – Volume III or UL Products Certified for Canada (cUL) Directory
- .2 Use only firestop products that have been ULC or cUL tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- .3 For penetrations through a Fire Separation wall provide a firestop system with a "F" Rating as determined by ULC or cUL as indicated below:

Fire Resistance Rating of Separation	Required ULC or cUL "F" Rating of Firestopping Assembly
30 minutes	20 minutes
45 minutes	45 minutes
1 hour	45 minutes
1.5 hours	1 hour
2 hours	1.5 hours
3 hours	2 hours
4 hours	3 hours

For combustible pipe penetrations through a Fire Separation provide a firestop system with a "F" Rating as determined by ULC or cUL which is equal to the fire resistance rating of the construction being penetrated.

- .4 For penetrations through a Fire Wall or horizontal Fire Separation provide a firestop system with a "FT" Rating as determined by ULC or cUL which is equal to the fire resistance rating of the construction being penetrated.
- .5 Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction joint assembly.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
 - .1 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 without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.
- .2 Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
 - .1 Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
 - .2 Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of ULC or cUL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
 - .3 Protect materials from damage on surfaces subjected to traffic.
- .3 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.
- .4 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .5 Tool or trowel exposed surfaces to neat finish.
- .6 Remove excess compound promptly as work progresses and upon completion.
- .7 Regulatory Requirements: Install firestop materials in accordance with ULC Fire Resistance Directory or UL Products Certified for Canada (cUL) Directory or Omega Point Laboratories Directory.

3.4 SEQUENCES OF OPERATION

- .1 Proceed with installation only when submittals have been reviewed by Consultant.

- .2 Install floor fire stopping before interior partition erections.

- .3 Mechanical pipe insulation: certified fire stop system component.

- .1 Ensure pipe insulation installation precedes fire stopping.

3.5 FIELD QUALITY CONTROL

- .1 Inspections: notify Authority Having Jurisdiction and Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
- .2 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.7 SCHEDULE

- .1 Fire stop and smoke seal at:
 - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
 - .2 Edge of floor slabs at curtain wall and window wall assemblies by-passing edge of floor slab.
 - .3 Top of fire-resistance rated masonry and gypsum board partitions.
 - .4 Intersection of fire-resistance rated masonry and gypsum board partitions.

- .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
- .6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
- .7 Openings and sleeves installed for future use through fire separations.
- .8 Around mechanical and electrical assemblies penetrating fire separations.
- .9 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.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION
INCLUDES

- .1 Materials, preparation and application for caulking and sealants.
- .2 Text to complete other various Sections containing sealant or caulking specifications.

1.2 RELATED
SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 01 45 00 - Quality Control.
- .4 Section 01 61 00 - Common Product Requirements.
- .5 Section 04 05 00 - Common Work Results for Masonry
- .6 Section 07 26 00 - Vapour Retarders
- .7 Section 07 27 00 - Air Barriers
- .8 Section 07 52 00 - Modified Bituminous Membrane Roofing
- .9 Section 07 62 00 - Sheet Metal Flashing and Trim
- .10 Section 08 11 00 - Metal Doors and Frames
- .11 Section 08 11 16 - Aluminum Doors and Frames
- .12 Section 08 44 13 - Glazed Aluminum Curtain Walls
- .13 Section 08 80 50 - Glazing
- .14 Section 09 21 16 - Gypsum Board Assemblies
- .15 Section 09 22 16 - Non-structural Metal Framing

1.3 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C 919, Standard Practice for Use of Sealants in Acoustical Applications.
- .2 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .3 General Services Administration (GSA) - Federal Specifications (FS)
 - .1 FS-SS-S-200-E(2), Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .5 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.4 SUBMITTALS

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

Submittal Procedures.

- .2 Manufacturer's product to describe.
 - .1 Caulking compound.
 - .2 Primers.
 - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- .3 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Submit duplicate samples of each type of material and colour.
- .5 Cured samples of exposed sealants for each color where required to match adjacent material.
- .6 Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Instructions to include installation instructions for each product used.

1.5 QUALITY
ASSURANCE/MOCK-UP

- .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
- .2 Construct mock-up to show location, size, shape and depth of joint s complete with back-up material, primer, caulking and sealant.
- .3 Mock-up will be used:
 - .1 To judge workmanship, substrate preparation, operation of equipment and material application.
- .4 Locate where directed.
- .5 Allow 24 hours for inspection of mock-up by Consultant before proceeding with sealant work.
- .6 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-up may remain as part of finished Work.

1.6 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.

1.7 WASTE
MANAGEMENT AND
DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .5 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
- .6 Divert unused joint sealing material from landfill to official hazardous material collections site approved by Consultant.
- .7 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.
- .8 Fold up metal banding, flatten, and place in designated area for recycling.

1.8 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.

1.9 ENVIRONMENTAL

- .1 Comply with requirements of Workplace Hazardous Materials

REQUIREMENTS

Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.

- .2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .3 Ventilate area of work by use of approved portable supply and exhaust fans.

PART 2 – PRODUCTS

2.1 SEALANT MATERIALS

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

2.2 SEALANT MATERIAL DESIGNATIONS

- .1 Type 1: Silicones One Part.
 - .1 To CAN/CGSB-19.13, Type MCG-2-25-A-L.
 - .1 Acceptable material: Spectrum 2 by Tremco
- .2 Type 2: Silicone Resistant One Part Mildew resistant:
 - .1 Acceptable material: Tremsil 200 by Tremco
- .3 Type 3: Acrylic Latex One Part.
 - .1 To CAN/CGSB-19.17.
 - .2 Acceptable material: Tremflex 834 by Tremco
- .4 Type 4: Acoustical Sealant.
 - .1 To ASTM C 919.
 - .2 Acceptable material: Acoustical Sealant by Tremco
- .5 Preformed Compressible and Non-Compressible back-up materials.
 - .1 Polyethylene, Urethane, Neoprene or Vinyl Foam.
 - .1 Extruded open 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/m³ 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 (i.e. brick, block, precast masonry): Sealant type: 1.
- .2 Expansion and control joints in exterior surfaces of poured-in-place concrete walls: Sealant type: 1.
- .3 Expansion and control joints in exterior surfaces of precast panels: Sealant type: 1.
- .4 Control and expansion joints in exterior surfaces of unit masonry walls: Sealant type: 1.
- .5 Coping joints and coping-to facade joints: Sealant type: 1
- .6 Exterior joints in horizontal wearing surfaces (as itemized): Sealant type: 1.
- .7 Seal interior perimeters of exterior openings as detailed on drawings: Sealant type: 1.
- .8 Control and expansion joints on the interior of exterior poured-in place concrete walls: Sealant type: 1.
- .9 Control and expansion joints on the interior of exterior surfaces of unit masonry walls: Sealant type: 1.
- .10 Interior control and expansion joints in floor surfaces: Sealant type: 1.
- .11 Perimeters of interior frames, as detailed and itemized: Sealant type: 1.
- .12 Interior masonry vertical control joints (block-to-block, block-to-concrete, and intersecting masonry walls): Sealant type: 1.

- .13 Joints at tops of non-load bearing, non-rated masonry walls at the underside of poured concrete: Sealant type: 4
- .14 Perimeter of bath fixtures (e.g., sinks, tubs, urinals, stools, water closets, basins, vanities): Sealant type:2.
- .15 Exposed interior control joints in drywall: Sealant type: 3.
- .16 Perimeter of all acoustically rated partitions and around penetrations through acoustically rated partitions: Sealant Type 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 TESTING

- .1 Perform an adhesive test of proposed joint sealant for all exterior applications to confirm surface prep, priming and sealant performance to manufacturer's specifications. Submit written test results to Consultant prior to proceeding with project work.

- 3.4 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.
- 3.5 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.
- 3.6 MIXING
- .1 Mix materials in strict accordance with sealant manufacturer's instructions.
- 3.7 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 primer to joints prior to caulking application.
 - .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

Door No	Room Name	Frame Type	Throat Dim	Finish	Details	Door Type	Width	Height	Finish	Glass	Label Min.	Hardware Heading	Remarks
GROUND FLOOR													
101.1	Vestibule	–	–	–	–	ALD-1	2 x 965	2440					Aluminum Curtain Wall Framing / Insulated aluminum door / Auto Operator
101.2	Vestibule	–	–	–	–	ALD-1	2 x 965	2440					Interior Aluminum Curtain Wall Framing / Auto Operator
102.1	Youth Lobby	PSF-2	241	PT	D1	HMD-1	2 x 965	2150	PT				
102.2	Youth Lobby	–	–	–	–	ALD-1	2 x 965	2440					Interior Aluminum Curtain Wall Framing
102.3	Youth Lobby	PSF-1	241	PT	D1	HMD-1	965	2150	PT				
103.1	Theatre	PSF-1	118	PT	D2	HMD-1	965	2150	PT				
103.2	Theatre	PSF-1	118	PT	D2	HMD-1	610	2032	PT				
104.1	Universal Washroom	PSF-1	118	PT	D2	HMD-1	965	2150	PT				Auto Operator
105.1	Universal Washroom	PSF-1	118	PT	D2	HMD-1	965	2150	PT				Auto Operator
106.1	Janitor	PSF-1	118	PT	D2	HMD-1	915	2150	PT				
107.1	Gym	–	–	–	–	ALD-1	2 x 965	2440					Interior Aluminum Curtain Wall Framing
107.2	Gym	–	–	–	–	ALD-1	2 x 965	2440					Aluminum Curtain Wall Framing / Insulated aluminum door
108.1	Youth Activity Space	–	–	–	–	ALD-1	965	2440					Aluminum Curtain Wall Framing / Insulated aluminum door
108.2	Youth Activity Space	PSF-2	118	PT	D2	HMD-2	2 x 915	2150	PT	GL-1			
110.1	Vestibule to Women's washroom	PSF-1	229	PT	D2	HMD-1	965	2150	PT				
111.1	Women's Washroom	PSF-1	118	PT	D2	HMD-1	965	2150	PT				
112.1	Vestibule to Men's Washroom	PSF-1	229	PT	D2	HMD-1	965	2150	PT				
113.1	Men's washroom	PSF-1	118	PT	D2	HMD-1	965	2150	PT				
114.1	Corridor	PSF-2	118	PT	D2	HMD-2	2 x 915	2150	PT	GL-1			

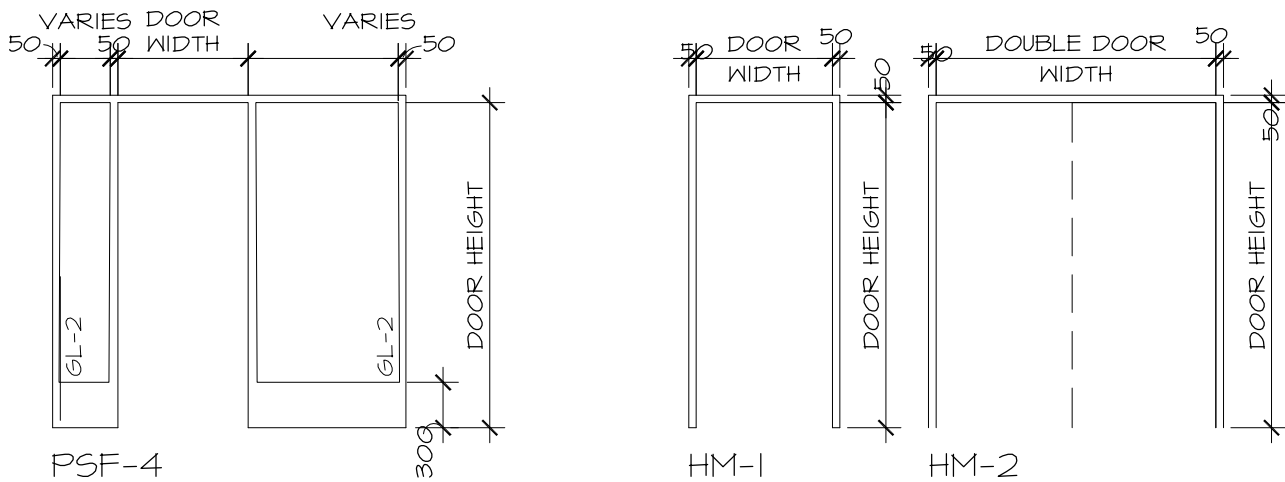
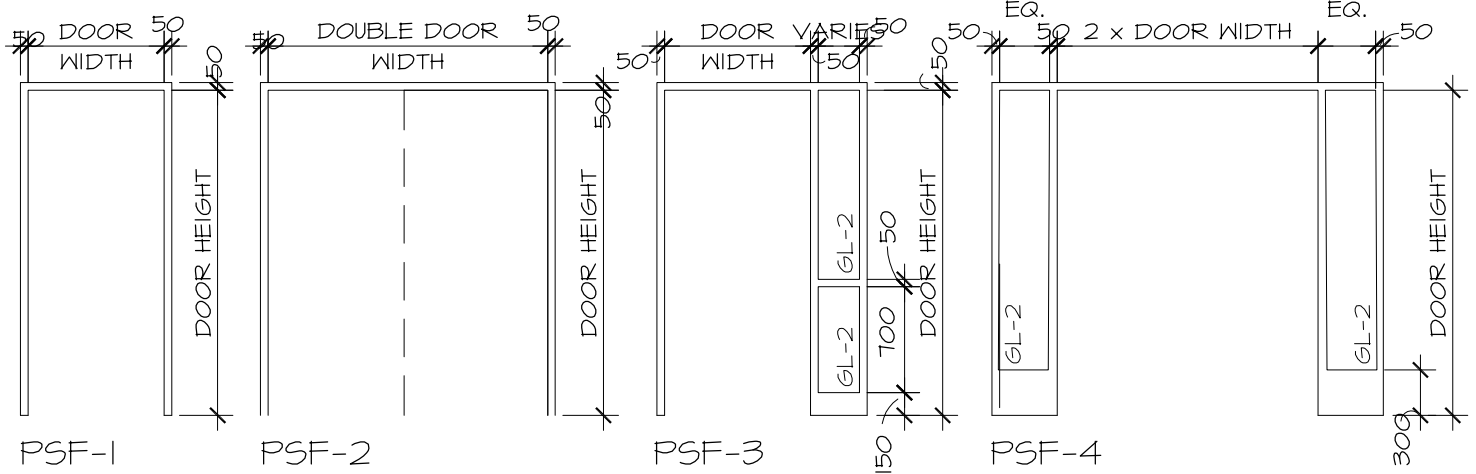
Door No	Room Name	Frame Type	Throat Dim	Finish	Details	Door Type	Width	Height	Finish	Glass	Label Min.	Hardware Heading			Remarks
115.1	Café	PSF-2	176	PT	D2	HMD-2	2 x 965	2150	PT	GL-1					
115.2	Café	–	–	–	–	ALD-1	2 x 1220	2440							Aluminum Curtain Wall Framing / Insulated aluminum door / Auto Operator
115.3	Café	PSF-1	241	PT	D1	HMD-1	965	2150	PT						
115.4	Café	–	–	PT	HD-1	WD-1	2 x 3600	2150	PT						Double Sliding Barn Door
116.1	Exit Vestibule	PSF-2	216	PT	D3	HMD-1	2 x 965	2150	PT		45 min.				Interior Door
116.2	Exit Vestibule	HM-2	381	PT	D4	HMD-1	2 x 965	2440	PT						Exterior Door
117.1	Kitchen	PSF-1	176	PT	D2	HMD-3	965	2150	PT	GL-1					
117.2	Kitchen	PSF-1	176	PT	D2	HMD-3	965	2150	PT	GL-1					
117.3	Kitchen	HM-1	381	PT	D4	HMD-1	965	2440	PT						Exterior Door
117.4	Kitchen	PSF-1	176	PT	D2	HMD-3	965	2150	PT	GL-1					
118.1	Pantry	PSF-1	118	PT	D2	HMD-1	915	2032	PT						
119.1	Exit Vestibule	–	–	–	–	ALD-1	2 x 965	2440							Aluminum Curtain Wall Framing / Insulated aluminum door / Auto Operator
119.2	Exit Vestibule	PSF-2	216	PT	D3	HMD-1	2 x 965	2150	PT		45 min.				Interior Door
120.1	Storage	HM-1	118	PT	D2	HMD-1	915	2032	PT						
121.1	Storage	PSF-1	118	PT	D2	HMD-1	915	2032	PT						
122.1	Volunteer Room	PSF-1	440	PT	D5	HMD-1	965	2150	PT						EXISTING WALL
123.1	Storage	PSF-2	118	PT	D2	HMD-1	2 x 965	2150	PT						
124.1	Universal Washroom	PSF-1	440	PT	D5	HMD-1	965	2150	PT						Existing Wall/Auto Operator
125.1	Washroom	PSF-1	118	PT	D2	HMD-1	965	2032	PT						

Door No	Room Name	Frame Type	Throat Dim	Finish	Details	Door Type	Width	Height	Finish	Glass	Label Min.	Hardware Heading			Remarks
SECOND FLOOR															
201.1	Corridor	PSF-1	216	PT	D3	HMD-3	965	2032	PT	GL-1	45 min.				
202.1	Youth Administration	PSF-3	118	PT	D2	HMD-4	965	2032	PT	GL-1					Glazed sidelight Refer to window schedule
203.1	Youth Room 1	PSF-3	118	PT	D2	HMD-4	965	2032	PT	GL-1					Glazed sidelight Refer to window schedule
204.1	Youth Room 2	PSF-3	118	PT	D2	HMD-4	965	2032	PT	GL-1					Glazed sidelight Refer to window schedule
205.1	Youth Room 3	PSF-3	118	PT	D2	HMD-4	965	2032	PT	GL-1					Glazed sidelight Refer to window schedule
206.1	Storage	PSF-1	118	PT	D2	HMD-1	965	2032	PT						
208.1	Vestibule to Women's Washroom	PSF-1	118	PT	D2	HMD-1	965	2032	PT						
209.1	Women's Washroom	PSF-1	118	PT	D2	HMD-1	965	2032	PT						
210.1	Vestibule to Men's Washroom	PSF-1	118	PT	D2	HMD-1	965	2032	PT						
211.1	Men's Washroom	PSF-1	118	PT	D2	HMD-1	965	2032	PT						
212.1	Multi Purpose Room 2	PSF-4	118	PT	DT	HMD-2	2x965	2150	PT	GL-1					Glazed sidelight Refer to window schedule
212.2	Multi Purpose Room 2	PSF-2	118	PT	D2	HMD-3	2 x 965	2032	PT	GL-1					
214.1	Service Kitchen/Storage	PSF-2	118	PT	D2	HMD-3	2 x 965	2032	PT	GL-1					
214.2	Service Kitchen/Storage	HM-1	118	PT	D2	HMD-1	965	2032	PT						
215.1	Janitor	HM-1	118	PT	D2	HMD-1	915	2032	PT						
216.1	Electrical	HM-1	118	PT	D2	HMD-1	915	2032	PT						
217.1	Reception	PSF-4	118	PT	DT	HMD-2	2x965	2150	PT	GL-1					Glazed sidelight Refer to window schedule
218.1	Document Storage	PSF-1	118	PT	D2	HMD-1	965	2032	PT						
218.2	Document Storage	PSF-1	118	PT	D2	HMD-1	965	2032	PT						
218.3	Document Storage	PSF-1	118	PT	D2	HMD-1	965	2032	PT						

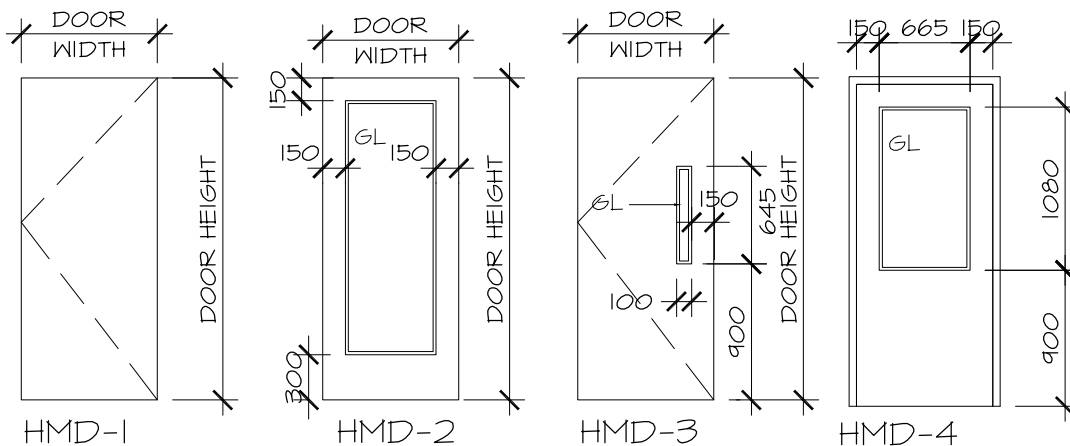
Woodvale Pentacostal Church

Door No	Room Name	Frame Type	Throat Dim	Finish	Details	Door Type	Width	Height	Finish	Glass	Label Min.	Hardware Heading			Remarks
219.1	Conference Room	PSF-1	118	PT	D2	HMD-1	965	2032	PT						
219.2	Conference Room	PSF-3	118	PT	D2	HMD-4	965	2032	PT	GL-2					Glazed sidelight Refer to window schedule. Opaque film applied to glazing
220.1	Church Administration	PSF-5	118	PT	D2	HMD-2	965	2032	PT	GL-1					Glazed sidelight Refer to window schedule
220.2	Church Administration	PSF-2	118	PT	D2	HMD-1	2 x 610	2032	PT						
221.1	IT Room	PSF-1	118	PT	D2	HMD-1	915	2032	PT						
222.1	Storage	PSF-2	241	PT	D1	HMD-1	2 x 965	2032	PT						
223.1	Office	PSF-1	118	PT	D2	HMD-1	915	2032	PT						
224.1	Office	PSF-1	118	PT	D2	HMD-1	915	2032	PT						
225.1	Exec. Pastor	PSF-1	118	PT	D7	WD-1	915	2032	PT						
226.1	Office	PSF-5	118	PT	D2	HMD-2	965	2032	PT	GL-2					Glazed sidelight Refer to window schedule. Opaque film applied to glazing
227.1	Washroom	PSF-1	118	PT	D2	HMD-1	915	2032	PT						
228.1	CL.	PSF-1	118	PT	D2	HMD-1	915	2032	PT						
229.1	Senior Pastor	PSF-3	118	PT	D2	HMD-4	965	2032	PT	GL-2					Glazed sidelight Refer to window schedule
230.1	Office	PSF-1	118	PT	D2	HMD-1	915	2032	PT						
231.1	Office	PSF-1	118	PT	D2	HMD-1	915	2032	PT						

PRESS STEEL FRAME TYPES



DOOR TYPES



PROJECT / LOCATION:
WOODVALE PENTECOSTAL
CHURCH ADDITION
205 Greenbank Rd, Nepean, ON K2H 8K9

Hobin Architecture Incorporated
63 Pamilla Street T: 613-238-7200
Ottawa, ON K1S 3K7 F: 613-235-2005
hobinarc.com E: mail@hobinarc.com

DRAWING NAME:
**DOOR SCHEDULE
FRAME AND
DOOR TYPES**

DATE:
Nov 12, 2021

PROJECT NO.:
1939

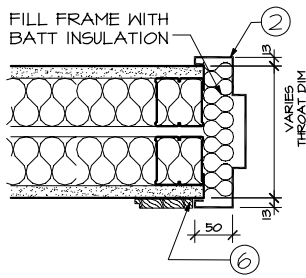
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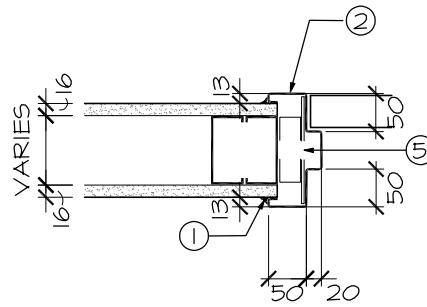
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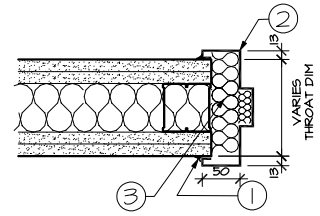
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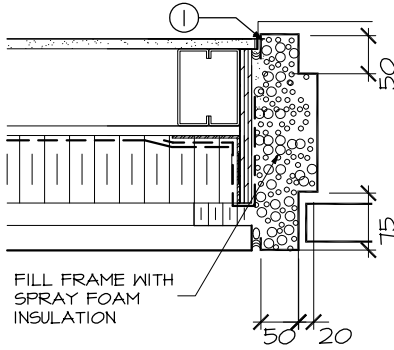
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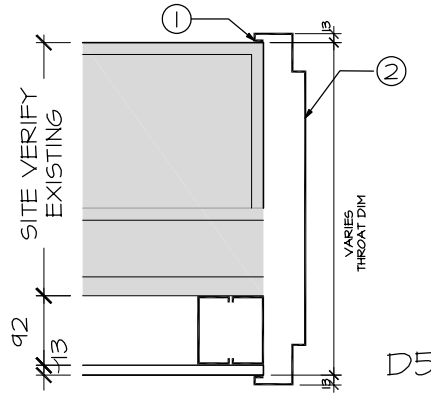
D2



D3



D4



D5

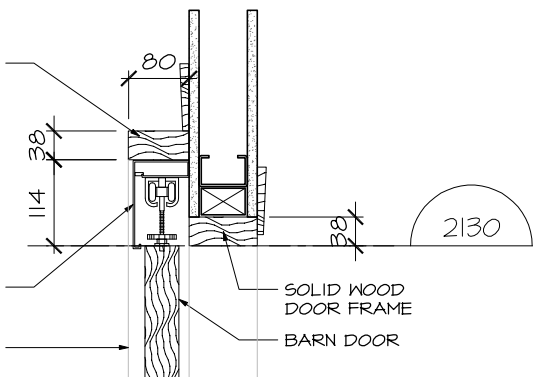
LEGEND

- ① CAULKING BOTH SIDES OF FRAME TO WALL SURFACE
- ② PRESSED STEEL DOOR FRAME TO PROFILE INDICATED
- ③ FILL DOOR FRAME SOLID WITH GROUT
- ④ MASONRY TUBE & SCREW ANCHOR (AT EXIST. MASONRY WALL LOCATIONS)
- ⑤ METAL STUD STRAP ANCHOR
- ⑥ WOOD DOOR CASING. PROFILE AS SELECTED BY DEVELOPER,
- ⑦ EXISTING BUILDING WALL CONSTRUCTION

FRAME TRIM APPLIED TO WALL FACE 80mm PROUD OF WALL TO COVER 74mm TRACK DEPTH

CCSF-493-B TRACK ASSEMBLY

FRAME TRIM APPLIED TO WALL FACE 80mm PROUD OF WALL BEYOND



HD-1
DOOR HEAD



PROJECT / LOCATION:
WOODVALE PENTECOSTAL
CHURCH ADDITION
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DRAWING NAME:
**DOOR SCHEDULE
JAMB DETAILS**

DATE:
Nov 12, 2021

PROJECT NO.:
1939

DRAWN BY:
AM

ASK NO.

SCALE:
N.T.S.

08 00 00.03

PART 1 - GENERAL

1.1 RELATED
SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 07 92 00 - Joint Sealants
- .3 Section 08 71 00 - Door Hardware
- .4 Section 08 80 50 - Glazing
- .5 Section 09 21 16 – Gypsum Board Assemblies
- .6 Section 09 22 16 - Non-structural Metal Framing
- .7 Section 09 91 23 - Interior Painting

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 653/A 653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM A240/A240M, Standard Specification for Chromium and Chromium/Nickel Stainless Steel Plate, sheet, and strip for pressure vessels and general application.
- .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 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W59, Welded Steel Construction (Metal Arc Welding).
- .4 Canadian Steel Door Manufacturers' Association (CSDMA)
 - .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames,
 - .2 CSDMA, 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 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1113, Architectural Coatings.
 - .2 SCAQMD Rule 1168, Adhesives and Sealants Applications.

	.7 Underwriters' Laboratories of Canada (ULC) .1 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering. .2 CAN/ULC-S704, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced. .3 CAN4-S104, Standard Method for Fire Tests of Door Assemblies. .4 CAN4-S105, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.
<u>1.3 SYSTEM DESCRIPTION</u>	.1 Design Requirements: .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35 degrees C to 35 degrees C. .2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span. .3 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 NFPA 252 for ratings specified or indicated. .4 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104, ASTM E 152 or NFPA 252 and listed by nationally recognized agency having factory inspection services.
<u>1.4 SUBMITTALS</u>	.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures. .2 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures. .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada. .2 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed louvred, 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 and reinforcing fire rating finishes. .4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule. .5 Submit test and engineering data, and installation instructions.

- 1.5 DELIVERY,
STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 07 74 21 Construction/Demolition Waste Management and Disposal.

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.
 - .1 G90 Galvanized where noted and specifically in shower areas.
 - .2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A 653M, ZF75.
- 2.2 DOOR CORE MATERIALS
- .1 Stiffened: face sheets, insulated core.
 - .1 Recycled Content: minimum 30 % post-consumer content.
 - .2 Fibre glass: to CAN/ULC-S702, semi-rigid Type 1 density 24 kg/m³.
 - .3 Polyurethane: to CAN/ULC-S704 rigid, modified polyisocyanurate, closed cell board. Density 32 kg/m³.
- 2.3 ADHESIVES
- .1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
 - .2 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. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.
 - .1 All paints applied on site must comply with VOC limits.
- 2.6 ACCESSORIES
- .1 Door silencers: single stud rubber/neoprene type.
 - .2 Exterior 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 Door bottom seal: Refer to Hardware Schedule.
- .5 Metallic paste filler: to manufacturer's standard.
- .6 Fire labels: metal riveted.
- .7 Sealant: Refer to Section 07 92 00.
 - .1 Sealants applied on site must meet VOC limits.
- .8 Glazing: Refer to Door Schedule.
- .9 Make provisions for glazing as indicated and provide necessary glazing stops.
 - .1 Provide removable stainless steel glazing beads for use with glazing tapes and compounds and secured with countersunk stainless steel screws.
 - .2 Design exterior glazing stops to be tamperproof.

2.7 FRAMES

FABRICATION GENERAL

- .1 Fabricate frames in accordance with CSDMA specifications. G90 galvanized for all shower areas and plumbing chase access.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Interior frames: 1.6 mm (16 ga.) welded type construction.
- .4 Exterior frames: 1.6 mm (16 ga.) welded type construction.
- .5 Blank, reinforce, drill and tap frames for mortised, templated hardware, and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
- .6 Protect mortised cutouts with steel guard boxes.
- .7 Prepare frame for door silencers, 3 for single door, 2 at head for double door.
- .8 Manufacturer's nameplates on frames and screens are not permitted.
- .9 Conceal fastenings except where exposed fastenings are

indicated.

- .10 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

2.8 FRAME ANCHORAGE

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

2.9 FRAMES: WELDED TYPE

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

2.10 DOOR FABRICATION GENERAL

- .1 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.
- .2 Interior doors: Insulated hollow steel stiffened construction with fiberglass insulation.
- .3 Fabricate doors with longitudinal edges locked seam. Seams: fill with metallic paste filler and sand to a uniform smooth finish. G90 galvanized for all shower areas and plumbing chase access.

- .4 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.
- .5 Factory prepare doors to receive specified and reviewed shop drawing hardware.
- .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 conformance with CAN4-S104 ASTM E 152 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.
- .9 Manufacturer's nameplates on doors are not permitted.

2.11 HOLLOW STEEL CONSTRUCTION

- .1 Form face sheets for exterior doors from 1.6mm (16 ga.) sheet steel.
- .2 Form face sheets for interior doors from 1.6mm (16 ga.) sheet steel.
- .3 Reinforce doors with vertical stiffeners, securely welded to face sheets at 150 mm on centre maximum.
- .4 Fill voids between stiffeners of insulated doors (IHMD) with polyurethane core.
- .5 Fill voids between stiffeners of interior doors (HMD) with fiberglass.

PART 3 – EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION
GENERAL

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

3.3 FRAME
INSTALLATION

- .1 Set frames plumb, square, level and at correct elevation. Frame installation tolerances to comply with Canadian Steel Door Manufacturer's Association Standard as indicated on Drawings 08 11 00-1, 2 and 3 included as part of this section.
- .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 Provide low expansion foam fill to all exterior door frames. Caulk perimeter of frames between frame and adjacent material.
- .6 Maintain continuity of air barrier and vapour retarder.

3.4 DOOR
INSTALLATION

- .1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 – Door Hardware.
- .2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
 - .1 Hinge side: 3.3 mm.
 - .2 Latch side and head: 3.3 mm.
 - .3 Finished floor, and thresholds: 19 mm.
 - .4 Door clearance tolerances to comply with Canadian Steel Door Manufacturer's Association Standard as indicated on Drawings 08 11 00-1, 2 and 3 included as part of this section.
- .3 Adjust operable parts for correct function.

3.5 FINISH REPAIRS

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

3.6 GLAZING

- .1 Install glazing for doors and frames in accordance with Door Schedule.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 78 00 - Closeout Submittals.
- .3 Section 05 50 00 - Metal Fabrications.
- .4 Section 06 10 00 - Rough Carpentry.
- .5 Section 07 26 00 - Vapor Retarders.
- .6 Section 07 92 00 - Joint Sealing.
- .7 Section 08 44 13 - Glazed Aluminum Curtain Wall
- .8 Section 08 71 00 - Door Hardware - General.
- .9 Section 08 80 50 - Glazing
- .10 Division 26 - Outlet Boxes, Conduit Boxes and Fittings.
- .11 Division 26 - Conduits, Conduit Fastenings and Conduit Fittings.
- .12 Division 26 - Wiring Devices.
- .13 Division 26 - Wire and Box Connectors - 0-1000 V.
- .14 Division 26: Electrical connections for security systems and sensors.

1.2 REFERENCES

- .1 Aluminum Association (AA).
 - .1 DAF 45, Designation System for Aluminum Finishes.
- .2 American Architectural Manufacturers Association (AAMA).
 - .1 AAMA 609, Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.
- .3 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM E 330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .4 Canadian General Standards Board (CGSB).
 - .1 CGSB 1.40, Primer, Structural Steel, Oil Alkyd Type.
 - .2 CAN/CGSB-12.1, Tempered or Laminated Safety Glass.

	.3	CAN/CGSB-12.20, Structural Design of Glass for Buildings.
	.5	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.
	.6	National Fenestration Rating Council, NFRC 100-200, NFRC 200-2001, NFRC 500.
<u>1.3 SYSTEM DESCRIPTION</u>	.1	Design Criteria.
	.1	Design frames and doors in exterior walls to:
	.1	Accommodate expansion and contraction within service temperature range of -35 to 75 degrees C.
	.2	Limit deflection of mullions to maximum 1/175th of clear span when tested to ASTM E 330 under wind load of 1.2 kpa submit certificate of tests performed.
	.3	Movement within system.
	.4	Movement between system and perimeter framing components or substrate.
	.2	Size glass thickness and glass unit dimensions to limits in accordance with CAN/CGSB-12.20.
	.3	Design door system to provide average thermal resistance of:
	.1	Door system (excluding vision glass areas): RSI of 3.8.
	.4	Provide continuous air barrier and vapour retarder through door system. Primarily in line with inside pane of glass and heel bead of glazing compound.
<u>1.4 SUBMITTALS</u>	.1	Product Data:
	.1	Submit manufacturer's printed product literature, specifications and data sheets in accordance with Section 01 33 00 - Submittal Procedures.
	.2	Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's for caulking materials during application and curing.
<u>1.5 SHOP DRAWINGS</u>	.1	Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
	.2	Indicate materials and profiles and provide full-size, scaled details of components for each type of door and frame. Indicate:

	.1 Interior trim and exterior junctions with adjacent construction. .2 Junctions between combination units. .3 Elevations of units. .4 Core thicknesses of components. .5 Type and location of exposed finishes, method of anchorage, number of anchors, supports, reinforcement, and accessories. .6 Location of caulking. .7 Each type of door system including location. .8 Arrangement of hardware and required clearances.
	.3 Submit catalogue details for each type of door and frame illustrating profiles, dimensions and methods of assembly.
1.6 CLOSEOUT SUBMITTALS	.1 Provide maintenance data for cleaning and maintenance of aluminum finishes for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
1.7 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 are required for release of payment for work of this Section. .3 Pre-installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.
1.8 DELIVERY, STORAGE, AND HANDLING	.1 Storage and Protection: .1 Apply temporary protective coating to finished surfaces. Remove coating after erection. Do not use coatings that will become hard to remove or leave residue. .2 Leave protective covering in place until final cleaning of building.
1.9 WASTE MANAGEMENT AND DISPOSAL	.1 Separate and recycle waste materials in accordance with Construction Manager's Construction/Demolition Waste Management And Disposal plan. .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

- .3 Dispose of corrugated cardboard, polystyrene, plastic packaging material in appropriate on-site bin for recycling in accordance with site waste management program.
- .4 Divert used metal cut-offs from landfill by disposal into the on-site metals recycling bin.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Aluminum extrusions: Aluminum Association alloy AA 6063-T5 or T6 anodizing quality.
- .2 Sheet aluminum: Aluminum Association alloy AA 1100 - H14 or AA 5005 - H32 or H34 anodizing quality.
- .3 Steel reinforcement: to CAN/CSA-G40.20/G40.21, grade 300 W.
- .4 Fasteners: stainless steel, finished to match adjacent material.
- .5 Weatherstrip: replaceable mohair backed wool pile.
- .6 Door bumpers: black neoprene.
- .7 Door bottom seal: adjustable door seal of anodized extruded aluminum frame and vinyl weather seal, surface mounted with drip cap, closed ends.
- .8 Isolation coating: alkali resistant bituminous paint.
- .9 Glazing materials: as per Section 08 80 52.
- .10 Sealants: as per Section 07 92 00 colour selected by Consultant.

2.2 ALUMINUM DOORS

- .1 Construct doors of porthole extrusions with minimum wall thickness of 2.4 mm.
- .2 Door stiles nominal 127 mm wide plus or minus 6 mm.
- .3 Top rail nominal 127 mm wide plus or minus 6 mm.
- .4 Bottom rail nominal 165 mm or 254 mm wide plus or minus 6 mm.
- .5 Mid rail nominal 127mm wide plus or minus 6mm where noted on specific doors.

- .6 Reinforce mechanically-joined corners of doors to produce sturdy door unit.
- .7 Glazing stops: interlocking snap-in type for dry glazing. Exterior stops: tamperproof type.
- .8 Provide thermally broken doors for exterior.
- .9 Hardware: as per Hardware Schedule.
- .10 Acceptable Products:
 - .1 Kawneer 1 Insulclad Exterior/500 Interior
 - .2 Alumicor 600A Insuldoor Exterior/600 Interior
 - .3 Alumico 5020 Exterior / 5000 Interior
 - .4 **Provide a certified U value of .70 (i-P) or U=3.97(SI) for all exterior doors as per OBC SB-10**
- .11 Corners:
 - 1. True mortise and tenon joints.
 - 2. Full-width 3/8-inch diameter galvanized steel tie rods secured with locking hex nuts.
- .12 Welding of Joints: Not permitted.
- .13 Mid Rail: (where indicated)
 - 1. Width: 165mm (6-1/2 inches).
 - 2. One-piece extrusion with integral exterior glass stops.
 - 3. Secure to vertical stiles with mortise and tenon joints and 3/8-inch diameter galvanized steel tie rod with locking hex nuts.
- .14 Finish
 - 1. Anodized Aluminum: Smooth finish

2.3 ALUMINUM FRAMES

- .1 Exterior framing to be Curtainwall Framing as per Section 08 44 13 or alternate window framing as specified under Section 08 50 00. All frame construction to incorporate thermally broken details to perimeter of all door and frame openings noted as Frame Type I on drawings.
- .2 Interior framing at vestibules to be aluminum extrusions with minimum wall thickness of 2mm noted as Frame Type II on drawings.
 - .1 Frame members 44mmx 115mm nominal size for flush glazing.
- .2 Acceptable products: to match framing system following

model.

- .1 Kawneer Trifab VG 450
- .2 Alumicor 800 Series
- .3 Alumico 4500 Series

2.4 ALUMINUM FINISHES

- .1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.
 - .1 Clear anodic finish: designation AA-M12C22A41
- .2 Appearance and properties of anodized finishes designated by the Aluminum Association as Architectural Class 1.

2.5 STEEL FINISHES

- .1 Finish steel clips and reinforcing steel with zinc coating to CSA G164.

2.6 FABRICATION

- .1 Doors and framing to be by same manufacturer.
- .2 Fabricate doors and frames to profiles and maximum face sizes as shown. Provide minimum 22 mm bite for insulating glazed units.
- .3 Provide structural steel reinforcement as required.
- .4 Fit joints tightly and secure mechanically.
- .5 Conceal fastenings.
- .6 Mortise, reinforce, drill and tap doors, frames and reinforcements to receive hardware using templates provided under Section 08 71 00 - Door Hardware - General.
- .7 Isolate aluminum from direct contact with dissimilar metals, concrete and masonry.

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 Set frames plumb, square, level at correct elevation in alignment with adjacent work.
- .2 Anchor securely.
- .3 Install doors and hardware in accordance with hardware templates and manufacturer's instructions.

	.4	Adjust operable parts for correct function.
	.5	Make allowances for deflection of structure to ensure that structural loads are not transmitted to frames.
<u>3.3 GLAZING</u>	.1	Glaze aluminum doors and frames in accordance with Section 08 80 50 - Glazing.
<u>3.4 CAULKING</u>	.1	Seal joints to provide weathertight seal at outside and air, vapour seal at inside.
	.2	Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within the aluminum work except where exposed use is permitted by Consultant.
<u>3.5 FIELD QUALITY CONTROL</u>	.1	Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.
	.2	Manufacturer's field services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
	.3	Schedule site visits to review Work at stages listed: .1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins. .2 Twice during progress of Work at 25% and 60% complete. .3 Upon completion of Work, after cleaning is carried out.
	.4	Obtain reports within three days of review and submit.
<u>3.6 CLEANING</u>	.1	Perform cleaning of aluminum components in accordance with AAMA 609.1 - Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.
	.2	Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
	.3	Clean aluminum with damp rag and approved non-abrasive cleaner.
	.4	Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.
	.5	Clean glass and glazing materials with approved non-abrasive

cleaner.

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittals
- .2 Section 01 61 00 – Common Product Requirements
- .3 Section 01 74 11 - Cleaning
- .4 Section 01 77 00 – Closeout Procedures
- .5 Section 04 05 00 – Common Work Results for Masonry
- .6 Section 09 21 16 – Gypsum Board Assemblies
- .7 Section 09 30 13 – Ceramic Tile
- .8 Section 09 65 16 – Resilient Sheet Flooring
- .9 Section 09 65 19 – Resilient Tile Flooring
- .10 Section 09 68 13 – Tile Carpeting

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures. Submit electronically.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for access door components and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Submit catalogue details for each type of door illustrating profiles, dimensions and methods of assembly.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit 1 of each type of hand entry access door, if requested.
 - .4 Submit one 300 x 300 mm corner sample of each type of body entry door.

1.3 CLOSEOUT SUBMITTALS

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

1.4 DELIVERY,

- .1 Deliver, store and handle materials in accordance with Section

STORAGE AND
HANDLING

01 61 00 - Common Product Requirements and with manufacturer's written instructions.

- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect access doors from nicks, scratches, and blemishes.
 - .3 Apply temporary protective coating to finished surfaces. Remove coating after installation.
 - .1 Use coatings in accordance with manufacturer's written instructions that are easily removable.
 - .2 Leave protective coating in place until final cleaning of building.
 - .4 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 ACCESS DOORS

- .1 Sizes: as follows unless indicated:
 - .1 For body entry: 600 x 600 mm minimum.
 - .2 For hand entry: 300 x 300 mm minimum.
- .2 Construction: rounded safety corners, concealed hinges, screwdriver latch, anchor straps, able to open 180 degrees.
- .3 Materials:
 - .1 Tiled, acoustic or carpet surfaces: stainless steel with brushed satin.
 - .2 Other areas: prime coated steel. Finish to match Room Colour or as directed to suit Section 09 91 23 Interior Painting.

2.2 EXCLUSIONS

- .1 Lay-in tile ceilings: use unobtrusive identification locators.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for access door installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate.
- .2 Inform Consultant of unacceptable conditions

immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Installation: locate access doors within view of equipment and ensure equipment is accessible for operating, inspecting, adjusting, servicing without using special tools.

.1 Tiled surfaces: in accordance with Section 09 30 13 - Ceramic Tiling 09 30 15 - Quarry and Paver Tiling.

.2 Install masonry surfaces: in accordance with Section 04 05 00 - Common Work Results for Masonry.

.3 Install gypsum board surfaces: in accordance with Section 09 21 16 - Gypsum Board Assemblies.

3.3 CLEANING

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

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

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

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by access door installation.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 61 00 - Common Product Requirements
- .3 Section 01 78 00 - Closeout Submittals
- .4 Section 05 50 00 - Metal Fabrications
- .5 Section 07 21 13 – Board Insulation
- .6 Section 07 21 19 – Foamed in Place Insulation
- .7 Section 07 27 00 – Air Barriers
- .8 Section 07 92 00 - Joint Sealants
- .9 Section 08 11 16 - Aluminum Doors and Frames
- .10 Section 08 50 00 - Windows
- .11 Section 08 80 50 - Glazing
- .12 Section 09 21 16 – Gypsum Board Assemblies
- .13 Section 09 91 23 - Interior Painting

1.2 REFERENCES

- .1 Aluminum Association (AA)
 - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 American Architectural Manufacturers Association (AAMA)
 - .1 AAMA CW-10, Care and Handling of Architectural Aluminum from Shop to Site.
 - .2 AAMA T1R-A1, Sound Control for Fenestration Products.
 - .3 AAMA 501, Methods of Test for Exterior Walls.
 - .4 AAMA 611, Voluntary Specifications for Anodized Finishes Architectural Aluminum.
- .3 ASTM International
 - .1 ASTM A 36/A 36M, Specification for Carbon Structural Steel.
 - .2 ASTM A 123/A 123M, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .3 ASTM A 653/A 653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .4 ASTM B 209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - .5 ASTM B 221, Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - .6 ASTM E 283, Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - .7 ASTM E 330-, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls, by Uniform Static Air Pressure Difference.

- .8 ASTM E 331-00, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference.
- .9 ASTM E 413, Classification for Rating Sound Insulation.
- .10 ASTM E 1105-00, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1.108, Bituminous Solvent Type Paint.
 - .2 CAN/CGSB-12.20, Structural Design of Glass for Buildings.
- .5 CSA International
 - .1 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA S136, North American Specification for the Design of Cold Formed Steel Structural Members.
 - .3 CAN/CSA-S157/S157.1, Strength Design in Aluminum/Commentary on CAN/CSA-S157, Strength Design in Aluminum.
 - .4 CSA W59.2-M1991, Welded Aluminum Construction.
- .6 OBC - Ontario Building Code/Part 4/Paragraph 4.1.5.17 Walls Acting As Guards. All glazing systems to comply to lateral loading. Provide Engineer's certificate.
- .7 OBC-Ontario Building Code SB-10 for Zone 6 for all window units and doors.
- .8 National Fenestration Rating Council, NFRC 100-200, NFRC 200, NFRC 500.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Co-ordination: co-ordinate work of this Section with installation of fire stopping, air barrier placement, vapour retarder placement, flashing placement, and components or materials.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for curtain wall components, anchorage and fasteners, glass and infill, and internal drainage details and include product characteristics, performance criteria, physical size, finish and limitations and water flow diagrams.

- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Indicate system dimensions, framed opening requirements and tolerances, adjacent construction, anchor details anticipated deflection under load, affected related Work, weep drainage network, expansion and contraction joint location and details, and field welding required.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit 1 sample 300 x 400 mm in size illustrating prefinished aluminum surface, finish, colour, texture, specified glass units, insulated infill panels, glazing materials illustrating edge and corner.
- .5 Delegated Design Submittals:
 - .1 Include framing member structural and physical characteristics, calculations, dimensional limitations, special installation requirements.
- .6 Test Reports:
 - .1 Submit substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria, and supportive data.
 - .2 Signed and dated certification from the window manufacturer is required for release of payment for work of this Section

1.5 CLOSEOUT SUBMITTALS

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

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Conform to applicable code for acoustic attenuation, sound transmission, requirements.
- .2 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Supply mock-up including intermediate mullion, corner mullion, sill, muntin, column cover, vision glass light, and insulated infill panel glass and assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.

- .3 Allow 24 hours for inspection of mock-up by Consultant before proceeding with work.
- .4 When accepted, mock-up will demonstrate minimum standard of quality and materials for work of this Section.
- .5 Mock-up may remain as part of finished work.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Handle work of this Section in accordance with AAMA CW-10.
 - .2 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .3 Store and protect aluminum glazed curtain wall components from nicks, scratches, and blemishes.
 - .4 Protect prefinished aluminum surfaces with wrapping or strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
 - .5 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials.

1.8 AMBIENT CONDITIONS

- .1 Install sealants when ambient and surface temperature is above 5 degrees C minimum.
- .2 Maintain this minimum temperature during and for 48 hours minimum after installation of sealants.

1.9 WARRANTY

- .1 Contractor hereby warrants that glazed aluminum curtain wall will function as specified in accordance with CCDC 5B, but for 60 months.

PART 2 - PRODUCTS

2.1 SYSTEMS

- .1 Description:
 - .1 Vertical glazed aluminum curtain wall system includes thermally broken tubular aluminum sections with self supporting framing, shop fabricated, factory prefinished, vision glass, spandrel infill, related flashings, anchorage and attachment devices.
 - .2 Assembled system to permit re-glazing of individual glass (and infill panel) units from exterior without requiring removal of structural mullion sections.
- .2 Performance Requirements:
 - .1 Design and size components to withstand dead and live loads caused by pressure and suction of wind, acting normal to plane of system as calculated in accordance with OBC to a design pressure for Ottawa, Ontario.
 - .2 Design and size components to withstand seismic loads and sway displacement as calculated in accordance with applicable codes.
 - .3 Limit mullion deflection to L/240 with full recovery of glazing materials.
 - .4 Size glass units and glass dimensions to limits established in CAN/CGSB-12.20.
 - .5 Ensure system is designed to accommodate the following without damage to components or deterioration of seals:
 - .1 Movement within system.
 - .2 Movement between system and perimeter framing components.
 - .3 Dynamic loading and release of loads.
 - .4 Deflection of structural support framing.
 - .5 Shortening of building concrete structural columns.
 - .6 Creep of concrete structural members.
 - .7 Mid-span slab edge deflection of 10 mm.
 - .6 Sound attenuation through wall system (exterior to interior): STC 50, measured to AAMA T1R - A1.
 - .7 Limit air infiltration through assembly to $0.0003 \text{ m}^3 / \text{s/m}^2$ of wall area, measured at a reference differential pressure across assembly of 75 Pa as measured in accordance with AAMA 501.
 - .8 Provide $U=.35(\text{i-P})$ or $U=1.99 (\text{SI})$ for all curtain wall sections as per SB-10/Ontario Building Code. Refer to 1.4.6.2 for submission requirements.

- .9 Vapour seal with interior atmospheric pressure of 25 mm sp, 22 degrees C, 40% RH: no failure.
- .10 Water leakage: none, when measured to ASTM E 1105.
- .11 Ensure system allows for expansion and contraction within system components when temperature range is 95 degrees C over 12-hour period without causing detrimental effect to system components.
- .12 Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.
- .13 Maintain continuous air barrier and vapour retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.
 - .1 Position thermal insulation on exterior surface of air barrier and vapour retarder.
- .14 Ensure no vibration harmonics, wind whistles, noises caused by thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system occur.
- .15 Reinforce curtain wall system to accommodate window washing guide rails.
 - .1 Supply sufficiently rigid anchors to resist loads caused by equipment platform, without damage to wall system.

2.2 MATERIALS

- .1 Extruded aluminum: to ASTM B 221.
- .2 Sheet aluminum: to ASTM B 209.
- .3 Sheet steel: to CSA-S136M ASTM A653/A 653M; galvanized in accordance with CAN/CSA G164.
- .4 Steel sections: to CSA G40.20/G40.21 shaped to suit mullion sections.
- .5 Anchors: 3-way adjustable hot-dip galvanized cast iron.
- .6 Fasteners: stainless steel, finish to match curtain wall.
- .7 Bituminous paint: CAN/CGSB 1.108, Type 1, without thinner.
- .8 Vertical glass units: Refer to 08 80 50 Glazing and architectural elevations for glass type and location.
- .9 Fire Safety Materials: see Section 07 84 00 - Fire Stopping.
- .10 Sealant:
 - .1 Perimeter sealant: Refer to Section 07 92 10
 - .2 Sealant used within system (not used for Glazing): Type silicone as recommended by the manufacturer.

2.3 COMPONENTS

- .1 Mullion profile:
 - .1 Vertical members: 64 x 127 mm nominal dimension to suit heights shown. Pressure plate and cap.
 - .2 Horizontal members: 64 x 127 mm nominal dimension to suit spans shown.
 - .3 Thermally broken with interior tubular section insulated from exterior pressure plate.
 - .4 Matching stops and pressure plate of sufficient size and strength to ensure adequate bite on glass and infill panels.
 - .5 Drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system.
 - .6 Internal mullion baffles to eliminate "stack effect" air movement within internal spaces.
- .2 Reinforced mullion: 64 x 127 mm profile of extruded sheet aluminum cladding with internal reinforcement of shaped steel structural section.
 - .1 Acceptable Products:
 - .1 Alumicor 2600
 - .2 Kawneer 1600 UT
 - .2 Compliance: must comply with current SB-10 standard for Zone 6 Metal framing: curtainwall/storefront
- .3 Flashings: 1.5 mm thick galvanized metal, Clear anodized to match existing curtain wall mullion sections where exposed, secured with concealed fastening method. Provide matching end dams at all sills. Fabricate to match coursing.
- .4 Vapour retarder: specified in Section 07 26 00 - Vapour Retarders
- .5 Air barrier: specified in Section 07 27 00 - Air Barriers - Descriptive or Proprietary.

2.4 FABRICATION

- .1 Fabricate system components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- .2 Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof
- .3 Prepare components to receive anchor devices. Install anchors.
- .4 Arrange fasteners and attachments to ensure concealment from

view.

- .5 Prepare system components to receive exterior doors, and hardware specified in Section 08 71 10 Door and Hardware Schedule.
- .6 Reinforce framing members for external imposed loads.
- .7 Visible manufacturer's identification labels not permitted.
- .8 Finishes:
 - .1 Finish coatings: conform to AAMA 611
 - .2 Exterior exposed aluminum surfaces: to AA A41 A42 A43 A44 anodized to 215-R1, 4 mm thickness, prepared with a mechanical M chemical C pre-treatment, anodized to clear colour.
 - .3 Interior exposed aluminum surfaces: to AA A41 anodized to 215-R1, .4 mm thickness, prepared with a chemical C pretreatment, anodized to clear colour.
 - .4 Touch-up primer for galvanized steel surfaces: SSPC 20 Paint zinc rich.
 - .5 Concealed steel items: galvanized in accordance with ASTM A 123 to 600 gm/m².
 - .6 Apply 1 coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

2.5 SOURCE QUALITY CONTROL

- .1 Perform work in accordance with AAMA CW-DG-1, AAMA CWG-1-89. Maintain 1 copy on site.
- .2 Manufacturer qualifications: company specializing in manufacturing the products specified in this section with minimum 5 years documented experience.
- .3 Installer qualifications: company specializing in performing the work of this section with minimum 10 years documented experience approved by manufacturer.
- .4 Design structural support framing components to CAN/CSA-S157 under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the Province of Ontario.
- .5 Perform welding Work in accordance with CSA W59.2.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for aluminum curtain wall installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Consultant.
 - .2 Verify dimensions, tolerances, and method of attachment with other work.
 - .3 Verify wall openings and adjoining air barrier and vapour retarder materials are ready to receive work of this Section.
 - .4 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .5 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

- .1 Install curtain wall system in accordance with manufacturer's instructions.
- .2 Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- .3 Use alignment attachments and shims to permanently fasten system to building structure. Clean weld surfaces; apply protective primer to field welds and adjacent surfaces.
- .4 Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.
- .5 Use thermal isolation where components penetrate or disrupt building insulation.
- .6 Install sill flashings.
- .7 Co-ordinate installation of fire stop insulation, specified in Section 07 84 00 - Fire Stopping, at each floor slab edge and intersection with vertical construction where indicated.
- .8 Co-ordinate attachment and seal of perimeter air barrier and vapour retarder materials.
- .9 Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- .10 Install fire-safing in areas as indicated.
- .11 Install operating sash in accordance with Section 08 80 50 -

Glazing, to glazing method required to achieve performance criteria.

- .12 Install glass and infill panels in accordance with Section 08 80 50 - Glazing, to glazing method required to achieve performance criteria exterior wet/dry method of glazing. Place sealant on the up-slope side of the pressure plate cover caps; finish the surface with a slope to encourage drainage over the cap Cover caps to conceal screws and ensure continuous sightline.
- .13 Install perimeter sealant, backing materials, and installation criteria in accordance with Section 07 92 00 - Joint Sealants.

3.3 SITE TOLERANCES

- .1 Maximum variation from plumb: 1.5 mm/m non-cumulative or 12 mm/30 m, whichever is less.
- .2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.
- .3 Maximum sealant space between curtain wall and adjacent construction: 13 mm.

3.4 FIELD QUALITY CONTROL

- .1 Inspection by independent testing agency will monitor quality of installation and glazing.
 - .1 Test system to: ASTM E 1105, and AAMA 501.
- .2 **Mandatory Manufacturer's Field Services:**
 - .1 Obtain written report from manufacturer of curtain wall and or glass verifying compliance of Work, in handling, installing, applying, protecting and cleaning of products, and submit written reports in acceptable format to verify compliance of Work with Contract within 3 days of review.
 - .2 Submit manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Ensure manufacturer's representative of curtain wall and of glass is present before and during critical periods of installation.
 - .4 Schedule site visits to review Work at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Remove protective material from prefinished aluminum surfaces.
 - .3 Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
 - .4 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.
 - .5 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by glazed aluminum curtain wall installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 45 00 - Quality Control
- .3 Section 01 74 21 - Construction Demolition Waste Management and Disposal
- .4 Section 01 78 00 - Closeout Submittals
- .5 Section 07 92 00 - Joint Sealants
- .6 Section 08 00 00 - Door Schedule
- .7 Section 08 11 00 - Metal Doors and Frames
- .8 Section 08 11 16 - Aluminum Doors and Frames
- .9 Section 08 14 16 - Flush Wood Doors
- .10 Section 08 44 13 - Glazed Aluminum Curtain Walls
- .11 Section 08 50 00 - Windows

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM C 542, Standard Specification for Lock-Strip Gaskets.
 - .2 ASTM D 790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - .3 ASTM D 1003-, Standard Test Method for Haze and Luminous Transmittance of Plastics.
 - .4 ASTM D 1929, Standard Test Method for Determining Ignition Temperature of Plastics.
 - .5 ASTM D 2240, Standard Test Method for Rubber Property - Durometer Hardness.
 - .6 ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - .7 ASTM E 330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - .8 ASTM F 1233, Standard Test Method for Security Glazing Materials and Systems.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-12.1, Tempered or Laminated Safety Glass.
 - .2 CAN/CGSB-12.3, Flat, Clear Float Glass.
 - .3 CAN/CGSB-12.8, Insulating Glass Units.
 - .4 CAN/CGSB-12.8, (Amendment), Insulating Glass Units.
 - .5 CAN/CGSB-12.9, Spandrel Glass.
 - .6 CAN/CGSB-12.10, Glass, Light and Heat Reflecting.
 - .7 CAN/CGSB-12.11, Wired Safety Glass.
 - .8 CAN/CGSB-12.13, Patterned Glass.

- .3 Glass Association of North American (GANA)
 - .1 GANA Glazing Manual.
 - .2 GANA Laminated Glazing Reference Manual - 2009.
- .4 2012 Ontario Building Code
 - .1 Subsection 4.1.5.14 – Loads on Guards
 - .2 SB-13 Glass in Guards.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting 1 week prior to beginning work of this Section and on-site installation, with Contractor's Representative and Consultant in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's written installation instructions and warranty requirements.
- .2 Arrange for site visit with Consultant prior to start of Work to examine existing site conditions.
- .3 Hold project meetings bi-weekly.
- .4 Ensure key personnel site supervisor project manager subcontractor representatives attend.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario Canada.
 - .2 OBC Ontario Building Code Part 4/Paragraph 4.1.5.17 walls acting as guards. All glazing to comply to lateral loadings.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit duplicate 300 mm size samples of framing and sealant material.

- .5 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements for all insulating and spandrel glass sealed unit constructions.
 - .6 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
 - .1 Submit testing and analysis of glass under provisions of Section 01 45 00 - Quality Control.
 - .2 Submit shop inspection and testing for glass.
- 1.5 CLOSEOUT SUBMITTALS
- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.
- 1.6 QUALITY ASSURANCE
- .1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
 - .2 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct mock-up to include glass glazing, and perimeter air barrier.
 - .3 Mock-up will be used:
 - .1 To judge quality of work, substrate preparation, operation of equipment and material application.
 - .4 Locate where directed.
 - .5 Allow 24 hours for inspection of mock-up before proceeding with work.
 - .6 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.
- 1.7 DELIVERY, STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
 - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .3 Storage and Handling Requirements:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

- .2 Store and protect glazing and frames from nicks, scratches, and blemishes.
- .3 Protect prefinished aluminum surfaces with wrapping or strippable coating.
- .4 Replace defective or damaged materials with new.

- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials.

1.8 AMBIENT CONDITIONS

- .1 Ambient Requirements:
 - .1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.
 - .2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Design Criteria:
 - .1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:
 - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
 - .2 Size glass to suit terms of reference as required by the Ontario Building Code.
 - .3 Limit glass deflection to 1/200 with full recovery of glazing materials.
- .2 Flat Glass:
 - .1 Float glass: to CAN/CGSB-12.3, glazing quality thickness as required for pane size.
 - .2 Safety glass: to CAN/CGSB-12.1, transparent, thickness as required to comply with engineering requirements for panel size.
 - .1 Noted as **Type GL-1** on Drawings. Type 1-laminated at all entrances, new sidelights, glazing infills 6mm with interlayer and Gym glazing 4mmTp clear with .060PVB interlayer plus 4mm Top clear . Type 2 tempered only at glazed lights 2400 above grade or higher.
 - .2 Class B-float.
 - .3 Category 11.
 - .4 Edge treatment ground and polished.
- .3 Silvered mirror glass: 6 mm thick.
 - .1 Type 3B- laminated glass for high humidity use.

- .5 Insulating Glass: (Indicated as IGL on Door Schedule Legend 08 00 00)
 - 1 Double insulating glass units: to CAN/CGSB-12.8, double unit, 25mm overall thickness. Thermal Edge low conductivity spacer, colour black, with bent corners, filled with desiccant in two sides, appropriate dimension to obtain a unit thickness of 25.4 mm.
 - .2 Noted as **Type GL-2** on Drawings: Insulating glass unit as per CAN/CGSB-12.8, double unit, 25mm overall thickness.
 - .1 Glass to CAN.CGSB-12.3, outer glass Solarban 70 clear laminated, (2) soft coat Low-E, tempered, inner glass clear laminated.
 - .2 Glass thickness: 6mm each lite (Minimum)
 - .3 Inter-cavity space thickness: 12.5mm with **low conductivity thermal edge spacer**, colour: black
 - .4 Glass coating: surface number 2, soft coat low "E"
 - .5 Inert gas fill: argon
 - .6 Performance:
 - .1 Visible transmittance: 64%
 - .2 Winter U value: 0.24(Argon)
 - .3 Solar heat gain coefficient: 0.27
 - .3 **Type SPG-1**: Spandrel panels to 6mm thick clear tempered with a ceramic frit on surface #2.
 - .1 Colours from glass manufacturers standard colour ranges

2.2 ACCESSORIES

- .1 Setting blocks: neoprene EPDM or silicone, 80-90 Shore A durometer hardness to ASTM D 2240, length of 25 mm for each square meter of glazing minimum 100 mm x width of glazing rabbet space minus 1.5 mm x height or to suit glazing method, glass light weight and area.
- .2 Spacer shims: neoprene or silicone, 50-60 Shore A durometer hardness to ASTM D 2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.
- .3 Glazing tape:
 - .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D 2240; coiled on release paper; black colour.
 - .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2 %, designed for compression of 25 %, to affect an air and vapour seal.

- .4 Glazing splines: resilient silicone, extruded shape to suit glazing channel retaining slot, colour as selected.
- .5 Lock-strip gaskets: to ASTM C 542.
- .6 Mirror attachment accessories:
 - .1 Stainless steel clips concealed.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.
 - .1 Verify that openings for glazing are correctly sized and within tolerance.
 - .2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
 - .3 Visually inspect substrate.
 - .4 Inform of unacceptable conditions immediately upon discovery.
 - .5 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

- .1 Clean contact surfaces with solvent and wipe dry.
- .2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- .3 Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION: EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

- .1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.
- .2 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.
- .3 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.
- .4 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

3.4 INSTALLATION:
INTERIOR - DRY
METHOD (TAPE AND
TAPE)

- .5 Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.
- .6 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line. Place glazing tape on glazing light or unit with tape flush with sight line.
- .7 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.
- .8 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.
- .1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.
- .2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.
- .3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
- .4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.
- .5 Place glazing tape on free perimeter of glazing in same manner described.
- .6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- .7 Knife trim protruding tape.

3.5 INSTALLATION:
MIRRORS

- .1 Set mirrors with clips. Anchor rigidly to wall construction.
- .2 Set in frame.
- .3 Place plumb and level.

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .1 Remove traces of primer, caulking.
 - .2 Remove glazing materials from finish surfaces.
 - .3 Remove labels.
 - .4 Clean glass and mirrors using approved non-abrasive cleaner in accordance with manufacturer's instructions.
 - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 After installation, mark each light with an "X" by using removable plastic tape or paste.
 - .1 Do not mark heat absorbing or reflective glass units.
- .3 Repair damage to adjacent materials caused by glazing installation.

3.8 GLAZING SCHEDULE

- .1 New glazing at Entrances and Club areas. Outer Light Clear with SolarBan 70 (2), Inner Light Laminated Safety Glass 6 mm minimum.
- .2 New glazing in Gym Exterior, Outer Light patterned glass with Bird Strike pattern applied to exterior, SolarBan 70 (2), Inner light laminated safety glass 8mm minimum.
- .3 All interior single glazed lights below 2400 mm AFF all to be laminated safety glass, 6mm minimum.
- .4 All interior single glazed lights above 2400 mm AFF or part of a replacement IGU may be tempered safety glass, 6mm minimum
- .4 All glass pane thickness to be engineered to suit IGU sizes as noted on the Window Schedule.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Louvres and vents to be installed in windows, doors and curtainwall framing.
- .2 Louvre at Roof Screen at cooling tower enclosure.
- .2 Louvres and vents connected to mechanical systems not located in glazing windows and curtain wall framing by Division 15.

1.2 RELATED SECTIONS

- .1 Section 08 44 13 - Glazed Aluminum Curtain Walls
- .2 Section 08 50 00 - Windows
- .3 Division 15

1.3 REFERENCES

- .1 The Aluminum Association Inc. (AAI)
 - .1 AAI DAF-45-2003, Designation System for Aluminum Finishes - 9th Edition.
- .2 Air Movement and Control Association International (AMCA)
 - .1 AMCA 500-D-98, Laboratory Methods of Testing Dampers for Rating.
 - .2 AMCA 500-L-99, Laboratory Methods of Testing Louvers for Rating.
 - .3 AMCA 501-03, Application Manual for Air Louvers.
 - .4 AMCA 511-99(R2004), Certified Ratings Program for Air Control Devices.
- .3 American National Standards Institute (ANSI)
 - .1 ANSI H35.1/H35.1M-06, Alloy and Temper Designation Systems for Aluminum.
- .4 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 167-99(2004), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM A 653/A 653 M-05a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .3 ASTM A 1008/A 1008M-05b, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable.
 - .4 ASTM B 32-04, Standard Specification for Solder Metal.

- .5 ASTM B 209-04, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .6 ASTM B 221-05a, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- .7 ASTM D 523-89(1999), Standard Test Method for Specular Gloss.

- .5 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.213-2004, Etch Primer (Pretreatment Coating of Tie Coat) for Steel and Aluminum.
 - .2 CAN2-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.

1.4 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit WHMIS MSDS - Material Safety Data Sheets
- .3 Shop Drawings:
 - .1 Submit drawings incorporated into window and curtainwall shop drawings.
 - .2 Indicate fabrication and erection details, including anchorage, accessories, and finishes.
- .4 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and.
- .5 Closeout Submittals:
 - .1 Provide operation and maintenance data for manual or motorized operated louvres for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver materials to the site in undamaged condition.

- .2 Storage and Protection:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Protect louvres from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Weather resistant louvres, with insect screens made to withstand a wind load of not less than 1.44 kilopascals.
- .2 Ratings to indicate water penetration of 0.06 kilograms or less per square meter of free area at free velocity of 244 meters per minute.
- .3 Aluminum extrusions: to AA 6063-T5.
- .4 Nails and fasteners: same material as fabricated items.
- .5 Gaskets: vinyl.
- .6 Screens:
 - .1 Insect screens: 0.3 mm diameter aluminum wire 18 x 14 mesh with 60% free area, secured to aluminum frame.
- .7 Extruded aluminum louvers within curtain wall and window framing:
 - .1 Construct louvres from aluminum extrusions of minimum 3 mm thickness to sizes and shapes indicated. Total depth of louver to be 40mm to fit within window frame assembly.
 - .2 Arrange blades, mullions and frame extrusions as indicated.
 - .3 Install concealed vertical stiffeners spaced to meet required loads.
 - .4 Complete louver assembly to have 50 % free area.
 - .5 Acceptable product: Cometal CL-101-45 series, 40mm depth.
- .8 Extruded aluminum louvers at cooling tower roof screen:
 - .1 Construct louvres from aluminum extrusions of

minimum 3 mm thickness to sizes and shapes indicated. Total depth of louver to be 101mm.

- .2 Arrange blades, mullions and frame extrusions as indicated.
- .3 Install concealed vertical stiffeners spaced to meet required loads.
- .4 Install prefinished aluminum blank-off panel behind complete louver area. Louver is for aesthetic treatment and is not a functioning unit.
- .5 Secure louver framing and stiffeners to steel support framing.

2.2 FINISHES

- .1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.
 - .1 Exterior Finish: Typical exterior finish for all exposed surfaces of aluminum components located in aluminum panel or metal siding
 - . Colours to be as follows:
 - Colour 1 (within aluminum panels **PAN-1**): as selected by Architect.
 - Colour 2 (within metal siding **MS-1**): as selected by Architect.
 - .3 Appearance and properties of anodized finishes designated by the Aluminum Association as Architectural Class 1, and Protective and Decorative.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install louvres where indicated in window and curtainwall framing.
- .2 Provide blank of panels for louvre areas outside mechanical ductwork connections. Colour: match louvre colour.
- .3 Attach insect screen to inside face of louvre or vent.
- .4 Repair damage to louvres to match original finish.

3.3 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.4 PROTECTION

- .1 Where aluminum contacts metal other than zinc, paint dissimilar metal with primer and two coats of aluminum paint.
- .2 Paint metal in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

PART 1 - GENERAL

<u>1.1 GENERAL</u>	.1	Conform to requirements of Division 01 as applicable.	
<u>1.2 SUBMITTALS</u>	.1	Samples: Submit for approval the complete range of colours, finishes and material for the various items of work specified herein. Submit in accordance with Section 01 33 00 – Submittal Procedures.	
	.2	Shop Drawings: Submit shop drawings for review in accordance with Section 01 33 00 – Submittal Procedures.	
	.3	Maintenance Data and Operating Instructions: Provide copies of maintenance and operating instructions in accordance with Section 01 77 00 – Closeout Submittals.	
<u>1.3 RELATED SECTIONS</u>	.1	Submittal Procedures	Section 01 33 00
	.2	Wood Blocking	Section 06 10 00

PART 2 - PRODUCTS

2.1 FLOOR GRILLES

- .1 Standard of acceptance: Nuway/ Tuftigard 17 mm double closed charcoal wiper strip. Vestibule 101. Centre and balance size to suit surrounding ceramic tile sizing. 2400mm long x 2100mm wide.
- .2 Grid Frames: AMF-266 – aluminum angle frame 26 mm deep x 28 mm leg. Fill with leveling compound to level of recess suitable to match matte thickness.
- .3 Accurately and rigidly fit together joints and corners. Ensure continuity, with connections that are flush, minimal and weatherproof. Frame corners to be mitered.
- .4 All exposed aluminum surfaces to be Clear Anodized Finish.
- .5 Protect all grilles and frames from construction traffic. Grilles should be stored until completion of project or protected by plywood or other substrate to prevent damages.

<u>3.1 INSTALLATION</u>	.1	Install work securely as indicated and in accordance with shop drawings and manufacturer's instructions.

- .2 Co ordinate slab recess with concrete trade to ensure rough location and depth for aluminum trim frame.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittals
- .2 Section 01 45 00 - Quality Control
- .3 Section 01 61 00 – Common Product Requirements
- .4 Section 01 74 11 - Cleaning
- .5 Section 01 78 00 – Closeout Submittals
- .6 Section 09 22 16 Non-Structural Metal Framing

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 167-2004, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-B651-04, Accessible Design for the Built Environment.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .5 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for toilet partitions or components, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Include overall product dimensions, floor plan, elevations, sections, details and attachments to other work. Include choice of options with details.

	.4	Samples: .1 Submit duplicate 300 x 300mm samples of panel showing finish on both sides, two finished edges and core construction. .2 Submit duplicate representative samples of each hardware item, including brackets, fastenings and trim.
	.5	Quality control submittals: submit following in accordance with Section 01 45 00 - Quality Control. .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and maintenance.
	.6	Closeout Submittals: .1 Provide maintenance and cleaning data for plastic laminate for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
<u>1.4 QUALITY ASSURANCE</u>	.1	Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section and on-site installation, with contractor's representative. .1 Verify project requirements. .2 Review installation and substrate conditions. .3 Co-ordination with other building subtrades. .4 Review manufacturer's installation instructions and warranty requirements. 20 years breakage, delamination or corrosion of solid plastic parts. Not including improper use.
<u>1.5 DELIVERY, STORAGE AND HANDLING</u>	.1	Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
	.2	Protect finished laminated plastic surfaces during shipment and installation. Do not remove until immediately prior to final inspection.
	.3	Waste Management and Disposal: .1 Separate waste materials for reuse and recycling.
<u>PART 2 - PRODUCTS</u>		
<u>2.1 MATERIALS</u>	.1	HDPE Core: High Density Polyethylene resins. Provide smooth material, without creases or ripples. .1 Acceptable materials: .1 Hadrian or Bradley/ Floor to ceiling mounting with high privacy Restroom Partitions. Low Jamb/Sill at doors and 400 below finished ceiling. All BFWC enclosures in

.2 Colour: 2 colours to be selected from manufacturers standard range

.3 Stainless steel sheet metal: to ASTM A 1240 or A 666, 300 series.

2.2 COMPONENTS

.1 Door, panel and pilaster construction: For edges with 15 degree bevel without crown moulding. Finish edges smooth.

.2 Door construction: 1" (25mm) thick. No sight construction

.3 Panel construction: 1" (25mm) thick.

.4 Pilaster construction: 1" (25mm) thick.

.1 Provide pilaster with mechanically fastened leveling bar reinforcement with zinc-plated jack bolt for leveling.

.5 Shoes: 4 inches (102mm) high minimum, Type 304 stainless steel with No. 4 satin brushed finish. Provide concealed retainer clips to attach to pilaster.

.6 Hinges: Self-closing surface mounted through bolted, with gravity cams, adjustable to hold doors open at any angle up to 90 degrees, with emergency access by lifting door strike and keeper, with provisions for emergency access, meeting requirements for accessibility at accessible compartments.

.7 Latch and Keeper: Heavy duty extruded aluminum (6063-T5 alloy) complete with black anodized slide bolt. Surface-mounted slide latch with flat rubber-faced combination door strike and keeper, with provisions for emergency access, meeting requirements for accessibility at accessible compartments.

.8 Coat Hook: Combination hook and rubber-tipped stop, sized to prevent door from hitting compartment-mounted accessories. Provide wall bumper where door abuts wall. Provide formed L-shaped hook without stop at outswing doors.

.9 Door Pull: Standard unit on outside of inswing doors. Provide pulls on both sides of outswing doors.

.11 For privacy purposes mounting brackets for solid plastic partitions to be as follows: full height continuous mounting U-brackets/ stainless steel and full height continuous hinges.

PART 3 - EXECUTION

<u>3.1 MANUFACTURER'S INSTRUCTIONS</u>	.1	Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.
<u>3.2 INSTALLATION</u>	.1	Ensure supplementary anchorage, as required, is in place. Coordinate location of furring with drywall trades.
	.2	Do work in accordance with CSA-B651.
<u>3.3 ERECTION</u>	.1	Partition erection: .1 Install partitions secure, plumb and square. .2 Leave 12 mm space between wall and panel or end pilaster. .3 Anchor mounting brackets to masonry or concrete surfaces using screws and shields: to hollow walls using bolts and toggle type anchors. .4 Attach panel and pilaster to brackets with through type sleeve bolt and nut. .5 Provide for adjustment of floor variations with screw jack through steel saddles made integral with pilaster. Conceal floor fixings with stainless steel shoes. .6 Equip each door with hinges, latch set, and each stall with coat hook mounted on door. Adjust and align hardware for proper function. Set door open position at 30 degrees to front. Install door bumper continuous to pilaster. .7 Equip out swinging doors with door pulls on inside and outside of door in accordance with CSA-B651. .8 Install hardware grab bars.
	.2	Ceiling hung partition erection. Support required for ceiling-hung partitions to be provided by phenolic partition supplier: .1 Attach pilasters to floor with pilaster supports and level, plumb, and tighten installation with leveling device. .2 Secure pilaster shoes in position. .3 Secure headrail to pilaster face with not less than two fasteners per face. .4 Set tops of doors parallel with overhead brace when doors are in closed position.
	.3	Screen erection: .1 Provide urinal stall screens consisting of panel, pilaster as indicated. .2 Anchor screen panels to walls with continuous panel brackets.

3.4 FIELD QUALITY
CONTROL

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

3.5 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 - GENERAL

<u>1.1 Description</u>	.1	This section describes the requirements for furnishing and installing the following: .1 Stainless steel corner guards
<u>1.2 Submittals</u>	.1	Samples: Submit duplicate 300 mm long sample pieces of sheet material in accordance with Section 01 33 00.
	.2	Maintenance Data: Provide maintenance data for resilient flooring for incorporation into Maintenance Manual specified in Section 01 78 00.
	.3	Furnish MSDS sheets or other proof of VOC compliance for adhesives.
<u>1.3 Quality Assurance</u>	.1	Installer Qualifications: Engage an installer who has previously installed corner guards and chair rails similar in material, design and extend to the systems specified for this Project.
<u>1.4 Product Delivery, Storage and Handling</u>	.1	Deliver materials in manufacturer's original, unopened containers with labels indicating brand names, colours and patterns, and quality designations legible and intact.
	.2	Store materials in original undamaged packages and containers inside a well ventilated area protected from weather, moisture, soiling, extreme temperatures and humidity.
<u>1.5 Project Conditions</u>	.1	Environmental Conditions: Do not install corner guards until the space is enclosed and weatherproof and until the ambient temperature within the building is maintained at not less than 70-deg.F for not less than 72 hours prior to beginning of installation.

PART 2 - PRODUCTS

<u>2.1 Stainless Steel Corner Guards</u>	.1	Approved Manufacturers: Hiawatha Inc. "Saf-T-Guard, Koroseal Wall Protection Systems "Koroguard" , Gamco USA or approved equal.
	.2	Material: Stainless steel, complying with AISI Type 304, minimum 16-gauge, No. 4 satin finish.
	.3	Wing Sizes: .1 Corners: 65mm x 65mm x 1100mm high or height as indicated on interior elevations.

- .2 Wall Ends: 65mm x thickness on partitions x 1100mm high, or height as indicated on interior elevations.
- .4 Mounting Method: Double-faced self adhesive foam tape or epoxy adhesive complying with VOC requirements.
- .5 Corner Radius: 1/8 inch.
- .6 Corner Guard Height: As indicated on the interior elevations.
- .7 Provide custom U-shaped wall end guards where indicated.

PART 3 - EXECUTION

3.1 Inspection

- .1 Examine areas and conditions in which corner guards will be installed.
- .2 Complete finishing operations, including painting, before beginning installation.

3.2 Preparation

- .1 Prior to installation, clean substrate to remove dust, debris and loose particles.

3.3 Installation

- .1 Install corner guards plumb and true to line without distortions.

3.4 Cleaning

- .1 Immediately upon completion of installation, clean corner guards in accordance with manufacturer's recommendations.
- .2 Remove excess adhesive using methods and materials recommended by manufacturer.
- .3 Remove surplus materials, rubbish and debris resulting from installation upon completion of work and leave areas of installation in neat, clean condition.

END OF SECTION

PART 1 - GENERAL

<u>1.1 RELATED REQUIREMENTS</u>	.1	Section 01 33 00 - Submittals
	.2	Section 01 45 00 - Quality Control
	.3	Section 01 61 00 - Common Product Requirements
	.4	Section 01 74 11 - Cleaning
	.5	Section 01 78 00 - Closeout Submittals
	.6	Section 10 21 31.19 -Plastic Toilet Compartments
<u>1.2 REFERENCES</u>	.1	ASTM International
	.1	ASTM A 167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
	.2	ASTM B 456-03, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
	.3	ASTM A 653/A 653M-09, 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-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
	.2	CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
	.3	CGSB 31-GP-107MA-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.
	.3	CSA International
	.1	CAN/CSA-B651-04, Accessible Design for the Built Environment.
	.2	CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
<u>1.3 ACTION AND INFORMATIONAL SUBMITTALS</u>	.1	Provide submittals in accordance with Section 01 33 00 - Submittal Procedures. . All products must be one manufacturers line for all WC accessories.
	.2	Product Data:
	.1	Provide manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

	.3	Shop Drawings: .1 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.
	.4	Samples: .1 Submit samples if requested. .2 Samples will be returned for inclusion into work.
<u>1.4 CLOSEOUT SUBMITTALS</u>	.1	Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
<u>1.5 MAINTENANCE MATERIAL SUBMITTALS</u>	.1	Tools: .1 Provide special tools required for 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 Owner.
<u>1.6 DELIVERY, STORAGE AND HANDLING</u>	.1	Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
	.2	Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
	.3	Storage and Handling Requirements: .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area. .2 Store and protect toilet and bathroom accessories from nicks, scratches, and blemishes. .3 Replace defective or damaged materials with new.
	.4	Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

<u>2.1 MATERIALS</u>	.1	Sheet steel: to ASTM A 653/A 653M with ZF75 designation zinc coating.
	.2	Stainless steel sheet metal: to ASTM A 167, Type 304, with satin finish.
	.3	Sustainability Characteristics:
	.1	Laminate Adhesives.
	.1	Urea Formaldehyde Free.
	.4	Stainless steel tubing: Type 304, commercial grade, seamless welded, 1.2 mm wall thickness. Satin Finish
	.5	Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.
<u>2.2 COMPONENTS</u>	.1	Toilet tissue dispenser: double roll type, surface mounted, steel frame, roll under spring tension for controlled delivery. One in B/F W/C , large stalls 5 locations .1 Bobrick B-6977 Recessed Dual Roll-Mounted Toilet Tissue Dispenser. Or .2 Bradley equivalent
	2	Surface double roll toilet tissue dispenser Bobrick B-6867 or Bradley equivalent Stainless Steel or approved equal.
	.3	Surface-mounted Combination towel .1 Cascade C340 (<i>Snelling service provider for BGCO.</i> (Coordinate unit count to be installed)
	.4	Soap dispenser: liquid push-in valve spout, self-contained, <i>Snelling through BGCO service provider.</i> (Coordinate unit count to be installed. One at each lavatory and shower stall.
	.5	Grab bars: 32 mm diameter x 1.6 mm wall tubing of 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 1.3kN applied in all directions. All stainless steel finish. Lengths and angles as per below and as per drawings. Refer to interior elevations for locations in Universal and BF WC stalls and in shower compartments.

- .6 Coat hooks: Frost – Safety Coat Hook 1150 or approved equal.
- .7 Mirrors:
 - 1. Full height Mirror: tempered glass, welded frame. Min. 24" w x 40" high (610 x 1020). ¼" (6mm) tempered mirror glass. One (1) per WC's and one in Universal (with Tilt) and one each in Change Rooms. Refer to drawings for mounting heights. Acceptable product: Bradley 781-2440-2 or equal.
- .8 Sanitary Napkin Disposal: wall or stall mounted, stainless steel, self-closing panel and tumbler lock. One in Universal, one in each WC and in each Change Room/WC Stall.
 - .1 Frost Code 622. Coordinate with Dan Rees for unit count to be installed.
- .10 Shower Seat: hinged or fixed. Designed to carry a load of 1.3kN and not less than 450mm wide x 400mm deep.
 - 1. Bobrick Solid Phenolic Reversible Folding Shower Seat B5191. Or
 - 2. Frost 972.
- .11 Baby Change Station: horizontal, wall-mounted polypropylene cabinet and bed with 01 Gray poly finish.
 - .1 Koala Kare KB 200-05 Granite White Horizontal Surface Mount Mounted Finish Baby Changing Station. One in Universal W/C.

2.3 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 CAN/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.

2.4 FINISHES

- .1 Chrome and nickel plating: to ASTM B 456, **satin finish**.
- .2 Manufacturer's or brand names on face of units not acceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrates and surfaces to receive toilet and bathroom accessories previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to toilet and bathroom accessories installation.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

- .1 Install and secure accessories rigidly in place as follows:
 - .1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.
 - .2 Hollow masonry units, existing plaster or drywall: use toggle bolts drilled into cell or wall cavity.
 - .3 Solid masonry, marble, stone or concrete: use bolt with lead expansion sleeve set into drilled hole.
 - .4 Toilet and shower compartments: use male to female through bolts.
- .2 Install grab bars on built-in anchors provided by bar manufacturer.
- .3 Use tamper proof screws/bolts for fasteners.
- .4 Fill units with necessary supplies shortly before final acceptance

of building.

- .5 Install mirrors in accordance with Section 08 80 50 - Glazing.

3.3 ADJUSTING

- .1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.
- .2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

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

3.6 SCHEDULE

- Review detail interior elevations and plan details for locations and mounting heights. Confirm units to be flush mounted are coordinated with site work to accept units in locations noted
- .1 Locate accessories where indicated on interior elevations and plans and as follows. Exact locations to be reviewed prior to install with Consultant.
- .2 Toilet tissue dispenser: one Universal W/C mounting height 600-700 mm above finished floor. One per WC and stalls.
- .3 Towel dispenser/waste receptacles: one Universal W/C.

Maximum height of dispenser and operable part from floor 1200 mm. BGCO service provider. Coordinate with Dan Rees for unit count to be installed.

- .4 Soap dispenser: one in Universal W/C. Maximum dispensing height of 1200mm AFF. One per WC room and lavatory location. One (1) per sink location in Kitchen areas. BGCO service provider. Coordinate with Dan Rees for unit count to be installed.
- .5 Grab bar:
 - a. Universal W/C and Change Room BF Stalls: One L-shaped with 760mm long horizontal and vertical components mounted with the horizontal component 750mm to 900mm AFF and vertical component 150mm from the front of the toilet bowl, and one 600mm long mounted horizontally on the wall behind the water closet from 840mm to 920mm AFF. Or as otherwise detailed on drawings.
- .6 Soap dispenser: one at each shower. Maximum height from floor 1200 mm. BGCO service provider. Coordinate with Dan Rees for unit count to be installed.
- .7 Coat/Robe hook:
 - a. Two in each shower stall: one outside shower mounting height 1400 mm AFF on wall, one above bench at 1800mm AFF.
 - b. Two in each change stall, one at 1200mm AFF and one at 1800mm AFF.
 - c. One on back of each WC Room and Universal door at 1200mm AFF (Universal) and 1500 mm AFF (WC doors)
- .8 Shower Seat: 450 AFF, with rear edge 65mm from wall and within 500mm of shower controls.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 35 30 – Safety Requirements
- .3 Section 01 45 00 – Quality Control
- .4 Section 01 56 00 – Temporary Barriers and Enclosures
- .5 Section 01 61 00 – Common Product Requirements
- .6 Section 01 71 00 – Examination and Preparation
- .7 Section 01 73 00 – Execution
- .8 Section 01 74 11 – Cleaning

1.2 REFERENCES

- .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 422-632002, Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D 698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .5 ASTM D 1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³).
 - .6 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.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
 - .2 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .4 Geotechnical Report: EXP Services Inc., Report No. OTT-00018293-J5, March 5, 2101 shall take precedent over any paragraph of this Section.

1.3 DEFINITIONS

- .5 A current ESA 2 Site Specific Report by EXP will note quality of as found fill materials. Coordinate with Lundy for removal and location of transported materials to disposal site.

- .1 **Excavation classes:** two classes of excavation will be required common excavation and unclassified excavation.

.1 **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 **Rock Excavation** is any rock larger than 1.5 m3 and will be the definition if encountered on site

- .2 **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 25 millimeters in any dimension.

- .3 **Waste material:** excavated material unsuitable for use in Work or surplus to requirements.

- .4 **Borrow material:** material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

- .5 **Recycled fill material:** material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

- .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-8.1.

.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.

.4 Notify Geotechnical Engineer of any suspect materials and comply with site recommendations where requested.

1.4 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Inform Engineer at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.

1.5 QUALITY ASSURANCE

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.
- .2 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.
- .2 Divert contaminated excavated materials to partner landfill location as directed by Lundy.

1.7 EXISTING CONDITIONS

- .1 Examine soil report included herein.
- .2 Buried services:
 - .1 Before commencing work verify and establish location of buried services on and adjacent to 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.
 - .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .5 Prior to beginning excavation Work, notify applicable Engineer authorities having jurisdiction establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
 - .6 Confirm locations of buried utilities by careful test excavations.

- .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered and as indicated.
- .8 Where utility lines or structures exist in area of excavation, obtain direction of Engineer before removing or re-routing. Costs for such Work to be paid by Owner.
- .9 Record location of maintained, re-routed and abandoned underground lines.
- .10 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
 - .1 Conduct, with Engineer, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
 - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed.
 - .3 Where required for excavation, cut roots or branches as directed by Consultant.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 OPSS Granular B Type II conforming to OPSS 1010 as non-frost susceptible backfill. Under slab on grade and footings, backfill in footing trenches and against foundation walls, backfill in service trenches inside building. Approved recycled materials may be used for under slab fill and fill in foundation areas.
- .2 OPSS Granular B Select Subgrade Material (SSM) conforming to OPSS 1010. Exterior service trenches or subgrade fill.
- .3 OPSS Granular A conforming to OPSS 1010, Asphalt areas
- .4 Site materials are acceptable for re-use as fill. Coordinate with Exp and Lundy to confirm extent, handling and placement following removal and stockpiling on site.
- .5 Unshrinkable fill: proportioned and mixed to provide:
 - .1 Maximum compressive strength 0.4 MPa @ 28 days.
 - .2 Maximum Portland Cement content of 25 kg/m³ to CAN/CSA - A3000 - A 5, Type 10.
 - .3 Minimum strength 0.07 MPa @ 24 hours.
 - .4 Concrete Aggregate to CAN/CSA-A23.1.
 - .5 Portland Cement / Type 10.
 - .6 Slump 160 to 200mm.

- .6 Pavement Areas: refer to Geotechnical Report for granular fill profiles, asphalt thicknesses and compaction densities.
- .7 Geotextiles: as required and noted in Geotechnical Report. Geotextiles may be required if rockfill is used for the bulk engineered fill, during the installation of site services and in pavement construction.
- .8 Refer to EXP Services Inc. Geotechnical Report captioned above for specific material type, compaction and lifts.

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 PREPARATION/ PROTECTION

- .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 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.
- .4 Protect buried services that are required to remain undisturbed.

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- .5 Bottom of excavations / surface of native soil should be proof-rolled with a heavy smooth-drum vibratory roller as part of subgrade preparation. Dewatering may be required.
- 3.4 STOCKPILING .1 Stockpile fill materials in areas designated.
.1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
- 3.5 COFFERDAMS, SHORING, BRACING AND UNDERPINNING .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Health and Safety Act for the Province of Ontario
.1 Where conditions are unstable, Engineer to verify and advise methods.
- .2 Obtain permits from authority having jurisdiction.
- .3 Construct temporary Works to depths, heights and locations as required.
- 3.6 DEWATERING AND HEAVE PREVENTION .1 Keep excavations free of water while Work is in progress. Refer to recommendations in the EXP Services Inc. Geotechnical Report.
- .2 Provide details of proposed dewatering or heave prevention methods. Follow recommendations in the EXP Services Inc. Geotechnical Report.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
.1 Prevent piping or bottom heave of excavations by groundwater lowering in advance of excavating.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water in runoff areas and in manner not detrimental to public and private property, or portion of Work completed or under construction.
.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
- .6 A Permit-to-Take-Water would be required prior to lowering the groundwater level to permit excavations below the water table as per geotechnical report.

3.7 EXCAVATION

- .1 Remove concrete, masonry, paving, walks demolished foundations and rubble and unselected fill material and any other obstructions encountered during excavation.
- .2 Excavation must not interfere with bearing capacity of adjacent foundations.
- .3 Excavations into the bedrock should be avoided due to its high hydraulic conductivity.
- .4 Do not disturb soil within branch spread of trees or shrubs that are to remain.
 - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .5 For trench excavation, unless otherwise authorized by Engineer in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .6 Keep excavated and stockpiled materials and large boulders safe distance away from edge of trench.
- .7 Restrict vehicle operations directly adjacent to open trenches.
- .8 Dispose of surplus and unsuitable excavated material off site.
- .9 Earth bottoms of excavations to be inspected by Geotechnical consultant to confirm undisturbed soil, level, free from loose, soft or organic matter. Bottom of excavations/surface native soil should be proof-rolled with a heavy smooth-drum vibratory roller as part of sub-grade preparation. De-watering may be required.
- .10 Bottom of excavations / surface of native soil should be proof-rolled with a heavy smooth-drum vibratory roller as part of subgrade preparation. Dewatering may be required.
- .11 Notify Engineer when bottom of excavation is reached.
- .12 Obtain Engineer approval of completed excavation and bearing capacity.
- .13 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Engineer.

- .14 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with concrete specified for footings or as directed by the Geotechnical consultant.
 - .2 Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.
- .15 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.
- .16 Install geotextiles in accordance with Geotechnical Report.

3.8 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 Engineered fill under the slab-on-grade area and footings OPSS 1010 Granular B Type II placed in 300 mm thick lifts and each lift compacted to 98 and 100 percent SPMDD respectively. Approved recycled products may be used.
 - .2 Backfill in footing trenches and against foundation walls – OPSS 1010 Granular B Type II placed in 300 mm thick lifts and each lift compacted to 98 percent of the SPMDD inside the building and 95 percent SPMDD outside the building respectively. Approved recycled products may be used.
 - .3 Backfill in services trenches inside building – OPSS 1010 Granular B Type II placed in 300 mm thick lifts and each lift compacted to 98 percent of the SPMDD.
 - .4 Backfill in exterior services trenches or subgrade fill– OPSS 1010 Select Subgrade Material (SSM) placed in 300 mm thick lifts and each lift compacted to 95 percent of the SPMDD or on-site approved excavated material as noted above. Trench backfill and subgrade fill, select on-site material free of organics, boulders and cobbles and following further sampling and testing during construction.

3.9 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Place and compact granular material for bedding and surround of underground services as indicated and as specified with 150 mm bed of Type 3 fill to spring line of pipe. Cover from spring line to at least 300mm above pipe invert. Place in 300 mm lifts and compact to 95% of Standard Proctor Maximum Dry Density.

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- .2 Place bedding and surround material in unfrozen condition.
- 3.10 BACKFILLING .1 Do not proceed with backfilling operations until completion of following:
- .1 Engineer has inspected and approved installations.
 - .2 Engineer 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.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 300 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer to 95% of Standard Proctor Maximum Dry Density.
- .5 Backfilling around installations:
- .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed .3 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 Engineer or:
 - .2 If approved by Engineer, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Engineer.
- .6 Install drainage system in backfill as indicated.
- 3.11 RESTORATION .1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Consultant.

- .2 Install topsoil to grade and thickness noted on landscape drawings and specifications.
- .3 Reinstall lawns to elevation which existed before excavation.
- .4 Reinstall pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .5 Clean and reinstall areas affected by Work as directed by Consultant.
- .6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.
- .7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Materials and installation for foundation and under slab drainage.
- 1.2 RELATED SECTIONS .1 Geotechnical Investigation: EXP Services Inc., Report No. OTT-00018293-J5, March 5, 2101, shall take precedent over drawings and other specifications.
- .2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- 1.3 REFERENCES .1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM D 698-07E1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .2 Canadian Standards Association (CSA International)
- .1 CSA B1800-02, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).
- .1 CSA B182.2-02, PVC Sewer Pipe and Fittings (PSM Type).
- .3 Geotechnical Reports as listed above and prepared by EXP Services Inc. establishes all requirements for backfill, bedding and installation and compaction of fill material for this project.
- 1.4 WASTE MANAGEMENT AND DISPOSAL .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Divert unused metal materials from landfill to metal recycling facility for disposal.
- .4 Divert unused geotextiles from landfill to plastic recycling facility for disposal.
- .5 Place materials defined as hazardous or toxic in designated containers.
- .6 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

<u>1.5 SITE CONDITIONS</u>	.1	Examine sub-surface investigation report which is bound into specification.
	.2	Known underground utility lines and buried objects are as indicated on plans.
	.3	Contractor to confirm location of utility lines on site with Authorities Having Jurisdiction.

PART 2 - PRODUCTS

<u>2.1 BEDDING AND SURROUND MATERIALS</u>	.1	Coarse filter aggregate: to CSA-A23.1/A23.2, 150mm on all sides of pipe with 10mm clear crushed stone placed around the exterior perimeter.
	.2	Fine filter aggregate: to OPSS Granular A.
	.3	Flexible plastic tubing and fittings. Corrugated Perforated nominal inside diameter 150 mm. Set on footings.
	.4	Rigid plastic pipe and fittings: to CSA-B182.1, size NPS 6, complete with fittings.
	.5	Geotextile filter: as required by Geotechnical Report.

<u>2.2 BACKFILL MATERIAL</u>	.1	In accordance with and as indicated in the Geotechnical Report, Page 14. 150 mm of peas gravel and 300 mm of CSA Concrete Aggregate.
	.2	Excavated or graded material existing on are suitable to use.

<u>2.3 PAVEMENT STRUCTURE DRAINAGE</u>	.1	Refer to Geotechnical Reports prepared EXP Services Inc. for requirements at catch basins in asphalt areas.

PART 3 - EXECUTION

<u>3.1 EXAMINATION</u>	.1	Ensure graded subgrade and sub-base conforms with required drainage pattern before placing bedding material.
	.2	Ensure improper slopes, unstable areas, areas requiring additional compaction or other unsatisfactory conditions are corrected to approval of Engineer.
	.3	Ensure foundation wall rigid insulation have been installed and approved by Engineer and Consultant before placing bedding

material.

3.2 BEDDING
PREPARATION

- .1 Cut trenches in subgrade and base and place bedding materials in uniform layers not exceeding 150 mm compacted thickness to depth of 150mm
- .2 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.
- .3 Shape transverse depressions, as required, to suit joints.
- .4 Compact each layer full width of bed to at least 95% Standard Proctor Maximum Dry Density
- .5 Fill excavation below design elevation of bottom of specified bedding with compacted bedding material or common backfill.

3.3 PIPE OR TUBING
INSTALLATION

- .1 Ensure pipe interior and coupling surfaces are clean before laying.
- .2 Lay perforated pipe minimum to slope of 1:100 or as indicated. For pipe face perforations and coupling slots downward.
- .3 Lay non-perforated pipe to slope of 1:50 from perforated pipe to disposal area. Make joints watertight.
- .4 Grade bedding to establish pipe slope.
- .5 Install end plugs at ends of collector drains to protect pipe ends from damage and ingress of foreign material.
- .6 Connect non-perforated pipe to storm sewer by appropriate adapters manufactured for this purpose.
- .7 Provide cleanouts on non-perforated pipe at changes of pipe direction and in runs greater than 15 m.
- .8 Provide flush cleanouts where directed by Engineer.
- .9 Connect drainage system to building storm sewers, as indicated.

3.4 PIPE OR TUBING
SURROUND MATERIAL

- .1 Upon completion of pipe laying and after Engineer has inspected Work in place, surround and cover pipe and install geotextile filter as indicated.
- .2 Hand place surround material in uniform layers not exceeding

150 mm compacted thickness, as indicated. Do not drop material within 1.0 m of pipe.

- .3 Place layers uniformly and simultaneously on each side of pipe.
- .4 Compact each layer from pipe invert to mid-height of pipe to at least 95% Standard Proctor Maximum Dry Density
- .5 Compact each layer from mid-height of pipe to underside of backfill to at least 90% Standard Proctor Maximum Dry Density

3.5 BACKFILL MATERIAL

- .1 Place backfill material above pipe surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
- .2 Under paving and walks, compact backfill to at least 100% Standard Proctor Maximum Dry Density

END OF SECTION